

Journal of Physical Activity & Health

The official journal of the International Society for Physical Activity and Health

Volume 15 • Supplement 1 • October 2018

7th International Society for Physical Activity and Health Congress

London, England

15–17 October 2018

Contents

Symposia: Monday 15 October	S1
Symposia: Tuesday 16 October	S9
Parallel Oral Sessions: Monday 15 October	S16
Parallel Oral Sessions: Tuesday 16 October	S42
Parallel Oral Sessions: Wednesday 17 October	S67
Oral ePosters.....	S91
ePosters	S169

7th ISPAH Congress Committees

Organising Committee

Co-Chairs

Dr Michael Brannan, *National Lead for Physical Activity, Public Health England*

Dr Karen Milton, *Lecturer in Public Health, University of East Anglia*

Sarah Ruane, *Strategic Lead—Health, Sport England*

Members

Beelin Baxter, *Senior Policy Manager, Department of Health and Social Care*

Dr Nick Cavill, *Director, Cavill Associates*

Anna Chalkley, *Postdoctoral Researcher, Loughborough University*

Nick Clarke, *Physical Activity Programme Manager, Public Health England*

Dr Catherine Draper, *Senior Research, University of the Witwatersrand*

Suzie Gittus, *Senior Programme and Relationship Manager, Tackling Inactivity, Sport England*

Dr Sjaan Gomersall, *Lecturer in Physiotherapy, The University of Queensland*

Dr Steve Harris, *NCSEM Programme manager, Loughborough University*

Dr Sonja Kahlmeier, *Senior Researcher, Head of Unit, University of Zurich*

Jacqueline Mair, *Lecturer, Edinburgh Napier University*

Professor Marie Murphy, *Dean of Postgraduate Research and Director of the Ulster University Doctoral College, Ulster University*

Anushka Naidoo, *Communications Officer, Public Health England*

Zjan Shirinian, *Head of Editorial and Content, Sport England*

Rachel Weeden, *7th ISPAH Congress Manager, Public Health England*

Scientific Advisory Committee

Co-Chairs

Dr Charlie Foster, *Reader in Physical Activity and Public Health; Director of MPhil/PhD Research; UK Chief Medical Officers Expert Committee for Physical Activity, University of Bristol; President 2017-2018, International Society for Physical Activity and Health*

Andrew Spiers, *Strategic Lead—Data and Market Innovation, Sport England*

Members

Dr Nana Anoke, *Director of Research, Department of Clinical Sciences, Brunel University London*

Dr Laurence Carmichael, *WHO Collaborating Centre for Healthy Urban Environments, University of the West of England*

Nick Clarke, *Physical Activity Programme Manager, Public Health England*

Professor Robert Copeland, *Director, National Centre for Sport and Exercise Medicine, Sheffield Hallam University*

Professor Diane Crone, *Professor of Exercise Science, University of Gloucestershire*

Professor Joan L Duda, *Professor of Sport and Exercise Psychology, School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham*

Dr Benjamin Gardner, *Senior Lecturer, King's College London*

Professor Mark Hamer, *Professor of Exercise as Medicine, Loughborough University*

Dr Melvyn Hillsdon, *Associate Professor, University of Exeter*

Dr Ruth Hunter, *Lecturer, Queen's University Belfast*

Professor Russ Jago, *Professor of Paediatric Physical Activity and Public Health, University of Bristol*

Professor Tess Kay, *Dean of Research, Brunel University London*

Professor Mark Lewis, *Professor of Musculoskeletal Biology and Dean The School of Sport, Exercise and Health Sciences, Loughborough University*

Dr Jacqueline Mair, *Lecturer, Edinburgh Napier University*

Dr Karen Milton, *Lecturer in Public Health, University of East Anglia*

Marie Murphy, *Dean of Postgraduate Research; Director Ulster University Doctoral College, Ulster University*

Dr Niamh Murphy, *Lecturer and Researcher, Waterford Institute of Technology*

Professor Nanette Mutrie, *Chair in Physical Activity for Health; Director of PAHRC, University of Edinburgh*

Professor Harry Rutter, *Professor of Global Public Health, University of Bath*

Professor Brett Smith, *Head of Research, University of Birmingham*
Dr Afroditi Stathi, *Reader in Active Ageing Promotion, University of Birmingham, United Kingdom*

Professor Gareth Stratton, *Deputy Pro-Vice Chancellor Physical Activity, Sport, Health and Well Being; Deputy Head of College; Head of School Sport and Exercise Sciences, Swansea University*
Rachel Weeden, *7th ISPAH Congress Manager, Public Health England*

Dr Katrien Wijndaele, *Senior Investigator Scientist, MRC Epidemiology Unit, University of Cambridge*

Symposia: Monday 15 October

Session: Acting locally to promote activity-friendly environments globally: Leveraging citizen science to foster health equity

Utilising the Our Voice citizen science model to support and promote active environments at schools and universities in Colombia, New Zealand, South Africa, and the USA

Erica Hinckson¹, Margaret Schneider², Olga Sarmiento³, Estelle Lambert⁴, Camilo Triana³, Ann Banchoff⁵, Sandra Winter⁵, Abby King⁵

¹Auckland University of Technology ²University of California, ³Universidad de los Andes, ⁴University of Cape Town, ⁵Stanford University

Introduction: Evidence worldwide suggests that the built environment must be reshaped to improve and sustain engagement in physical activity across communities to secure associated health benefits. *Our Voice*, an evidence-based community participatory approach, was used to directly engage school staff and students as “citizen scientists” in assessing their physical activity and food environments.

Methods: Through the *Our Voice* process of Discovery, Discussion, Activation and Change, citizen scientists analyse their own data, create realistic action plans, and engage with local stakeholders to advance activity-supportive changes in their educational environments. To enable useful, standardized data collection, citizen scientists used a simple GPS-enabled mobile app capable of collecting geocoded visual and auditory data about walking routes and relevant environmental features.

Results: The *Our Voice* framework is being utilised in educational settings in four international regions: Bogotá Colombia, Auckland, New Zealand, Cape Town, South Africa, and Irvine and Santa Clara County, CA, USA. Each citizen scientist used the mobile app to identify environmental features that hindered or facilitated physical activity and food environments, or that influenced choice of stairs versus elevators. In group discussions, citizen scientists reviewed their collected data, prioritized issues, and generated practical solutions with relevant stakeholders. Major qualitative and quantitative data from each project will be presented.

Conclusion: These *Our Voice* projects have been successful in generating direct student, parent, staff, and stakeholder engagement in developing realistic environmental and policy solutions in differing school contexts and populations.

External funding details: Robert Wood Johnson Foundation Grant-ID#73344

Employing the Our Voice citizen science model to support age- and activity-friendly communities in Chile, Brazil, Canada, England, and USA

Afroditi Stathi¹, Nicolas Aguilar-Farias², Michelle Porter³, Diane King⁴, Ann W Banchoff⁵, Sandra J Winter⁵, Abby C King⁶

¹University of Bath, ²Departamento de Educación Física, Deportes y Recreación, Universidad de La Frontera, ³University of Manitoba, ⁴Center for Behavioral Health Research and Services, Institute of Social and Economic Research, University of Alaska, ⁵Stanford Prevention Research Center, Stanford University, ⁶School of Medicine, Stanford University

Introduction: Engaging older people as citizen scientists may empower them to become agents of change and improve the age- and activity-friendly features of their communities.

Methods: The four principles of the Our Voice model—Discover, Discuss, Evaluate, Change—guided the design of citizen science projects in four countries. These programmes employed a range of objective (accelerometers, GIS and GPS systems) and subjective (quality of life, built and natural environment evaluation) data collection methods. The innovative mobile application, the Stanford Healthy Neighborhood Discovery Tool, which enables citizens to document local environmental features through geo-referenced photographs, audio narratives and walking routes, was employed in each project.

Results: All projects recruited older people in a wide range of settings, including towns, cities, and university campuses. They were actively involved in discovering environmental features influencing active ageing in their communities, analysing their collected data, and discussing their research findings. This approach led to an in-depth evaluation of how age-friendly their communities are and in some cases initiated active collaborations with key policy makers and service providers to introduce changes in their local environments which could enhance their age- and activity-friendly profile. Key qualitative and quantitative data from each project will be summarised and presented.

Conclusion: Employing the *Our Voice* model in community-level initiatives worldwide through engaging older people as citizen scientists to advance relevant data collection and local advocacy is a promising strategy for supporting communities in becoming more age- and activity-friendly.

External funding details: Robert Wood Johnson Foundation Grant - ID#73344

Acting locally while thinking globally to promote physical activity, address inequalities and achieve population change

Sandra Winter¹, Lisa Rosas², Matthew Buman³, Jylana Sheats⁴, Deborah Salvo⁵, Randi Garber⁶, Olga Lucia Sarmiento⁷, Bonnie Broderick⁸, Ann Banchoff², Abby King²

¹SPRC, ²Stanford University, ³Arizona State University, ⁴Tulane University, ⁵University of Texas, Texas Medical Center, ⁶JDC Israel Eshel, ⁷Universidad de los Andes, ⁸Santa Clara County Public Health Department

Acting locally while thinking globally facilitates the application of lessons learned from a variety of settings to address inequalities and achieve population change. The *Our Voice* (OV) Global Network fosters the implementation and dissemination of evidence-based approaches to promote physical activity (PA) by expanding the reach of community-engaged research and optimizing its impacts. *OV* Network members work collaboratively with community resident “citizen scientists” who use a simple mobile app (the Discovery Tool) to document aspects of their community that impact PA; meet with other citizen scientists to discuss their findings and agree on priorities for action; present their data to local decision-makers; and advocate for positive changes in local environments. This presentation will highlight *OV* Global Network projects that target improvement of neighborhood environments to better support PA. USA projects include inter-generational groups of Latino residents working to increase neighborhood walkability; efforts to promote park access and usage in under-resourced areas; African-American women conducting

walkability assessments across multiple urban areas to inform community improvement plans; and open-street evaluations. The Discovery Tool has been translated into 7 languages and the OV model has been adapted for use in Chile, Colombia, Israel, South Africa, Taiwan, China, Mexico, Brazil, Australia, New Zealand, Canada, and the U.K. The Network is committed to building a scientific road map; identifying and sharing measurement tools to track impact; coordinating cross-site comparisons; and generating, refining, and disseminating best practices. Network processes and outcomes will be reviewed.

External funding details: Robert Wood Johnson Foundation Grant-ID#73344

Session: Adapted, adaptive and adapting physical activity

Higher education in Europe on ‘adapted, adaptive and adapting physical activity’

Aija Klavina, Latvian Academy of Sport Education

While Physical Education is a compulsory part of education in most European countries, there is high variability across Europe in amount of allocated teaching hours for PE, the approach to curricula, and the competencies of PE teachers. While students with disabilities are included in general education settings with growing frequency across Europe, there is a lack of guidelines related to functions, knowledge, and skills for APE professionals who work with school-aged students with SEN.

Two large-scale European projects were implemented during the last decade that defined the APA in higher education in Europe. The Thematic European Network on Adapted Physical Activity involved more than 30 experts from 28 EU countries, while the European Standards in APA (EUSAPA) project (2008-2010) involved more than 20 APA experts from 10 EU countries.

Two international study programs in Europe offer specializations in APA. The first is the International Master in Adapted Physical Activity (IMAPA), a two-year Master's program (120 credits) offered jointly by the organizing universities and associate partners. The IMAPA aims to educate students for both professional careers and in a specialized discipline. The second international program, the European University Degree in Adapted Physical Activity (EUDAPA), is located at the Haaga-Helia University of Applied Sciences (Finland).

The development of a global policy implementation framework (G-PIF) to support UNESCO's International Charter of Physical Education, Physical Activity and Sport (2015).

Niamh Elizabeth Mourtou, UNESCO Chair in Inclusive PE Sport Recreation and Fitness, Institute of technology, Tralee

UNESCO's Charter (2015) engages in a comprehensive manner the need to explore the arena of physical education, physical activity and sport (PEPAS) more fully and inclusively. Literature suggests that in totality, there has been very little analysis of policy in this field and much of this research regarding this especially relates to doping, harassment and violence (Houlihan, 2005). Furthermore, the specific mention of disability and inclusion in policies related to PEPAS is very limited.

To ensure global coverage and a magnitude of relevant data generated across a range of sources, we proposed a multi-method and pluralistic qualitative approach to data collection and analysis for this study. This paper presents the core aims of this research around reviewing the main policy monitoring parameters: legislation, national policy strategies and plans, with focus on input, output, outcome and indicators, self-evaluation

and other assessment tools/initiatives; in particular with reference to people with disabilities and/or the inclusion of people with disabilities. The research focus on the views of those involved at a policy and practitioners level within the field of PEPAS will also be discussed. These views are inclusive of policy to practise (and vice versa), as well as views on the actual implementation of the UNESCO Charter (2015). It will also highlight the development of a policy implementation framework for policy makers and practitioners to help bridge the perceived gap between policy and practice in this field.

Protocol for converting physical activity surveys for children with special needs

Kwok Ng¹, Niko Leppä², Piritta Asunta², Pauli Rintala²

¹University of Limerick, ²University of Jyväskylä

National self-report physical activity and health surveys have been informing health promotion practices, public health policies and driving interventions for several decades. Until recently, the majority of surveys excluded children with disabilities and according to the UN convention on the rights of persons with disabilities, such actions breaches those rights (Article 31). It can be challenging to create a universal study design that enables all children to take part. Hence, a set of transformative procedures are needed to allow all children to participate in such important studies.

Several existing survey packages (Health Behaviour in School-aged Children – HBSC; Finnish School-aged Physical Activity (SPA) study; Washington Group and UNICEF Child Functioning Module) were combined and adapted for use amongst children with disabilities. Two rounds of pre-pilot testing as well as a larger pilot study were conducted.

The survey packages were refined (HBSC – 121 questions, SPA – 60 questions; 29 items overlapped). In pre-test 1, 19 pupils (11-15 y old) from a special school answered the questions without complications, but the survey was took too much time. A panel met select 40 questions and was tested on 5 different pupils (14 y old). The time it took to complete the questionnaire ranged between 15-30 minutes. The pilot test included visual images.

Creating modifications of self-reported surveys for children with disabilities was an important step towards a universal design that gives the possibility for all children to take part in surveys. There are differences in to take in account when creating the modifications.

External funding details: Ministry of Education, Finland

Research ‘with’ not ‘on’: Using participatory research to explore sport and physical activity with young people who have Learning Disabilities

Janine Coates, Peter Harrison Centre for Disability Sport, Loughborough University

Children and young people with learning disabilities are underrepresented in research relating to sport and exercise. This, in part, is due to the perceived difficulties of including this population in research using traditional methods of data collection, leading to the experiences of these children and young people being recounted by those who support and care for them (parents, teachers, etc) rather than the young people themselves. Innovative research methods, such as participatory research, presents an opportunity to engage young people with a range of support needs to engage meaningfully in research. This paper presents reflections from one such piece of research. Adopting the Mosaic Approach (Clark & Moss, 2011), the study engaged five young people, aged 17-19 years of age, at a special school in England in a co-produced piece of research developed over an eight week period. This paper will consider the importance of

direct consultation with young people with learning disabilities in the development of research questions and methods. It will also highlight some of the barriers to inclusive sport outside of school and consider the role of schools and families in supporting physical activity participation for children and young people with complex needs.

Adaptation of the NETFIT® to children with intellectual disabilities and other declared psychological developmental disorders

Anita Kir ly, Mónika Kaj, Katalin Kälbli, Tamás Csányi, Hungarian School Sport Federation

Introduction: From the school year 2014/2015, implementation of the Hungarian National Student Fitness Test (NETFIT®) was mandatory in all schools in Hungary. It was developed to examine the health-related fitness of typically developing children (TDC). The application of the battery was difficult for students with special educational needs (SEN). The purpose of this nationally representative research (on students with mild intellectual disability (MID) and other declared psychological developmental disorders (ODD)) was to evaluate the applicability and reliability of the NETFIT® test in the given population.

Methods: 10-18 year-old children with MID (N=429) and ODD (N=440) were investigated, with no other disabilities, cardiovascular problems affecting motor activity or orthopedic lesions. NETFIT® was assessed and the healthy fitness zone (HFZ) achievement rates were compared for TDC, children with MID and ODD. The correlation between the results and IQ was analyzed.

Results: Both students with MID and ODD had lower levels of HFZ achievement rates than TDC based on the existing health standards for the musculoskeletal fitness tests. The percentile ranks of the standards in musculoskeletal test were on average 20 percentile lower than those measured for the TDC. The results show a significant negative correlation between the standing broad jump test and IQ, for children with MID ($r = -0.213$, $p < 0.05$).

Conclusion: Based on the experience of the study it can be stated, that the adaptation and revision of the standards was necessary to realistically evaluate the fitness status of children with SEN and therefore establish a health-related fitness assessment for this population.

Session: Are all METs the same? The role of posture, intensity, time-pattern, domain and measurement of physical activity for health

How important is the intensity of physical activity for population health gains?

Emmanuel Stamatakis, University of Sydney

Despite the increasing public health focus on the lower end of the physical activity spectrum there has been a resurgent scientific and general public interest on higher intensities. Self-reported epidemiological literature has paid relatively little attention to the role of intensity when total activity volume is held constant. Further, self-reported measures of intensity has been a limiting factor because of the inability of such measures to capture potentially health enhancing short and sporadic higher intensity bouts. Questionnaires rarely capture incidental higher exertion activities such as stair climbing. Advanced measurement technologies employing motion sensors that are already implemented in large cohort studies allow both objective characterisation of short bouts of any activity intensity and pattern recognition. Grounded on past, recent, and current epidemiological studies, this presentation will discuss physical activity intensity in relation to population health outcomes. The

differential role of intensity in the occupational and recreational domains will also be explored.

Posture versus movement: Can we stand it? Or should we be sitting?

Pieter Coenen, VU University Medical Center

There is a growing body of evidence suggesting that exposure to excessive sitting is associated with a number of chronic diseases. As a result of this, office workers have recently been encouraged to replace sitting with standing during their work day. There is a general perception that metabolic equivalents are the main driver of physical activity related health effects. According to this notion of “the more, the healthier” one would indeed expect health benefits from replacing sitting with standing.

On the other hand, however, there is evidence showing excessive standing to be associated with several adverse health outcomes. Based on this evidence, standing has been recognised as an occupational hazard, and workers exposed to excessive standing have for example been provided perching stools at their workplaces.

As a result, it remains unclear whether sitting should be replaced with standing, and if so, to what extent. Moreover, it is imaginable that this differs between occupational groups. For example, for office workers who sit during the majority of their work time, standing seems a reasonable intervention for health improvement. However, for workers in service sector who stand a lot at work, standing can impair cardiovascular and musculoskeletal health. These complex and seemingly contradictory phenomena impede our ability to communicate clear messages to the public. An overview of the evidence on health outcomes associated with sitting, standing and variation between sitting and standing will be provided. Here, a clear distinction between posture and movement will be made.

Can the daily time-pattern differentiate the health effects of physical activity?

David Hallman¹, Andreas Holtermann²

¹University of Gävle, ²National Research Centre for the Working Environment

Abundant research demonstrates beneficial effects of sufficient levels of physical activity (PA) on health. However, the time-pattern of PA is rarely taken into account in epidemiological research. The time-pattern of PA can be defined as the temporal variation of physical activities (e.g. walking and running) and postures (e.g. sitting and standing). Studies show that more variation in PA is beneficial for health, while insufficient variation may be detrimental. For instance, it is well established in exercise science that variation in type and intensity of PA is a key to optimal effects on performance and health. In contrast, performing the same PAs over and over again can result in poor recovery and eventually to overload and injury. Experimental studies on sedentary behavior and health have demonstrated that interruptions in prolonged sitting by intermittent bouts of standing or walking have favorable effects on cardio metabolic biomarkers, even with marginal increase in total energy expenditure. Also, observational studies have shown that associations with musculoskeletal and obesity outcomes depend on whether sitting time is accumulated in shorted or longer periods. Thus, the time-pattern of PA is likely to be of importance to health irrespective of changes in total energy expenditure. As the development of technical devices makes it feasible to collect accurate and precise data of the time-line of PA even in large cohorts, there are immense opportunities for epidemiological studies to investigate the extent to which different time-patterns of PA can influence health.

Why does occupational physical activity not provide same health benefits as leisure?

Andreas Holtermann, National Research Centre for the Working Environment

Moderate to vigorous physical activity (PA) is well documented to be beneficial for health. However, this documentation is mainly restricted to leisure time physical activity (LTPA; e.g. sports, recreation, transportation and exercise).

For a considerable fraction of the adult population, work constitutes the main setting for PA. This mainly applies for disadvantaged socioeconomic groups being physically active for large parts of their working days, such as construction, cleaning, elderly care and manufacturing.

Despite of being physically active for several hours 5 days per week at work, these workers have relatively poor health and fitness. This indicates that occupational PA (OPA) does not provide the same health benefits as LTPA, termed the PA health paradox. Increasing evidence actually supports that high levels of OPA can be detrimental for health, even after extensive adjustments for other risk factors and socioeconomic status.

However, the potential mechanisms behind the PA health paradox remain to be established. The different typical characteristics of OPA and LTPA can be potential causes to the PA health paradox. For example, LTPA often includes dynamic movements at intensity levels sufficient to improve cardiorespiratory and muscular fitness, and is mostly performed voluntarily over short time periods with enough recovery time. In contrast, work often constitutes static loading, heavy lifting and awkward working postures at intensities not improving fitness over very long periods with insufficient recovery time.

An improved understanding of the mechanisms behind the PA health paradox can be an important step for reduction of the large socioeconomic health inequalities.

Objective measurements of physical activity in the Norwegian HUNT Study

Paul Jarle Mork, Norwegian University of Science and Technology

The fourth round of The Nord-Trøndelag Health Study (HUNT4) started in September 2017 and will include one week of objective measurement of physical activity (PA) in about 40,000 adults (≥ 20 years) and 10,000 adolescents (13-19 years). PA is measured by small, lightweight tri-axial accelerometers placed at the lower back and on the front of the thigh. Heart rate (HR) is recorded with a chest-band in a random sub-sample. Vocationally active participants report daily work hours in a diary along with the PA and HR measurements. A validation study has been carried out to develop a machine-learning model for classification of PA types, such as sitting, standing, shuffling, walking, running and cycling. The sensor set up also allow the identification of transition time between postures (e.g., sit-to-stand) as well as identification of body movements and postures while lying down (prone, supine and on right/left side). An ongoing validation study is investigating if nocturnal body movements and/or changes in body position can be used to identify the sleep-wake cycle as recorded by polysomnography. The objective measurements of physical activity in HUNT4 will make it possible to address some of the questions currently debated, such as the influence of PA intensity, posture (e.g. sitting vs. standing), time-pattern, and domain of PA (work vs. leisure) on health outcomes. This presentation will i) describe lessons learned from the planning and implementation of PA recording in the HUNT Study, and ii) discuss some of the future perspectives for research based on the HUNT data.

Session: Evidence on effectiveness and feasibility of physical activity in the school setting: Bridging the gap between evidence and practice

Effects of physical activity interventions on cognitive and academic performance in children and adolescents:

A systematic review

Amika Singh¹, Emi Saliassi¹, Vera van den Berg¹, Leonie Uijtdewilligen², Renate de Groot³, Jelle Jolles⁴, Mai Chinapaw¹

¹VU University Medical Center, ²Saw Swee Hock School of Public Health, ³Open University of the Netherlands, ⁴VU University

Objective: To summarize the current evidence on the effects of physical activity (PA) interventions on cognitive and academic performance in children.

Design: Systematic review (following PRISMA guidelines) with a methodological quality assessment. We based the evaluation of the consistency of the scientific evidence on the findings reported in studies rated as of high methodological quality.

Data sources: PubMed, PsycINFO, Cochrane Central, Web of Science, ERIC, and SPORTDiscus. Eligibility criteria for selecting studies: PA-intervention studies in children with at least one cognitive or academic performance assessment.

Results: Eleven (19%) of 58 included intervention studies received a high quality rating for methodological quality: four assessing effects of PA interventions on cognitive performance, six assessing effects on academic performance, and one on both. All high quality studies contrasted the effects of additional/adapted PA activities with regular curriculum activities. For cognitive performance ten of 21 (48%) constructs analysed showed significant beneficial intervention effects of PA, while for academic performance, 15 of 25 (60%) analyses of the high quality studies found a significant beneficial effect of PA. Across all five studies, assessing PA effects on math, beneficial effects were reported in six out of seven (86%) outcomes.

Conclusion: There is currently inconclusive evidence for beneficial effects of PA interventions on cognitive and overall academic performance in children. We conclude that there is strong evidence for beneficial effects of PA on math performance.

External funding details: The Netherlands Organisation for Scientific Research (NWO)

A systematic review of acute physically active learning and classroom movement breaks on children's physical activity, cognition, academic performance and classroom behaviour; understanding critical design features.

Andy Daly-Smith¹, Stephen Zvolinsky¹, Jim McKenna¹, Phillip Tomporowski², Margaret Defeyter³, Andrew Manley¹

¹Leeds Beckett University, ²University of Georgia, ³Northumbria University

Introduction: to examine the impact of acute classroom movement breaks (CMB) and physically activity learning (PAL) interventions on physical activity (PA), cognition, academic performance and classroom behaviour.

Method: Systematic review, PROSPERO number CRD42017070981. Data sources: PubMed, EBSCO, Academic Search Complete, ERIC, Psychinfo, SPORTDiscus, SCOPUS and Web of Science. Eligibility criteria for selecting studies: studies investigating school-based acute

bouts of CMB or PAL on PA, cognition, academic performance and classroom behaviour. The Downs and Black checklist assessed risk of bias.

Results: Ten PAL and eight CMB studies were identified from 2929 potentially relevant articles. Risk of bias scores ranged from 33% to 64.3%. Variation in study designs drove specific, but differing, outcomes. Three studies assessed PA using objective measures. Interventions replaced sedentary time with either light PA or MVPA dependant on design characteristics (mode, duration and intensity). Only one study factored individual PA outcomes into analyses. Classroom behaviour improved after longer moderate-to-vigorous (>10 mins), or shorter more intense (5 mins), CMB/PAL bouts (9 out of 11 interventions). There was no support for enhanced cognition or academic performance due to limited repeated studies.

Conclusion: Low-to-medium quality designs predominate in investigations of the acute impacts of CMB and PAL on PA, cognition, academic performance and classroom behaviour. Variable quality in experimental designs, outcome measures and intervention characteristics impact outcomes making conclusions problematic. CMB and PAL increased PA and enhanced time-on-task. To improve confidence in study outcomes, future investigations should combine examples of good practice observed in current studies.

Does exercise during the school day boost children's attention and memory?

Trish Gorely¹, Josie Booth², Naomi Brooks³, Ross Chesham³, Colin Moran³

¹University of the Highlands and Islands, ²University of Edinburgh, ³University of Stirling

Introduction: Short physical activity (PA) breaks may have a positive effect on cognition in children but the optimum intensity is unknown. The purpose was to explore the impact of PA at two intensities on affect and cognition.

Method: Primary school classes/groups (n = 503) volunteered as part of the BBC Terrific Scientific scheme. Participants completed short breaks from the classroom in three conditions: self-paced PA for 15 mins (SPA); maximal effort running task (bleep test (BT)); and, no exercise (control). Conditions were completed on different days and in any order. Before and after each condition participants completed the Children's Feeling Scale and Felt Arousal Scale, plus computer-based tasks assessing attention/inhibition, visual-spatial working memory and verbal working memory.

Results: Over 7,300 children (10.2 ± 0.7 years; 50% female) provided information on at least one key measurement, and 1040–1212 provided data across all conditions. Compared to the control condition, children: (1) felt more awake after doing either exercise condition, but most awake after SPA; (2) felt better after SPA; (3) responded quicker to the attention task after SPA; (4) were better at controlling their responses after both SPA and BT; and (5) were better at remembering words in sentences after SPA (all ANOVA p < 0.001). Overall effect sizes were small (0.06–0.21 SD).

Conclusion: For most tasks, participating in SPA was more beneficial than BT.; BT was mostly no different from the control activity. Children should be encouraged to exercise at their own pace during short breaks from class.

External funding details: University of Edinburgh, Physiological Society

Frequency, mode or duration? An overview of 3 experimental studies on acute effects of PA breaks in the school setting

Vera van den Berg¹, Emi Saliasi¹, Renate de Groot², Jelle Jolles³, Mai Chinapaw¹, Amika Singh¹

¹VU University Medical Center, ²Open University of the Netherlands, ³VU University

Purpose: Recent studies indicate that a single bout of physical activity (PA) can have immediate positive effects on children's cognitive performance. However, the specific PA features that benefit cognition most are largely unknown.

Methods: In three separate experimental studies, we examined the acute effects of 1) three types of 12-minute classroom-based exercise (i.e. aerobic, coordination and strength), 2) three durations of moderate to vigorous exercise (10, 20 and 30 minutes) and 3) two frequencies (1x20 or 2x20 minutes) of PA bouts. We examined effects on performance across three cognitive domains: selective attention, using the d2, test of everyday attention for children (TEA-Ch) and the Attention Network Test (ANT), information processing speed using the Letter Digit Substitution Test and working memory using the n-back. Statistical models included repeated measures ANOVA and generalized estimating equation models.

Results: There was no effect of light to moderate PA on cognitive performance and this effect was not modulated by PA type. Exercising at moderate to vigorous intensity, for either 10, 20 or 30 minutes, resulted in a slight improvement in performance on the ANT. Children who performed two 20 minute bouts of moderate-intensity PA had significantly better scores on the TEA-ch test compared to children who performed one PA bout or remained seated.

Conclusions: Our findings suggest that PA type or duration does not differentially affect cognitive performance in children. Exercising for a minimum of 10 minutes at moderate to vigorous intensity was found to improve selective attention.

External funding details: The Netherlands Organisation for Scientific Research (NWO)

Acute effects of active learning on academic performance in primary school children: A randomised control trial

Andy Daly-Smith, Jim McKenna, Stephen Zvolinsky, Andrew Manley, Leeds Beckett University

Purpose: To investigate the acute effects of a physically-active lesson (PAL) on moderate-to-vigorous physical activity (MVPA) and academic performance (AP) in primary school children.

Methods: Ninety-eight pupils from Year 2 (N = 43; Mage = 6.7 ± 0.30 yrs; nGirls = 23) and Year 5 (N = 55; Mage = 9.7 ± 0.32 yrs; nGirls = 20) were recruited. Following familiarisation, pupils were randomly allocated to a 45-minute PAL (n = 50) or standard classroom lesson (SCL, n = 48). One week post familiarisation, immediately before, and 10-mins after each lesson, pupils completed the Maths Addition and Subtraction, Speed and Accuracy Test (MASSAT) and Wide Range Achievement Test (WRAT4, Year 5 only). MVPA data was measured in 15-second epochs using accelerometers and Evenson cutpoints. A two-way ANOVA with repeated measures assessed changes in academic outcomes; MASSAT processing score (PS: total correct answers – total incorrect answers), WRAT4 Total Score (TS- total correct answers).

Results: Eighty-seven participants (nPAL = 42, nSCL = 45) completed assessments. Significantly more MVPA was accumulated in PALs (10.09 ± 4.09 mins, range 4.75 mins to 22.25 mins) compared to SCL (0.97 ± 1.00 mins; p = 0.001). Thirteen pupils (31%) achieved ≥12 mins MVPA in PALs. No significant interaction effects were observed in PALs compared to SCLs for either MASSAT-PS (p = 0.085) or WRAT4-TS (p = 0.519). Although non-significant, greater improvements in MASSAT-PS scores were observed for PAL ≥ 12 (2.62 ± 4.14) compared SCL (-0.36 ± 5.58; p = 0.084, Partial Eta = 0.052).

Conclusion: PAL led to substantial increases in MVPA with no significant change in AP. PAL resulted in a large variation of MVPA accumulation at

the individual level. Aligned with previous literature, higher levels of MVPA in the PALs may lead to higher AP.

Session: Physical activity promotion in health care settings: Recent developments in Europe

Life style counselling for the health care and the social sector

Eva Martin-Diener¹, Tommi Vasankari²

¹University of Zurich, ²UKK Institute for Health Promotion Research, Tampere

In Finland one of the Government's key projects focuses on lifestyle counseling (physical activity, diet and sleep) for the health care and the social sector (VESOTE project). The project operates in 11 of the 19 hospital districts in Finland. The aim of the project is to create a new form of lifestyle counseling in Finnish health care.

The key components of the project are:

- Commitment from directors of hospital districts, towns, the third sector, etc
- Strong multisectoral collaboration from health care to cities / third sector / private sector
- eLectures and webinars on lifestyle counseling
- Virtual lifestyle policlinic to every hospital district
- Creation of patient "paths" from specialised hospitals to third sector
- Measuring lifestyle factors objectively (physical activity, sedentary behaviour, sleep)
- Interactive accelerometer + smart phone application + cloud (personal goals) – same information to patient and health care professionals

The program is based on objective measurement of physical activity, sedentary behaviour and sleep. The patients will get personalized target for these behaviours and they can follow their lifestyle online using an interactive accelerometer + smart phone application + cloud system, and the same objectively measured information is delivered to health care from the cloud.

The effectiveness of the project will be evaluated by two different randomized controlled trials, with physical activity counseling for diabetics and counseling for coronary artery patients, respectively.

The impact of the Care Sport Connector in the Netherlands

Eva Martin-Diener¹, Annemarie Wagemakers², Liesbeth Preller³, Eva Smit⁴, Karlijn Leenaars⁵, Gerard Molleman⁵

¹University of Zurich, ²Wageningen University & Research Centre, Department of Social Sciences, Health and Society, ³Knowledge Centre for Sport Netherlands, Ede, ⁴Academic Collaborative Centre AMPHI, Primary and Community Care, Radboud University Medical Center, Nijmegen, ⁵3.Academic Collaborative Centre AMPHI, Primary and Community Care, Radboud University Medical Center, Nijmegen.

In 2012, the Ministry of Health, Welfare and Sports introduced Care Sport Connectors (CSCs), who are ascribed a broker role to connect the primary care and physical activity (PA) sector and to guide primary care patients towards PA facilities. The aim of this study was to assess CSCs' impact on 1) connecting both sectors and 2) activities organized, reach and health of participants.

Methods include three rounds of in-depth interviews with 13 CSCs in 9 municipalities, 14 focus groups with professionals collaborating with CSCs and monitoring of 405 participants of PA programs. At the start, after 6 months and after 1 year participants performed a fitness test and filled in a questionnaire about PA behaviour, motivation, and experienced health.

CSCs function as referrer, organiser and broker to connect different sectors. The number of collaborating organisations increased from 8.3 (2014) to 19.8 (2016). CSCs arranged multiple PA programs and used different strategies for recruitment: PR, a personal letter or referral by a (welfare or primary care) professional. Participants who were referred scored lower on fitness tests, PA behaviour and experienced health than those in other groups.

The CSC is successful in connecting the primary care and PA sector and leads to a better potential for referral and more PA programs. To reach primary care patients, collaboration with the welfare or primary care sector is a prerequisite. Whether CSCs really improve the target groups' PA level needs to be studied further.

External funding details: Funding by ZonMw (Netherlands Organisations for Health Research and Development) (525001002).

Moving healthcare professionals: A multi-component Physical Activity programme to engage, educate and change behaviors of health professionals

Eva Martin-Diener¹, Nick Clarke², Mike Brennan²

¹University of Zurich, ²Health Improvement Directorate, Healthy People Division, Adult Health and Wellbeing Team, Public Health England, London

Public Health England published the national physical activity framework Everybody Active, Every Day in 2014. It set out the need for action across four domains to increase and sustain physical activity levels across England and embraces a Making Every Contact approach across the health care workforce.

One of the domains 'Moving Healthcare Professionals' is a multi-component programme developed with Sport England that aims to educate and upskill healthcare professionals to deliver physical activity advice to demonstrate a cross cutting approach to Physical Activity promotion.

The programme consists of a number of activities:

1. Physical Activity Clinical Champions training scheme.
2. ELearning modules,
3. Physical Activity 'prescription pad' pilot,
4. Updating and dissemination of physical activity and health evidence base,
5. Pilot Sport and Exercise medicine integration in secondary care,
6. Promote and increase uptake of medical undergraduate resources.

This presentation will highlight the results from Phase 2/3 of the pilot clinical champions training programme - where 245 sessions were delivered by clinical champions to 3240 participants (>82% GP's). With the evaluation stating that the programme was successful in meeting its learning objectives, highlighted the positive impact that a one-time training session can have on primary care professional's confidence and the follow-up results showed that it had a positive effect on the participants' confidence to motivate patients to increase physical activity.

In addition, we will reflect on the next phase of the programme and the effectiveness of a 'making every contact count' approach to engaging health care professionals.

Mainstreaming physical activity within health and social care

Eva Martin-Diener¹, Flora Jackson²

¹University of Zurich, ²Health Improvement Manager Physical Activity, NHS Health Scotland, Edinburgh

In order to create effective leadership, coordination and delivery of physical activity (PA) within Health and Social Care in Scotland, the

national Health and Social Care Physical Activity (HSCPA) Delivery Group has been established to oversee the development and delivery of strategic actions, devised to enable people in contact with Health and Social Care services to experience the benefits of a more active life.

These actions build on evidence based practice, focused on increasing opportunities for staff, visitors, patients and the wider community to be physically active. More recently, the Health and Social Care Delivery Plan (Scottish Government, 2016), details actions to enhance health and social care services, enabling people to live longer, healthier lives and aspires to embedded the National Physical Activity Pathway (NPAP) into all appropriate clinical settings across the health care system by 2019.

Collectively, this involves the co-ordinated delivery of four work streams identified to enable and enhance delivery of the National Physical Activity Pathway:

1. National Physical Activity Pathway Infrastructure
2. Education and Workforce Development
3. Activating the Outdoor Estate
4. Creating an Active Workplace.

Quality improvement methodologies such as the improvement journey, coupled with an assets based approach have been adopted. Thereby enabling work streams to translate evidence into practice through small scale tests of change, through which solutions reflective of local needs can be developed, existing resources maximised and long term transformational change achieved.

Joint efforts to establish health behaviour counselling in Switzerland

Eva Martin-Diener¹, Jacques Cornuz², Stefan Neuner³, Raphael Bize⁴, Carlos Quinto⁵, Brian Martin⁶

¹University of Zurich, ²Department of Ambulatory Care and Community Medicine, University Hospital Lausanne, ³Swiss College for Primary Care Medicine, Fribourg, ⁴Institute of Social and Preventive Medicine, University of Lausanne, ⁵Health Promotion and Prevention Section, Swiss Medical Association, ⁶Chief Medical Officer, Canton of Zurich, Department of Health, Zurich; University of Zurich

Switzerland is a multicultural country with federalist structures, and a strong tradition of initiatives from individuals and groups such as professional associations. Within this context, a number of approaches for health counselling in primary care have been developed. Three of them have grown into programmes and are now in different phases of implementation: “Vivre sans Tabac” (“Living without Tobacco”), PAPRICA (Physical Activity promotion in PRImary CARE) and “Health Coaching” a programme addressing health behaviours in the order and priority chosen by the patient. They are using the same communication tools established with physicians, namely the principles of motivational interviewing.

Under the lead of the Swiss Medical Association, the programmes are currently preparing an even closer collaboration, including also EviPrev, a programme documenting the evidence for the effectiveness of all prevention approaches through the health care system. Within the context of the Swiss national strategy for the prevention of noncommunicable diseases NCD, the joint programme will aim to further establish prevention in the health care system, by taking into account the needs of health professionals, by providing new and possibly combined training formats and by developing the capacity to integrate further dimensions of health behaviour as well as new groups of health professionals.

This presentation will reflect on challenges and key success factors for scaling up programmes, based on the experiences gained with these four

programmes. Furthermore, it will describe the status of the joint efforts to integrate the support for health behaviour change into the implementation of the NCD strategy.

Session: Physical activity research in vulnerable populations using Ecological Momentary Assessment (EMA)

Sex differences in associations between daily affect and accelerometer-derived physical activity patterns in children

Genevieve Dunton¹, Eldin Dzibur², Chih-Hsiang Yang¹, Britni Belcher¹

¹University of Southern California, ²Cedars-Sinai Medical Center

Introduction: Research typically examines affective factors in relation to total volume of physical activity during childhood, a vulnerable period of life. However, daily physical activity patterns, not just volume of physical activity, may be important for physical and mental health. Research examined sex differences in day-level associations between children's affect and accelerometer-derived physical activity patterns.

Methods: Children (N = 163; M_{age} = 9.6 years; 46% boys) reported positive and negative affect through Ecological Momentary Assessment (EMA) and wore an accelerometer across seven days. The following pattern metrics were calculated for light and moderate-to-vigorous physical activity (LPA, MVPA): total duration (min), energy (METs), and number of events for short (<10 min) and long (≥10 min) bouts; and distribution/dispersion of bouts across the day.

Results: For boys and girls, mean positive and negative affect on any given day were unrelated to total volume of MVPA (min) on that day. However, compared to boys, on days when girls reported higher mean positive affect than their own average, they accumulated more MVPA (min) and (METs) through short bouts (<10 min) (p's < 0.01), engaged in a larger number of LPA and MVPA bouts (p's < .05), and engaged in LPA and MVPA bouts that were more evenly distributed in length across the day (p's < .01).

Conclusions: Compared to boys, girls may experience more acute positive affective benefits from sporadic activity (occurring in shorter and more evenly distributed bouts across the day). Examining physical activity pattern metrics (in addition to volume) can elucidate more nuanced relationships between affective experiences and physical activity in children.

Response patterns and predictors of compliance to Ecological Momentary Assessment in university students: Results from the MovingU study

Matthew Kwan¹, Chloe Bedard¹, Scott Veldhuizen¹, John Cairney³

¹McMaster University ³University of Toronto

Introduction: The transition out of high school represents a major life transition, corresponding with significant declines in physical activity (PA) behaviors. To date, the extant literature is largely based on cross-sectional or infrequent longitudinal studies, limiting our understanding of contextual and intra-individual factors impacting PA during this transitory period. The purpose of the current study was to describe the utility of using ecological momentary assessment (EMA) in first-year university students and to examine the predictors of EMA compliance.

Method: Our sample included 86 recent high school graduates (M_{age} = 18.30 ± .54; males = 45%), whom were asked to wear an accelerometer and complete EMA prompts 7x/day for five days. Each prompt included a very-brief survey assessing context, acute feelings, mood states, and PA cognitions.

Results: Fifty-five participants (68%) met minimal acceptable compliance (answering >3 prompts on >3 days), of which 47% had excellent compliance (answering >5 prompts for >4 days). Findings did not show any person-level factors being related to compliance; however, results from the mixed effects logistic model found a significant time-of-day (Coefficient = -5.10 SE = $.75$, $p < .001$) and day-of-week effect (Coefficient = $-.29$ SE = $.03$, $p < .001$).

Conclusion: Overall, compliance to EMA prompts was modest among first-year students, underlining the importance of investigating potentials for non-response biases. Results suggest prompts in the afternoons/early evenings were more likely adhered to, but that responses waned over time. Current findings suggest that future EMA studies may require a smaller sampling frame for emerging adults vulnerable to steep declines in PA behaviors.

External funding details: Funded by Social Sciences and Humanities Council of Canada

Affective responses to a multi-day, charity cycling event of people with depression and anxiety symptoms

Amanda Rebar¹, Simon Rosenbaum²

¹Central Queensland University, ²University of New South Wales

Introduction: The feelings experienced during exercise are a major contributor of exercise motivation. It may be that because of a deregulation of the brain's reward system, feelings experienced during exercise are unique for people experiencing depression and/or anxiety.

Method: An ecological momentary assessment was conducted during a week-long charity cycling event. Cyclists ($N = 37$, 81% male) reporting their depression and anxiety symptoms prior to the ride and their affective feeling states twice daily throughout the ride. Multilevel regression was used to test whether the feeling states experienced were different as a function of symptom severity.

Results: For people with depression, strength and attentiveness increased and hostility decreased more during the event than for people without depression (p 's $< .05$). For people with anxiety, feelings of distress, irritability, nervousness, fear, and fatigue reduced more during the event and interest, pride, guilt and activeness increased more during the event than for people without anxiety (p 's $< .05$). For people with depression and anxiety, interest, pride and guilt increased during the event, and distress and irritability decreased more during the event than for people without depression and anxiety (p 's $< .05$).

Conclusion: People with depression and anxiety symptoms tended to have more reactive feeling state responses to the cycling event, especially in regards to self-conscious emotions such as pride and guilt. It may be that the self-focus that accompanies depression and anxiety impact feelings experienced during exercise. Future research is needed to determine whether this impacts motivation.

Feasibility and validity of assessing older adults' physical activity and sedentary behavior through Ecological Momentary Assessment

Jaclyn Maher¹, Amanda Rebar², Genevieve Dunton³

¹University of North Carolina at Greensboro, ²Central Queensland University, ³University of Southern California

Introduction: Ecological Momentary Assessment (EMA) can yield new insights into the prediction and modeling of physical activity (PA) and sedentary behavior (SB). This study was designed to determine the feasibility and validity of an EMA protocol to assess PA and SB in older adults, the least active and most sedentary segment of the population.

Method: Over 10 days, participants ($n = 104$; 60-98 years) received 6 randomly-prompted EMA questionnaires on a smartphone each day and wore an ActivPAL monitor to provide a device-based measure of PA and SB.

Results: Older adults were compliant with the EMA and ActivPAL protocol on 92% of occasions. EMA compliance did not differ for monitor-based PA or SB in the 15 minutes before versus the 15 minutes after the EMA prompt, suggesting that these behaviors did not influence likelihood of responding and responding did not influence these behaviors ($ps > 0.05$). When PA was reported through EMA, participants engaged in more monitor-based PA in the 15 minutes after compared to the 15 minutes before the EMA prompt ($p = 0.01$), suggesting possible reactance. EMA-reported PA and SB were positively associated with higher device-based PA and SB in the ± 15 minutes, respectively, supporting criterion validity ($ps < 0.05$).

Conclusion: Assessment of older adults' PA and SB through EMA is feasible and valid, although there may be PA reactance to EMA prompting. EMA represents a significant methodological tool that can aid in our understanding of the environmental, social, and psychological processes regulating older adults' PA and SB in the context of everyday life.

Symposia: Tuesday 16 October

Session: Air pollution and physical activity

Are long-term benefits of physical activity on health modified by exposure to air pollution?

Zorana Jovanovic Andersen, University of Copenhagen

Introduction: Physical activity reduces, whereas exposure to air pollution increases the risk of cardiovascular and respiratory disease and premature mortality. Physical activity amplifies respiratory uptake and deposition of air pollutants in the lung, which may augment acute harmful effects of air pollution during exercise. We examined whether long-term benefits of physical activity on morbidity and mortality are moderated by long-term exposure to air pollution in an urban setting.

Methods: 57,000 subjects (50–65 years) from the Danish Diet, Cancer, and Health cohort, recruited in Aarhus and Copenhagen between 1993 and 1999, reported data on leisure-time and utilitarian physical activity. We linked the cohort to Danish nationwide registers to extract data on overall and cause-specific mortality, incidence of asthma and chronic obstructive pulmonary disease (COPD). We used modeled NO₂ levels at the residence at the cohort baseline year as proxy for air pollution exposure during physical activity. We modeled association of participation in sports, cycling, gardening, and walking with the above mentioned health outcomes by Cox regression, and then introduced NO₂ as an interaction term.

Results: Of ca. 53,000 subjects in analyses, 5,534 died until 2010, 1,151 developed asthma and 3,225 COPD until 2013. Participation in sports, cycling, walking and gardening was associated with reduced risk of premature mortality (18–22%), incident asthma (15–18%) and COPD (15–19%), and these were not modified by NO₂.

Conclusions: Increased exposure to air pollution during exercise does not outweigh long-term beneficial effects of physical activity on the risk of premature mortality, or risk of asthma and COPD.

Air pollution exposures while walking and cycling

Audrey de Nazelle, George Northover, Shahram Heydari, Imperial College London

Introduction: Travel microenvironments are often the most polluted places people encounter in their daily lives. Encouraging walking and cycling may increase physical activity in the population, but also lead to higher intakes of pollutants (due to high inhalation rates in highly contaminated environments). Quantification of exposure contrasts between travel modes is needed to estimate potential risks and benefits of walking/cycling.

Method: A systematic review of global literature comparing exposures while walking and cycling to other modes (car, bus, overground/underground rail) was conducted. Data from the disparate set of studies was harmonized to estimate ratios of concentrations in active travel vs motorized travel modes for fine particulate matter (PM_{2.5}), ultrafine particles (UFP), black carbon (BC) and carbon monoxide (CO). Comparisons were made for ratios obtained in different continents.

Results: Of 280 articles examined, 27 responding to inclusion criteria were retained for analyses. Most were derived from European studies although all continents except Antarctica were represented. Globally, walking was

amongst the least exposed travel modes for BC and CO, with more inconsistent results for PM_{2.5} and UFP. Cycling was amongst the most exposed for UFP, and the least exposed for BC (other than walking). Results varied by continent.

Conclusion: A large variety of study designs and settings makes a unified picture of air pollution contrasts between travel modes difficult. Nevertheless the ratios and associated confidence intervals obtained provide useful metrics for health impact modelling, enabling a comprehensive analysis of risk and benefit tradeoffs of walking and cycling policies in urban environments.

External funding details: MRC

Impact of ambient fine particulate matter air pollution on physical activity: A longitudinal study of university students in Beijing, China

Ruopeng An¹, Hongjun Yu²

¹University of Illinois at Urbana-Champaign, ²Tsinghua University

Objectives: This study examines the impact of ambient fine particulate matter (PM_{2.5}) air pollution on physical activity among college students in Beijing, China.

Methods: Health surveys were repeatedly administered among 12,000 newly admitted students at Tsinghua University during 2012–2015 over their freshman year. Linear individual fixed-effect regressions were performed to estimate the impacts of ambient PM_{2.5} concentration on physical activity-related health behaviors among survey participants, adjusting for various time-variant individual characteristics and environmental measures.

Results: Ambient PM_{2.5} concentration was found to be negatively associated with total minutes of walking and vigorous physical activity in the last week, but positively associated with daily average hours of nighttime/daytime sleep among survey participants. An increase in ambient PM_{2.5} concentration by one standard deviation (47.5 µg/m³) was associated with a reduction in weekly total minutes of walking by 21.9 (95% confidence interval = 19.6–24.2) and a reduction in weekly total minutes of vigorous physical activity by 5.2 (3.4–7.0), but an increase in daily average hours of nighttime/daytime sleep by 2.3 (2.3–2.4). Ambient PM_{2.5} concentration was not found to be associated with daily average hours of sedentary behavior.

Conclusions: Our previous systematic review found PM_{2.5} concentration to be associated with increased physical inactivity in the US. This study added to the literature by revealing that PM_{2.5} air pollution discouraged physical activity among Chinese college students. Policy interventions are urgently called to reduce air pollution level in China's urban areas.

External funding details: This study was funded by Beijing Federation of Social Science, National Social Science Foundation, and Tsinghua University.

Challenge for public health: Should you avoid cycling and walking in high pollution days?

Marko Tainio¹, Giorgos Giallourou², Panayiotis Kouis², John S. Evans³, Stefania I. Papatheodorou¹, James Woodcock¹

¹University of Cambridge, ²Cyprus University of Technology, ³Harvard T. H. Chan School of Public Health

Introduction: Regular active commuting (cycling, walking) is associated with reduced all-cause mortality through increased physical activity (PA). However, active commuting may increase intake of fine particles (PM2.5), causing negative health effects. In this study we estimate the combined risk of PA and PM2.5 for all-cause mortality among active commuters who, in days with high PM2.5 levels work from home.

Method: We modelled the changes in all-cause mortality by combining risks (PM2.5) and benefits (PA) for six cities (Helsinki, London, Sao Paulo, Warsaw, Beijing, New Delhi) using daily PM2.5 concentrations as an input. In each day with PM2.5 concentration above the threshold current active travelers were assumed to stay home.

Results: Everyday cycling to work resulted in RRs from 0.80 (cycling) and 0.84 (walking) in Helsinki to 0.86 (cycling) and 0.88 (walking) in New Delhi. Restricting active commuting in high PM2.5 days had a minimal effect on combined risk in Helsinki, London, Sao Paulo and Warsaw. However, in Beijing and New Delhi restricting cycling in days with PM2.5 concentration over 150 µg/m³ resulted in slightly lower combined RR than cycling every day.

Conclusions: Replacing cycling and walking for working from home in days with high air pollution days could lower all-cause mortality risk in Beijing and New Delhi.

External funding details: British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust (though the UK Clinical Research Collaboration), and Cyprus University of Technology.

Session: Increasing physical activity in overweight football fans: From developing and evaluating intervention programs to wider implementation in practice

Implementation of the successful weight loss and healthy living football fans in Training program in the UK and Germany

Kate Hunt¹, Cindy Gray², Chriss Bunn², Craig Donnachie², Sally Wyke²

¹University of Glasgow/University of Stirling, ²University of Glasgow

Introduction: The prevalence of overweight and obesity in men has been rising in many countries in recent decades, yet men have often been proven difficult to engage in weight management and other health-promoting programs. In response to this challenge, we developed the Football Fans in Training (FFIT) program, a 12 week weight management and healthy living intervention, which was gender sensitised in context, content and style of delivery. FFIT was designed originally to be delivered by community coaches at professional football clubs in Scotland, in partnership with the Scottish Professional Football League Trust (SPFLT). A randomised controlled trial (RCT) demonstrated that FFIT was effective (primary outcome - objectively-measured weight loss 12 months post pre-randomisation baseline measures) and cost effective.

Developing a sustainable implementation model: We will describe how we worked in partnership with the SPFLT to develop a 'Train-the-Trainers' program and a licensing and audit model which is designed to allow FFIT to be delivered with fidelity to the program as evaluated. This includes training for pre-post program measurement for monitoring purposes, which enable SPFLT, the original research team and program funders to monitor the outcomes of FFIT participation. We also describe the adaptation and delivery of FFIT towards a women's only program, in response to demand within the delivery clubs.

Conclusion: In partnership with SPFLT, we have developed an implementation model which has proved feasible and sustainable in the UK (over 5+ years post RCT evaluation) and other countries.

Development and implementation of the EuroFIT intervention program in 15 professional football clubs across Europe

Femke Van Nassau¹, Chris Bunn², Eivind Andersen³, Cindy Gray², Kate Hunt⁴, Judith Jelsma¹, Nanette Mutrie⁵, Ria Nijhuis-vanderSanden⁶, Hugo Pereira⁷, Glyn Roberts³, Marlene Silva⁷, Marit Sorensen³, Pedro Teixeira⁷, Shaun Treweek⁸, Theo van Achterberg⁹, Irene van de Glind⁶, Hidde van der Ploeg¹, Willem van Mechelen¹, Sally Wyke²

¹VU University Medical Centre, ²University of Glasgow, ³Norwegian School of Sport Sciences, ⁴University of Glasgow/University of Stirling, ⁵University of Edinburgh, ⁶Radboud University Medical Center, ⁷University of Lisbon, ⁸University of Aberdeen, ⁹KU Leuven

Introduction: Based on the success of the Scottish Football Fans in Training (FFIT) weight loss intervention, European Fans in Training (EuroFIT) was developed. EuroFIT primarily focusses on increasing physical activity and decreasing sedentary behaviour. The aim of this presentation is to describe the development and implementation of the EuroFIT intervention in 15 football clubs across 4 countries.

Methods: We collected process evaluation data from intervention participants (n = 560 overweight male football fans aged 30-65 years) of the EuroFIT randomized controlled trial. During implementation coaches completed attendance sheets and coach logs. After the 12-week intervention ended, both participant and coaches completed process evaluation questionnaires.

Results: Recruitment of participants went very well – expressions of interest exceeded the number needed three times. EuroFIT participants attended on average 9.9 (SD2.3) of the 12 sessions. Participants were satisfied with the intervention and coaches as they scored 8.8 (SD1.4) and 9.2 (SD1.4) on a ten point scale, respectively. Fidelity was overall good, but varied by club. In addition, we explored combining different process measures (i.e. fidelity, dose and quality) into a delivery score and linked this to lifestyle outcomes.

Conclusion: Implementation of EuroFIT was very good. Participants liked the coaches and the intervention, and coaches delivered the intervention with high fidelity. As a result, exposure to the EuroFIT intervention was high and resulted in positive changes in lifestyle outcomes (as described in the EuroFIT effectiveness presentation in this symposium). Evaluation of implementation of EuroFIT outside the research setting is needed to determine if this can be replicated.

Effectiveness of the EuroFIT lifestyle program delivered to male football fans across Europe

Hidde van der Ploeg¹, Femke van Nassau¹, Kate Hunt², Marlene Silva³, Sally Wyke⁴

¹VU University Medical Centre, ²University of Glasgow/University of Stirling, ³University of Lisbon, ⁴University of Glasgow

Introduction: The primary aim of the randomized controlled trial of the European Fans in Training (EuroFIT) lifestyle program is to determine whether EuroFIT can help men aged 30-65 years with a self-reported BMI ≥27 kg/m² to increase their physical activity and decrease their sedentary time 12 months after baseline.

Method: A pragmatic, randomised controlled trial was conducted in 15 professional football clubs in the Netherlands, Norway, Portugal and the UK (England). Participants were measured at baseline, post-program and

12 months after baseline. Primary outcomes were changes in total physical activity (i.e. steps/d) and total sedentary time (i.e. min/d spent sitting) objectively assessed with the activPAL.

Results: 1113 male football fans were recruited across the 15 participating clubs. 560 men were allocated to the intervention group and received the 12-week intervention program. 553 men were randomized to the waiting list comparison group. The intervention group increased their steps by 1163 steps/d (95%CI 774-1551) post program and by 633 steps/d (95% CI 284-981) at 12 months compared to the control group. Changes in sedentary time were not significantly different at 12 months between the groups. The intervention did result in significant improvements in many of the secondary outcomes (body weight, BMI, waist circumference, resting blood pressure, several cardio-metabolic blood biomarkers and food intake).

Conclusion: The EuroFIT intervention program effectively improved physical activity but not sedentary time in male football fans. EuroFIT has good potential for wider roll out to help improve public health through the football setting.

The role of motivational theory in promoting physically active lifestyles in the EuroFIT program

Marlene Silva¹, Pedro Teixeira¹, Glyn Roberts², Jennifer Laguardia¹, Cindy Gray³, Kate Hunt⁴, Hidde van der Ploeg⁵, Chris Bunn³, Femke van Nassau⁵, Eivind Andersen², Marit Sorensen², Irene van de Glind⁶, Hugo Pereira¹, Judith Jelsma⁵, Nanette Mutrie⁷, Sally Wyke³

¹University of Lisbon, ²Norwegian School of Sport Sciences, ³University of Glasgow, ⁴University of Glasgow/University of Stirling, ⁵VU University Medical Centre, ⁶Radboud University Medical Centre, ⁷University of Edinburgh

Introduction: Interventions reported as theory-based often do not describe the strategies and behavior change techniques used, neither measure changes in constructs that predict behavior. Such description and measurements are critical for improving theory and practice. This presentation seeks to: i) Describe how constructs from motivational theory (Self-Determination and Achievement Goal Theories) were used to inform EuroFIT intervention strategies; ii) Report on whether the program impacted motivational targets.

Methods: 1113 men participated in a pragmatic randomised controlled trial, comprising a gender-sensitized 12-week behaviour change program (12-month follow-up), at 15 football clubs in the Netherlands, Norway, Portugal, and the UK. Coaches, at club facilities, led the program. Club affiliation was leveraged to promote adaptive motivation, by increasing group relatedness, interest in the program, and, gradually building mastery through optimally challenging opportunities and a toolkit of self-regulation strategies for behaviour change.

Results: The intervention was successful in affecting theory-driven mediators, increasing the internalization of autonomous-motivation both post-program and at 12-months (ES = 0.37; 0.26, $p < 0.001$). Associations between theoretical-constructs matched the expected patterns ($p < 0.001$) and were related with the use of self-regulatory strategies (e.g. goal-setting, overcoming setbacks) ($p < 0.001$), and also with average step count both post-program and at 12 months ($r = 0.16; 0.23$, $p < 0.001$), and self-reported sitting less and becoming more active by making small changes to everyday life ($p < 0.001$).

Conclusion: Results indicate that the EuroFIT intervention properly affected the proposed-mediators, which demonstrated to be associated with the use of self-regulatory strategies and a more physically active lifestyle, both short and longer-term. Future analyses will assess specific mediation paths.

Session: Integrating health effects into transport planning: Achievements, pitfalls and lessons learned from 10 years of the WHO Health Economic Assessment Tool (HEAT) for walking and cycling

How does it work? Introduction to the methodological approaches of the new HEAT 4.0

Sonja Kahlmeier¹, Thomas Goetschi¹, Nick Cavill², Alberto Castro-Fernandez¹, Christian Brand², David Rojas-Rueda³, James Woodcock⁴, Paul Kelly⁵, Christoph Lieb⁶, Pekka Oja⁷, Charlie Foster⁸, Harry Rutter⁹, Francesca Racioppi¹⁰

¹University of Zurich, ²Oxford University, ³ISGlobal, Barcelona Institute for Global Health, ⁴Cambridge University, ⁵University of Edinburgh, ⁶Ecoplan, ⁷UKK Institute for Health Promotion Research, ⁸Bristol University, ⁹London School of Hygiene and Tropical Medicine, ¹⁰WHO Regional Office for Europe

Introduction: Initially launched in 2007, the WHO Health Economic Assessment Tools (HEAT) for walking and cycling are online tools to estimate the value of reduced mortality that results from regular walking or cycling. They are designed to meet the needs of an audience with limited access to extensive sets of inputs required for complex impact assessment models in terms of epidemiological, transport-related and economic data, and/or have limited experience of how to perform these assessments.

Method: The HEAT is developed through an open-ended, evidence- and multidisciplinary based approach. A core group reviews latest evidence, identifies next development steps and proposed possible approaches, which are then decided by consensus meetings with ad hoc invited international experts from various fields.

Results: HEAT assessments are based on only 2 input values (volume of walking/cycling and population number) and default values, which are based on best-available evidence or expert judgement and can be changed by the user. Initially only including reduced mortality from regular physical activity, the latest version also allows taking into account negative effects from air pollution, road crashes as well as carbon effects.

Conclusions: The main challenge of the HEAT approach is constant balancing of scientific robustness versus usability, supported by involvement of a wide range of experts. More systematic user feedback will further strengthen this successful tool and hopefully foster wider application, especially in the policy arena

The WHO Health Economic Assessment Tool (HEAT) for walking and cycling: How is it used?

Nick Cavill¹, Sonja Kahlmeier²

¹Cavill Associates Ltd, ²University of Zurich

The HEAT recently celebrated its tenth birthday: it has been available online since 2007. In that time it has been used by a wide variety of people from a range professional groups, including policy makers, researchers, professionals and students from all over the world. The HEAT is mainly used in the European region, but uses have been recorded by countries as far away as New Zealand, India or Mexico. The HEAT website was launched in May 2011. Since then, it has received almost 600.000 page views by over 34.000 users, or a weekly average number of visitors of about 170.

This presentation will give examples of varying uses of the HEAT from around the world. It will draw on research conducted for the European Cyclists' Federation on how to increase the use of the HEAT. This used a survey of users and semi-structured interviews to explore the use of the

HEAT and attitudes to its application. It will also draw on interviews conducted in 2017 with users from across Europe. The presentation will provide a unique insight into the ways the HEAT is being used, and introduce some challenges for future development of the tool.

Mainstreaming HEAT in a large transport authority

Lucy Saunders, Transport for London

Introduction: Transport for London - the strategic transport authority for Greater London in the UK - has been embedding public health in the organisation since 2013. This included a commitment in their Transport Health Action Plan (2014) to use the WHO HEAT for walking and cycling in business cases.

Method: A training programme was delivered to over 150 relevant staff across the organisation on how to use the tool. The training was accompanied by local implementation manual and standard data inputs to support use of the tool.

Results: A review was undertaken in 2018 to assess the extent to which the WHO HEAT was being used appropriately in business cases. This highlighted a number of challenges in embedding the use of this tool. There was reluctance among practitioners to ascribe a locally observed uplift in active travel with a net population physical activity benefit. There was an insufficient evidence base for proposing the likely uplift in active travel as a result of interventions. These factors among others were barriers to widespread use of the tool.

Conclusions: To ensure the WHO HEAT is used by practitioners to influence decision making a package of supporting measures is required.

The use of the HEAT to strengthen a town's physical activity policy

Susanna Aznar Lain, Universidad de Castilla-La Mancha

Toledo is a municipality and a city in Spain, capital of the autonomic community of Castilla-La Mancha. It has around 83,000 citizens (2015) and it is the second most populated municipality in the province. A major part of Toledo's action plan was focused on the building of a new cycle path from Toledo city to the Santa M^a de Benquerencia neighbourhood. The HEAT was therefore used to estimate the health benefits of the path, assuming different levels of usage. It also helped to compare the benefits to the cost of building the path (€400,000). The presentation will describe the process taken and how the HEAT findings helped to influence policy.

Examples and references to how the Health Economic Assessment Tool (HEAT) for walking and cycling has been used in Finland

Tanja Onatsu, Fit for Life Program, Finland

Introduction: the WHO Health Economic Assessment Tools (HEAT) for walking and cycling was first published in 2007 and officially launched in 2009. In 2011 an updated online version of the HEAT for cycling and walking were published. Since the HEAT-tools have been published it has been promoted widely in Finland which has resulted in its diverse usage.

Method: HEAT documents have been translated and published by Fit for Life Program in 2013. To further promote the HEAT-tools Fit for Life Program published case study application from the town of Joensuu. In 2014 was held two-day Mobility Management seminar and workshops seminars in 2015 which also promoted the tools. The usage of the HEAT was also promoted heavily through the network of cycling municipalities.

Results: As a result of this national-level promotion HEAT analyses have been carried out in national and local level. HEAT tool has been used in

Ministry of Transport and Communication's Programme on promoting walking and cycling as well as in many metropolitan and rural areas. Even some employees have done their own HEAT calculations in their promotion for active commuting. This presentation will give examples and references of uses of the HEAT in Finland.

Conclusions: HEAT tools have been widely used in Finland and its utilization is established in promotion for walking and cycling.

Session: Physical activity and social inequality: Using ethnography to make disadvantaged voices heard and inform interventions

Nature' as an affordable 'activity space'? The importance of attending to embodied space-time-income constraints.

Sarah Bell¹, Cassandra Phoenix²

¹University of Exeter, ²University of Bath

Recent years have seen growing efforts across research, policy and practice to counter our increasingly sedentary lifestyles, with a plethora of interventions emerging to increase physical activity levels across the population. Such interventions are often underpinned by health promotion messages that encourage people to 'move more' and to 'move faster'. Yet, such efforts often overlook the dynamic spatio-temporal contexts and embodied experiences that shape people's opportunities to be active in this way on a routine basis. We address this here, drawing on insights from two in-depth qualitative research studies; a geo-narrative doctoral study conducted with residents of two Cornish towns in 2013 to understand how and why people engage with their local 'green' and 'blue' spaces to gain a sense of wellbeing (or otherwise) through the life course, and a more recent 'Sensing Nature' study exploring how and why nature features in the everyday lives of people living with varied forms and severities of sight impairment. In this presentation, we focus specifically on the experiences of a sub-set of study participants whose opportunities to gain a sense of wellbeing through active encounters with their local nature settings are often undermined by long-term time-income and/or impairment-income constraints. By grounding opportunities to be active in the fine-grained spatio-temporal details of people's everyday lives, we argue that future health promotion policy and messaging around physical activity and sedentary behaviour could better reflect the realities of those it intends to serve.

External funding details: Funding: European Social Fund and Economic and Social Research Council.

Negotiating physical activity and mobility in a disadvantaged urban area: an ethnographic study with young people

Stephanie Morris, University of York

Evidence suggests that young people are more active when outside. However, their access to outdoor public spaces can be constrained because such spaces are associated with 'risk'; young people are often considered *in* danger or *a* danger to others. This study adopted a critical ethnographic approach to explore daily physical activity in 13-21-year-olds attending two youth centres in a disadvantaged urban area, using extensive participant observation and interviews, including go-along interviews. Findings show that the young people negotiated their sense of risk in their local environments in order to be mobile. Due to feelings of intimidation or fear, many of the young people avoided certain spaces at certain times of day, or moved around the area with friends for safety and enjoyment, whilst some young men presented themselves as fearless and tough. Many of the young people etched out spaces for fun and friendship, using outdoor spaces and

props in the material environment to engage in informal physical activity practices such as “hardcore parkour” or ‘childhood’ games. The youth centres helped the young people develop social connectedness needed for mobility, and provided less ‘risky’ and socially supportive spaces for unstructured or self-directed physical activity. Hence, for young people living in disadvantaged areas, engaging in youth centres may aid mobility and daily physical activity outside of PE, school, and organised sport club contexts.

External funding details: Funding: Economic and Social Research Council

How can school-based interventions make more of a difference?

Gareth Wiltshire, University of Bath

As social inequalities continue to significantly impact public health, physical inactivity in low socio-economic groups has become a particular concern. In recent years, children and young people have been targeted for physical activity promotion and schools have been positioned as important sites for intervention. Amidst a growing interest in conceptualising health behaviours as ‘social practices’ situated within cultural and material contexts, this presentation highlights how ethnographic research can help reveal the meaning and experience of school-based physical activity for young people as it relates to socio-economic status. Drawing on qualitative research from a range of methods (ethnography, visual methods, walking interviews and focus groups) from both primary and secondary schools, it is argued that socio-economic status provides important social conditions through which physical (in)activity is realised. Not only is it possible to see how young people in different socio-economic circumstances engage in different kinds of physically activity practices, but also that physical activity is understood and experienced in different ways. This raises concerns over the potential incommensurability between low socio-economic status pupils’ dispositions and the school contexts in which much health promotion is implemented. Data also highlight the complex interplay between pupils, school staff, parents and the physical environment in which physical activity is practised suggesting that interventions and policies aimed at reducing inequalities might benefit from being designed to reflect and accommodate these complexities. In seeking ways that this may be achieved in practice, the presentation concludes with findings from the School Culture Intervention Project pilot study.

Understanding women’s participation in walking groups in deprived areas: An ethnographic approach

Tessa Pollard¹, Stephanie Morris², Cornelia Guell³

¹Durham University, ²University of York, ³University of Exeter

Walking groups are promoted as an accessible and effective intervention to increase activity levels. However, there are concerns that walking group schemes may contribute to health inequalities because of higher levels of participation by advantaged groups. Our aim was to explore how walking groups located in deprived areas find a place in women’s lives. We conducted participant observation with five walking groups in north-east England, and interviews with 21 women, most of them members of these groups. Most study participants were aged over 60. All walks started in deprived areas, but many group members lived in less deprived neighbourhoods. Group members welcomed the experience of sociality, “fresh air” and “nature” associated with group walking. Many women had come to their walking group after retirement, unemployment, bereavement, or in the context of chronic illness or caring responsibilities. Women’s recruitment to walking groups also often depended on their links to resources such as friends or networks with links to walking groups. Thus, participation was often a result of a conjunction of three factors: positive experiences and understandings of walking, life circumstances that created a space for

walking, and social resources that linked women with walking groups. These factors are often patterned by socioeconomic status, which may result in higher levels of participation by those who are already advantaged. Walking groups should not be seen as a magic bullet for all, but can become embedded into some people’s “life projects” in beneficial ways.

Session: Tackling inactivity: improving the evidence base for the effectiveness of sport and physical activity in improving health and wellbeing

Evaluation of a national workplace physical activity and sport initiative in England: the CSP Network Workplace Challenge

Emma Adams¹, Hayley Musson¹, Andrew Watson²

¹Loughborough University, ²County Sports Partnership Network

Introduction: This study evaluated participation in, and the impact of, the Workplace Challenge, a multi-component intervention promoting sport and physical activity in employed adults. Intervention components include: logging activities online; activity challenges; and sports events/competitions.

Methods: A mixed methods evaluation was undertaken using: 1) online surveys (baseline; 3, 6 and 9 month follow-up); 2) activities logged on the programme website; and 3) focus groups/interviews with participants. Descriptive analysis of quantitative data was undertaken, along with using paired t-tests (continuous data) and McNemar’s test (categorical data) to assess changes in sport and physical activity. Qualitative data were analysed thematically.

Results: Overall, 63,653 employees registered for the programme (October 2013 – April 2017); of these 14,848 (23%) were inactive at baseline. Barriers to activity participation included ‘no time’, ‘not being motivated’, ‘young children/family’, ‘not the sporty type’ and ‘workplace culture/environment’. For inactive participants, the top five activities logged were walking (44.1%), road cycling (11.9%), running (9.7%), gym (4.4%) and swimming (2.9%). Increases were observed in the proportion of individuals participating in sport (baseline: 29.8%; 3 months: 51.6%; $p < 0.001$) and total minutes per week physical activity (baseline: 270.4 ± 476.8 minutes; 3 months: 452.1 ± 573.2 minutes; $p < 0.001$).

Conclusions: Workplace Challenge engaged large numbers of employees and increased sport and physical activity participation. To support future physical activity promotion in the workplace, barriers to activity and changes to workplace culture need to be addressed, along with providing activities suitable for inactive individuals.

External funding details: Workplace Challenge was funded through Sport England’s Lottery Funded Get Healthy Get Active portfolio.

How effective is community physical activity promotion in areas of deprivation for inactive adults with cardiovascular disease risk and/or mental health concerns?

Fiona Deans, Herts Sports Partnership / University of Hertfordshire

Introduction: A challenge all physical activity interventions face is targeting those members of the population who face the greatest barriers to becoming more active; these include those with lowest physical activity levels and those from socio-economically deprived neighbourhoods with little opportunity for participation in recreational activity. The prevention paradox proposed by Geoffrey Rose suggest that approaches that target whole-populations may be most efficacious to engage these groups, and this approach has been adopted by the Active Herts programme which targets the residents of four deprived areas in the county of Hertfordshire, England.

Method: A mixed-method approach combining quantitative outcomes evaluation and qualitative process evaluation. The evaluation is targeting the key delivery components including delivery staff training, the effects of activity socialisation and the long terms on participant physical activity and well-being.

Results: Evidence from the first 24-months of programme evaluation suggests that Active Herts is achieving its goals, with high levels of uptake from the most deprived communities and statistically significant improvements in participant physical activity and mental well-being 6 months post baseline. The use of skilled delivery staff who understand the barriers in this group has been key to the programme success. An unexpected benefit has also come from 'Conversation Cafés' which were originally run to gain evaluation feedback from participants but have turned into important opportunities for them to socialise together.

Conclusions: Using a range of approaches, Active Herts illustrates how a community focussed physical activity intervention can successfully reach those who are often overlooked by such programmes.

The Health and Sport Engagement Project: Findings from the design, outcome, process and economic evaluation of complex community sport intervention to increase physical activity and enhance health and wellbeing

Louise Mansfield¹, Nana Anokye², Tess Kay², Julia Fox-Rushby³

¹Brunel University, ²Brunel University London, ³King's College London

The HASE Project focused on tailored complex community sport provision and included a mixed methods outcome, process and economic evaluation. It engaged previously inactive people in sport for 1 x 30 minutes / week. This presentation outlines the methods and findings from participatory focus groups (n=32 x 1 hour) intended to ensure HASE activities met the needs of local inactive people. It explains how a bespoke package of public health training was delivered to sport coaches (n=15) to maximise the quality of relevant workforce knowledge in designing, delivering and engaging inactive people in community sport. The findings are presented and show that a total of 550 people engaged in the HASE project. There were large and significant increases in vigorous and moderate physical activity and sport during the design and training phase). There was a statistically significant increase over time in the degree of happiness felt by participants. Quality adjusted life years were slightly higher over time but not statistically significant. Costs of the project varied depending on the character of the inactive population and the delivery requirements. Overall, the HASE project showed that with the right support and provision, barriers to participating in sport can be overcome. Previously inactive people can take part in community sport activity, enjoy doing so, and potentially gain health and wellbeing benefits from participation.

External funding details: Sport England Get Health Get Active funding

Improving the evidence base for the effectiveness of sport and physical activity in improving health and wellbeing.

Amy Roden¹, Gabriella Frith²

¹Rotherham Metropolitan Borough Council, Public Health, ²Sheffield Hallam University

Active for Health is a robust physical activity & sport programme linking rehabilitation to community activity. The aim is to improve long term health & identify how physical activity pathways can contribute to the recovery from a long term condition (LTC), including Cancer, Stroke, Cardiac, Heart Failure, COPD, lower back pain, a recent fall or fracture. The programme is a three step pathway which links rehabilitation services & primary care to long term condition specific physical activity sessions.

The project involves health professionals & exercise specialists by developing a pathway that bridges the gap between NHS rehabilitation and community physical activity opportunities. A commissioned service model was implemented at the programme's inception, ensuring specialist and quality assured delivery by level 4 exercise providers. Additional mechanisms supporting the referrals, delivery and sustainability of the programme include; physical activity workshops, community buddies & clinical contact time.

To date there have been 1062 patients engaged (2015–2017), completing 13,407 visits. Self-reported physical activity levels were measured using IPAQ, with an increase in moderate activity from baseline (166.33) to 3 months (283.75). QALY has shown a significant improvement ($p < 0.05$) from 0.6761 at baseline to 0.7598 at 12 months. Active for Health currently offers over 50 sessions weekly, 28 community buddies have been recruited (2015 – 2017) to support sessions. The programme aims to revolutionise the role that physical activity plays in rehabilitation & recovery, by providing safe, effective & quality assured services in local communities, resulting in notable improvements in health & well-being.

The design principles

Sarah Ruane, Sport England

Tackling inactivity is one of the key areas of work that underpins Sport England's new strategy, Towards an Active Nation. It follows on from our previous work to explore the ways to engage and support inactive people to become active. The Get Healthy, Get Active fund was launched in 2012 to learn whether sport and physical activity projects can be designed to tackle inactivity, improve public health, reduce health inequalities and manage or prevent long-term health conditions. The investment held the specific aim to improve the evidence base for the effectiveness of sport and physical activity in improving population level health.

We have invested £13.8 million into 33 independently-evaluated pilot projects across England from 2013 – 2018, supporting over 134,694 inactive adults to move into physical activity and sport. The interventions test everything from the role of healthcare professionals and volunteers to how we change attitudes to physical activity.

A thematic analysis of this insight highlighted 10 key principles for developing projects and services to tackle inactivity. The Design Principles include; the importance of understanding the nature of inactivity, the role of behaviour change theories, audience insight, reframing messages away from 'sport', working in quality partnerships, supporting and measuring behaviour change, and scaling up what works.

This section will explore the key learnings and principles across the GHGA programme which can be utilised in future interventions to tackle the complex nature of inactivity and support population health and well-being in both the prevention and treatment of long term conditions.

Session: Walking and health: How much and how fast is enough?

What speed do adults walk? A systematic review and meta-analysis

Marie Murphy¹, Jacqueline Mair², Elroy Aguiar³, Catrine Tudor-Locke³, Elaine Murtagh⁴

¹Ulster University, ²Edinburgh Napier, ³University of Massachusetts, ⁴Mary Immaculate College

Walking has become the cornerstone of physical activity promotion for public health. One of the attractions of this form of activity is that it can be recommended by health professionals but done with little or no supervision. The health benefits of walking depend at least in part, on the relative

exercise intensity, determined by walking speed. Where walking is undertaken without supervision, self-selected walking speed is an important determinant of health benefit. This talk will present the findings of a systematic review of studies which have measured self-selected walking speed of apparently healthy adults. We will present a meta-analysis with standardised mean difference and 95% confidence intervals. Where sufficient data are available we will analyse walking speed and intensity by age, gender, BMI and activity status (e.g. inactive, habitual exercise walker) to describe habitual walking speeds in a range of populations.

Dose response of walking and CVD risk factors: frequency, intensity, bout duration, length and volume

Pekka Oja¹, Paul Kelly², Elaine Murtagh³, Marie Murphy⁴, Charlie Foster⁵, Sylvia Titzel⁶

¹UKK Institute, ²University of Edinburgh, ³Mary Immaculate College, ⁴Ulster University, ⁵Bristol University, ⁶University of Graz

Walking interventions in healthy populations show improvements for many cardiovascular disease (CVD) risk factors. As the dose-response characteristics between walking and the risk factors are of relevance for population interventions we assessed the relationships between the changes in CVD risk factors and the frequency, intensity, bout duration, length and volume of supervised walking interventions based on a systematic review of 37 randomized controlled trials.

Pooled meta-analyses showed statistically significant favorable effects of walking interventions for seven CVD risk factors: body mass, BMI, body fat, systolic and diastolic blood pressure, fasting glucose, and VO₂max. Despite testing 91 possible dose-response relationships, meta-regression analysis indicated only seven statistically significant associations.

Our findings suggest that the CVD benefits are largely independent of the frequency, intensity, bout duration, length and volume of walking interventions. These observations will be discussed with the perspective of promoting walking for population health.

Walking and health: How much and how fast is enough?

Emmanuel Stamatakis, University of Sydney

Walking is perhaps the most accessible form of physical activity for the large majority of the population. Interventions commonly recommend total volumes of walking at any pace but public health guidelines usually refer to walking of at least moderate intensity, which is often conveyed as a “brisk”

pace for most adults. There is relatively little evidence on the association between self-reported walking pace and mortality at the population level. This talk will present the results of a prospective analysis included in the ISPAH 2018 BJSM Special Issue on walking and health that examined the association between self-reported walking pace and all-cause, cardiovascular, and cancer mortality among 50,022 British adults. These findings and the relevant recent literature will be discussed in the context of whether any observed associations are causal or predictive, and what role measured and unmeasured confounding may play in shaping these associations.

Walking cadence (steps/min) and intensity in adults

Catrine Tudor-Locke¹, Ho Han², Elroy Aguiar¹, Tiago Barreira³, John Schuna⁴, Minsoo Kang⁵, David Rowe⁶

¹University of Massachusetts Amherst, ²Oklahoma State University, ³Syracuse University, ⁴Oregon State University, ⁵The University of Mississippi, ⁶University of Strathclyde

Cadence (steps/min) has been suggested as a reasonable proxy-indicator of ambulatory intensity. A summary of current evidence is needed for cadence-based metrics supporting benchmark (standard or point references) and threshold (minimums associated with desired outcomes) values that are informed by a systematic process. Therefore, a comprehensive search strategy was conducted to identify relevant studies focused on walking cadence and intensity for human adults. Identified studies (n = 38) included controlled (n = 11), free-living observational (n = 18), and intervention (n = 9) designs. There was a strong relationship between cadence (as measured by direct observation and objective assessments) and intensity (indirect calorimetry). Despite acknowledged inter-individual variability, ≥100 steps/min is a consistent heuristic (e.g., evidence-based, rounded) value associated with absolutely-defined moderate intensity (3 metabolic equivalents; METs). Emerging evidence suggests that >130 steps/minute may be similarly useful as a threshold value indicative of vigorous intensity (i.e., ≥6 METs) ambulatory activity. Peak cadence indicators may prove useful for capturing “best natural effort” in free-living behavior, but the evidence supporting benchmark and threshold values is immature at this time. The prescription and/or evaluation of cadence-based metrics in interventions is preliminary.

External funding details: This work was supported by a grant from the National Institute on Aging, National Institute of Health: CADENCE-Adults, 5R01AG049024-03.

Parallel Oral Sessions: Monday 15 October

Monday, 12:00–13:00

Session: Advocacy, policy and monitoring frameworks

A brief history of global physical activity policy measures and why they matter.

Michael Pratt, *Global Observatory for Physical Activity GoPA!*, University of California San Diego

Physical inactivity accounts for as many as 5 million deaths per year globally but has yet to be addressed effectively by most governments or the World Health Organization (WHO). Reasonable evidence for effective strategies exist, and several countries have implemented consistent public health policies and programs that have increased population prevalence of regular physical activity. Understanding why and how a few countries have developed sound public health programs for physical activity while most have not requires monitoring and evaluating policy, programmatic, and perhaps even research indicators in addition to more traditional surveillance of physical activity participation at the population level. Physical activity has lagged behind other equivalently important global public health issues as a priority for WHO and most countries. This may in part reflect inadequate measurement of key factors related to physical activity such as population prevalence, burden and cost, policies, programs, and recommendations. The aphorism “what gets measured gets done” may well apply here. It may also reflect insufficient evidence based advocacy for more effectively addressing physical inactivity as a public health priority. In this symposium we will address several key questions. Is it feasible to track physical activity policy for children and adults at the country level? Is the existence of “good” physical activity policy associated with less physical inactivity? How can policy indicators best be used for advocacy and to guide policy and programs? What organizations can or should monitor and evaluate physical activity policies globally? Are there lessons to be learned from global tobacco policy?

Learning from the tobacco/nutrition/obesity experience

Adrian Bauman, *Global Observatory for Physical Activity GoPA!*, University of Sydney

Introduction: This presentation examines the relevance of tobacco, alcohol and obesity policies on promoting population physical activity (PA). Much rhetoric surrounds tobacco policy successes, and is assumed transferable to PA.

Methods: Reviews / commentaries that described policy frameworks for food, tobacco and alcohol were extracted from Google, Scopus and Medline. A narrative synthesis considered key themes and successes, and their applicability to PA.

Results: Effective tobacco policy instruments include legislation, taxation, environmental regulation, incentives, social norms-changing campaigns, capacity building and clinical settings. Together these have diffused into many affluent countries, but policy progress remains slow in LMICs. For obesity policy, some countries report repeated sequences of policy frameworks, incompletely implemented without sustainable government resourcing. However, strategies for obesity prevention appear more effective as “upstream” policies (primordial prevention),

although downstream health system strategies may be politically more acceptable. For reducing sugar sweetened beverages, regulatory and taxation frameworks are effective, as are reformulation strategies and media campaigns. Similar approaches are effective for alcohol regulation and environmental restriction.

Conclusions: The multisectoral, complex aetiology of physical inactivity makes the policy context challenging. No single policy instruments can solve the cross-sectoral challenge of inactivity. Policy diffusion and policy emulation have not occurred nationally. Even clinical policies, such as the “Exercise is Medicine” framework remain to be adopted at scale. The 2004 WHO Strategy for Diet and Physical Activity increased policymakers awareness but resulted in limited implementation. The 2017 GAPP holds promise for building a better inter-sectoral case to promote government action.

From ‘car-dependency’ to ‘desirable walking’- trend in policy relevant indicators

Dafna Merom¹, Jacob Humphries², Ding Ding³, Grace Corpuz⁴, William Bellew³, Adrian Bauman⁵

¹University of Western Sydney, ²Biostatistics Training Program, NSW Health, ³University of Sydney, ⁴Office of Quality and Performance, Western Sydney University, ⁵University of Sydney

Background: Reducing car dependency in favour of health-enhancing active travel can address the issues of prolonged sitting and physical inactivity. This study utilises transportation-sector population surveys to develop interdisciplinary policy relevant indicators for benchmarking and progress tracking.

Methods: The continuous Sydney Greater Metropolitan Household Travel Survey (2000-June 2015) was analysed in 2017. The prevalence of adults (≥15 years old) who i) travelled by car for distances amenable for walking (≤1.5 km); ii) only drove a car and did not walk, including no walks that link to other modes (i.e., CD: ‘car-dependency’); and iii) walked ≥30 minutes, or ≥3 kms, or > 3 walking trips (i.e., DW: ‘desirable walking’) in the past 24 hours were examined including prevalence ratios for CD/DW by geographical regions.

Results: The adjusted yearly decline in the prevalence of CD was small (0.3%) but significant, from 40.3% (95% CI: 39.6 - 41.1) in 2000/3 to 39.3% (38.1-40.1) in 2012/14. DW remained unchanged, from 20.6% (95% CI:20.0; 21.2) to 21.2% (95%CI: 20.6-21.9). The adjusted yearly ratios of CD/DW presented a declining trend from 1.42 to 1.13. The CD/DW prevalence ratio varied greatly by distance from CBD, with medians ratios 0.86, 1.86 and 3.25 in short, medium and long distance categories, respectively. Across all periods 21% travelled by car for ≤1.5 kms, of those travellers 44% were car dependent.

Conclusion: These indicators can serve both transportation and health sectors wherever transport surveys exist, for benchmarking, monitoring and setting area- specific goals that are aligned with public health and transport policies.

Policy lessons learned through the Active Healthy Kids Global Alliance Report Cards

Mark S. Tremblay, *Healthy Active Living and Obesity Research Group, Children’s Hospital of Eastern Ontario Research Institute, Ottawa, Canada, Canada*

Introduction: The Active Healthy Kids Global Alliance was created to help power the movement to get kids moving around the world by recruiting and mentoring countries from around the world to develop and release a Report Card on the “state of the nation” of the physical activity of children. Report Cards follow a harmonized framework and process and include grades for “indicators” of individual behaviours and settings and sources of influence. A “Global Matrix” was developed to aggregate and compare Report Card grades across countries to identify best practices, success stories, and provide future guidance to “improve the grades”.

Methods: This presentation discusses findings from the Global Matrix with a focus on policy-related lessons learned from the grades.

Results: Overall, the results suggest a complex network of strengths and limitations across countries, with some global patterns emerging when comparing countries clustered by continent, Human Development Index, or inequality indices. A paradox of higher physical activity and lower sedentary behaviour in countries reporting poorer policy and environmental infrastructure, and lower physical activity and higher sedentary behaviour in countries reporting the opposite, suggests that autonomy to play, travel, or chore requirements and/or fewer attractive sedentary pursuits, rather than infrastructure and structured activities, may facilitate higher levels of physical activity. A policy–implementation disconnect or socio-cultural variation may partially explain this paradox.

Conclusions: International cooperation and cross-fertilization is encouraged to address existing challenges, understand underlying determinants, conceive innovative solutions, challenge conventional dogma, and mitigate the global childhood inactivity crisis.

Policy lessons learned through the Global Observatory for Physical Activity – GoPA!

Andrea Ramirez Varela, Global Observatory for Physical Activity GoPA!, Federal University of Pelotas

Introduction: Increasing physical activity (PA) is a global priority. Multiple distal and proximal determinants beyond individual choice are involved in explaining this modifiable risk factor. High quality resources to inform government policy and actions are essential for increasing PA. In 2013, WHO reported that 80.0% of countries had plans for addressing PA. However, only 55% of the plans were implemented, and only 42% of these were operational and funded. In response, there have been global calls for greater commitment to promote PA, most recently the 2017 WHO Global Action Plan for Physical Activity. GoPA! was created in 2013 as part of this global response to monitor national PA policy, surveillance and research.

Objective: Assess lessons learned after three years of policy monitoring by GoPA!.

Results: In 2016, GoPA! found that 76.3% of its members had policies or plans to address PA: 49.6% with a national NCD plan including PA, and 26.6% with a standalone national PA plan. 85.7% of Sub-Saharan African countries and 66.7% of low income countries had no plan. In 2017 GoPA! developed a global policy audit tool and conducted a pilot with twenty countries. Results varied greatly, however the feasibility of collecting detailed PA policy data was demonstrated.

Conclusion: National PA policy varies substantially by geographic area and country income group. PA policy indicators can enhance understanding of the links between policy and population levels of PA. GoPA! is committed to informing and encouraging adequate policy responses for addressing physical inactivity.

A policy framework approach to promote physical activity and tackle NCDs

Bryony Sinclair, World Cancer Research Fund International

Non-communicable diseases (NCDs) are the leading cause of death globally, accounting for two out of every three deaths, threatening global sustainable development. The prevention of cancer and other NCDs is arguably one of the most significant public health challenges of the 21st century. Governments are off track to meet the 9 voluntary global targets set out in the WHO’s Global NCD Action Plan 2013-2020, including a 10% reduction in physical inactivity. Public policy is critical to create environments conducive to healthy and active ways of living.

WCRF/AICR’s anticipated Third Expert Report, Diet, Nutrition, Physical Activity and Cancer: a Global Perspective brings together the latest research from the Continuous Update Project’s review of the accumulated evidence on cancer prevention and survival related to diet, nutrition and physical activity (launched 24th May 2018). Key findings of the report include strong evidence that physical activity protects against several cancers and that greater body fatness is a cause of many. Building on this report and our unique NOURISHING policy framework to promote healthy diets, we present a new policy framework that can be used as a tool to identify policy action to promote physical activity, healthy diets and breastfeeding and reduce alcohol consumption. The new framework demonstrates how common policy levers can be applied across these risk factors to make progress in achieving the global NCD targets and support the forthcoming WHO Global Action Plan to promote physical activity. Case studies of implemented physical activity policy actions from around the world will be presented.

Exploring the use of systems mapping in the development and dissemination of the draft WHO Global Action Plan to promote physical activity

Nick Cavill¹, Harry Rutter², Fiona Bull³

¹Cavill Associates Ltd, ²London School of Hygiene and Tropical Medicine, ³World Health Organization

Introduction: The World Health Organization’s draft global action plan on physical activity (GAPPA) proposes a set of specific policy actions to guide Member States’ efforts to promote physical activity. It emphasises the need for a ‘whole-of society paradigm shift’ to support and to value all people being regularly active, according to ability.

There is an increasing interest in the use of ‘whole systems approaches’ to complex problems such as physical inactivity. These aim to explore and understand the multiple and interacting influences on behaviours, and set them within the context of a complex adaptive system, rather than a set of separate and disconnected issues.

Activities: We set out to explore the extent to which systems thinking could help in the development and dissemination of the GAPPA. We developed a number of draft causal loop diagrams (CLDs) for physical activity. These set out the multiple and interacting influences on physical activity, including environmental; psychological and social influences. These draft CLDs were then discussed with key experts and stakeholders and used to ‘audit’ the actions in the draft GAPPA and to explore potential gaps or areas for future priority.

Results and Conclusions: The mapping process provided extremely interesting insights into the draft GAPPA, showed the extent to which it was taking a global whole systems approach, and identified gaps to be filled. It also proved to be a useful communication tool to develop understanding of the physical activity system and the system response necessary to create the required ‘whole-of-society paradigm shift’.

Session: Developments in wearable devices and analysis

Validation of the Sedentary Sphere in children: Does wrist or accelerometer brand matter?

Liezel Hurter¹, Alex Rowlands², Stuart Fairclough³, Zoe Knowles¹, Anna Cooper-Ryan⁴, Lorna Porcellato¹, Lynne Boddy¹

¹Liverpool John Moores University, ²University of Leicester, ³Edge Hill University, ⁴Salford University

Introduction: Posture classification is vital to sedentary behaviour measurement and central to its definition, though assessing posture using wrist-worn accelerometers is challenging. The Sedentary Sphere allows classification of posture based on arm elevation and has been validated in adults. This study aimed to further validate the Sedentary Sphere method of classifying posture from accelerometers worn on either wrist in children.

Methods: Twenty-seven 9-to-10 year old children wore ActiGraph GT9X and GENEActiv accelerometers on both wrists, and an activPAL on the thigh while completing five sedentary activities, standing with phone, walking (criterion: observation) and ten minutes free-living play (criterion: activPAL). Percent accuracy for posture estimates from both wrists and accelerometer brands were calculated. Pairwise 95% equivalence tests ($\pm 10\%$) and intra-class correlation coefficients (ICC) were used to evaluate agreement of posture estimates between wrists and between accelerometer brands.

Results: Mean percent accuracy was similar, irrespective of accelerometer brand, at 77% for the non-dominant wrist and 79% for the dominant wrist. Posture estimates could be considered equivalent between wrists within brand ($\pm 6\%$, ICC >0.81 , lower 95% CI >0.75), between brands worn on the same wrist ($\pm 5\%$, ICC >0.77 , lower 95% CI >0.72) and between brands worn on opposing wrists ($\pm 6\%$, ICC >0.78 , lower 95% CI >0.72).

Conclusion: This study validates the Sedentary Sphere method to classify posture from wrist-worn ActiGraph and GENEActiv accelerometers in children. The method is equally valid with data from either wrist and either brand of device and removes the requirement for multiple devices to assess both physical activity and sedentary behaviour in children.

Identifying active standing versus sitting using the “zero cadence” step metric

Aston K. McCullough, Elroy J. Aguiar, Scott W. Ducharme, Christopher C. Moore, Catrine Tudor-Locke, University of Massachusetts Amherst

Recent studies have used triaxial accelerometer activity counts to distinguish standing time from sitting time. Further research is needed on methods for classifying standing versus sitting using step-based metrics. Sparsely detected steps peppered into strings of 0 steps/min (i.e., zero cadence) may accurately identify such behaviors.

Purpose: To discriminate between active standing and sitting using steps/min data detected from wrist- and hip-worn ActiGraph GT9X accelerometers.

Methods: Participants [$N = 20$, women: 50%(10); mean age: 30(4.5) years; mean BMI: 24.6(4.3) kg/m²] engaged in three simulated tasks of daily living [i.e., seated rest (SITR), seated/typing at a computer (SITC), and standing/folding laundry (STND)] for 5-min bouts. Step counts detected in each scenario were analyzed in MATLAB R2017b. For each 5-min bout, cadence signals were deconstructed in both the time and frequency domains. Signal features from the time and frequency domains were modeled as predictors of each respective task using a Decision Tree

algorithm (CART) within a one-versus-all classification paradigm. To determine classification performance, the Receiver Operating Characteristic Area Under the Curve (AUC) and its bootstrapped 95% confidence interval (C.I.) were evaluated for each task and device location.

Results: For the wrist-worn location, the AUC(95% C.I.) were—SITR: 0.99(0.96-1.00), SITC: 0.95(0.88-0.97), and STND: 1.00(1.00-1.00). At the hip, values were—SITR: 0.50(0.50-0.50), SITC: 0.75(0.70-0.81), and STND: 0.98(0.90-1.00).

Conclusions: This preliminary evaluation of sparse step count episodes reveals that the “zero cadence” step metric can effectively distinguish between active standing time and sitting when devices are worn at the wrist or hip.

External funding details: Supported by NIH/NIA Grant 5R01AG04 9024—CADENCE-Adults.

Innovations in the use of raw accelerometry in epidemiology: A basis for harmonisation of physical activity outcomes across international datasets

Alex Rowlands¹, Charlotte Edwardson², Tatiana Plekhanova², Evgeny Mirkes³, Melanie Davies², Kamlesh Khunti², Tom Yates²

¹University of Leicester, ²Leicester Diabetes Centre, ³University of Leicester

Background: To capitalise on the increasing availability of accelerometry data for epidemiological research it is desirable to pool data from multiple surveys worldwide. This study aimed to establish which physical activity outcomes can be considered equivalent between three research-grade accelerometer brands worn on the dominant and non-dominant wrist.

Methods: Eleven adult participants wore a GENEActiv, Axivity and ActiGraph on both wrists for up to 7-days. Accelerometer data were processed using open-source software (GGIR) to generate mean daily activity outcomes (including average dynamic acceleration (ACC), intensity gradient, time inactive (≤ 50 mg) and time active (≥ 100 mg)). Agreement was assessed using pairwise 95% equivalence tests ($\pm 10\%$ equivalence zone) and intra-class correlation coefficients (ICC, 95% confidence interval (CI)).

Results: ACC and time active were higher ($p < 0.01$) when measured at the dominant wrist (31.9 vs 28.8 mg and 124 vs 114 min, respectively). ACC could be considered equivalent between monitors worn on the non-dominant wrist (ICC ≥ 0.88 , lower 95% CI ≥ 0.61). The intensity gradient (ICC ≥ 0.88 , lower 95% CI ≥ 0.55), time inactive (ICC ≥ 0.69 , lower 95% CI ≥ -0.06) and the number of valid days (ICC ≥ 0.95 , lower 95% CI ≥ 0.81), could be considered equivalent between all monitor/wrist pairings.

Conclusion: Free-living measures of average dynamic acceleration, and outputs that depend on acceleration magnitude, are higher at the dominant relative to the non-dominant wrist. Outputs that take into account the distribution of data, e.g. the intensity gradient and wear-time, are more consistent across wrist and monitor brand. These results will provide an evidence base for researchers wishing to harmonise data from surveys using different protocols and/or monitor brands.

Cadence (step/min) as an indicator of absolute and relative intensity in middle-aged adults

Catrine Tudor-Locke¹, Christopher Moor¹, Elroy Aguiar¹, Scott Ducharme¹, John Schuna², Tiago Barreira³, Stuart Chipkin¹, John Staudenmayer¹

¹University of Massachusetts Amherst, ²Oregon State University, ³Syracuse University

Introduction: Cadence (steps/min) thresholds may be associated with various indicators of absolute and relative intensity, including: metabolic equivalents (METs), percent of age-predicted maximum heart rate (%HRmax), percent of heart rate reserve (%HRR), and Borg Rating of Perceived Exertion (RPE).

Methods: Eighty adults (10 men and 10 women) from each 5-year age-group between 41-60 years (mean age = 50.2 ± 5.9 years; BMI = 26.0 ± 4.0 kg/m²) performed a series of 5-min treadmill bouts, starting at 0.22 m/s, and increasing in 0.22 m/s increments until participants: 1) chose to run, 2) achieved 75% HRmax, or 3) reported RPE >13. Cadence was directly observed. Oxygen consumption (VO₂) was measured using indirect calorimetry, with METs calculated from the final 2 min of each stage (VO₂*(3.5 mL/kg/min)-1). Absolute intensity was defined as moderate (3 METs) and vigorous (6 METs). Relative moderate and vigorous intensity was defined by the 2011 ACSM Position Stand. Receiver Operating Characteristic (ROC) models were used to identify optimal cadence thresholds.

Results: Cadence thresholds for the various indicators that corresponded to moderate and vigorous intensity were, respectively: METs – 98.5 and 121.9 steps/min; %HRmax – 112.9 and 122.1 steps/min; %HRR – 112.3 and 116.3 steps/min; RPE – 105.5 and 126.2 steps/min, respectively. All area under the curve values were >0.8, and all sensitivity and specificity values were >0.75 (87.5% were >0.8).

Conclusion: The cadence threshold for absolutely-defined moderate intensity was ~7-15 steps/min lower than those for indicators of relative intensity. Cadence thresholds for absolute and relative vigorous intensity agreed within of ± 5 steps/min.

External funding details: Supported by NIH/NIA Grant 5R01AG049024 - CADENCE-Adults.

Be aware of the consequences of cutting your cut-point when analysing sedentary behaviour and physical activity in youth.

Teatske Altenburg¹, Xinhui Wang¹, Evi van Ekris¹, Lars-Bo Andersen², Heidi Klakk³, Niels Christian Møller³, Niels Wedderkopp³, Mai Chin A Paw¹

¹VU University Medical Center, Amsterdam Public Health Research Institute, ²Norwegian School of Sport Sciences, ³University of Southern Denmark

Purpose: To examine the influence of cutting cut-points to 15- and 60-second epochs on (1) laboratory-controlled and (2) free-living sedentary behaviour (SB) and moderate-to-vigorous (MVPA) activity in youth.

Methods: For the first objective, data from a controlled laboratory study in children was used (n=80). Children performed eight sedentary and one physical activity for 10 minutes. For the second objective, data from the CHAMPS-study was used (n=902). Children wore an accelerometer at their right hip. We calculated mean differences in total time and time accumulated in bouts of SB, LPA and MVPA based on 15- and 60-second epochs.

Results: In the laboratory study, classification accuracy for SB was 88-99% and 97-100% for the 15- and 60-second epoch, respectively. Applying the 15-second epoch, 20-33% of dancing time was accurately classified as MVPA versus 0% for the 60-second epoch. Applying the 15-second epoch on free-living data resulted in 156 minutes more SB and 54 minutes more MVPA than the 60-second epoch. Time accumulated in SB bouts ≥ 10 minutes was lower when applying the 15-second than the 60-second epoch. No differences were found for MVPA bouts ≥ 10 minutes.

Conclusions: We recommend using a 15-second epoch when analysing both SB and MVPA as (1) misclassification was lower for assessing SB in

15-second epochs than MVPA in 60-second epochs, and (2) mean differences between applying 15- and 60-second epochs in free-living accelerometer data were relatively smaller for SB than MVPA. We recommend future controlled studies to examine the accuracy of classifying SB, light PA and MVPA.

NHANES and NNYFS wrist accelerometer data: Processing 7TB of data for public access

Rick Troiano¹, Stephen Intille², Dinesh John³, Binod Thapa Chhetry², Qu Tang⁴

¹National Cancer Institute, National Institutes of Health, ²College of Computer and Information Science and Bouvé College of Health Sciences, Northeastern University, ³Bouvé College of Health Sciences, Northeastern University, ⁴College of Engineering, Northeastern University

Purpose: The U.S. National Health and Nutrition Examination Survey (NHANES) 2011-2014 and the 2012 NHANES National Youth Fitness Survey (NNYFS) collected 80 Hz triaxial accelerometer data at the non-dominant wrist for up to 1 week on more than 15,000 participants ages 3 years and older. The data are being prepared for public release. This presentation will describe how the NHANES accelerometer data are being processed and how they will be made available.

Methods: Data are being processed on a protected cloud account provided by Amazon Web Services. Gt3x files were converted to an open source, flexible format for processing. A system for running data summarization algorithms in parallel using Python, Java, or R code was developed and tested with pilot data from approximately 700 participants and then scaled up. Data quality assessment was performed by examining distributions of selected signal features and summary data.

Results: NHANES accelerometer data will be processed to provide summary data (wear vs. non-wear vs. sleep estimates, activity volume) at the day and minute levels; high-resolution data will also be provided, including selected frequency and time domain features of the high-resolution signals. Daily and minute-level data will be provided for download from NCHS, while higher resolution data may require processing within a cloud environment.

Conclusions: Researchers will have facilitated access to high frequency and selected feature data from NHANES 2011-2014 and NNYFS for algorithm development, testing and application, as well as summary data for use in epidemiological and other analyses with NHANES data.

Physical activity levels in women and men measured by accelerometer. The Tromsø 7 Study 2015-16

Edvard Sagelv¹, Sigurd Pedersen¹, Alexander Horsch¹, Laila Arnesdatter Hopstock¹, Sameline Grimsgaard¹, Anna Norström², Séren Brage³, Ulf Ekelund⁴, Bente Morseth¹

¹UiT the Arctic University of Norway, ²Umeå University, ³MRC Epidemiology Unit, University of Cambridge, ⁴Norwegian School of Sport Sciences

Introduction: The health benefits of physical activity (PA) is undisputable. However, surveillance data of population PA patterns assessed objectively is rare. The objective of this study was to describe the PA patterns measured by accelerometer in a large Norwegian general population, and describe the prevalence of sufficiently active individuals according to the World Health Organization's recommendation for PA (150 min of moderate -or 75 min of vigorous PA or a combination of both in 10 min bouts).

Methods: A total of 21083 women and men aged 40-99 participated in Tromsø 7 Study in 2015-16. 6289 wore an accelerometer (ActiGraph wGT3X-BT) for eight consecutive days of which 6141 provided valid data. The counts per minute (CPM) cut-points for different PA intensities were as follows; Sedentary; <100 CPM, light PA; 100-1951 CPM; moderate PA; 1952-5724 CPM; vigorous PA; >5725 CPM.

Results: 1132 (18.4%) accumulated at least 150 min in moderate or 75 min in vigorous PA or a combination of both in 10 min bouts. Time spent in moderate and vigorous PA averaged 16.9 ± 16.4 min/day per day. The participants spent most of their time in sedentary and light PA; 11.6 ± 1.7 ($67.3 \pm 7.5\%$) and 5.2 ± 1.3 ($29.8 \pm 6.8\%$) hours per day, respectively.

Conclusion: The vast majority of Norwegian adults (>80%) do not fulfill the current recommendations for health enhancing physical activity.

Session: The impact of places and spaces on physical activity

Built environment change and neighbourhood socioeconomic disadvantage: are neighbourhood differences widening over time, and what are the implications for inequalities in physical activity and health?

Gavin Turrell¹, Jerome Rachele², Aislinn Healy³, Billie Giles-Corti⁴

¹Deakin University, ²The University of Melbourne, ³Australian Catholic University, ⁴RMIT University

Introduction: Reducing health inequality is a goal of many governments and international health authorities. As cities change and grow, a key question is whether changes in their built environments lead to a widening of inequalities in physical activity (leisure and transport-related) and health. This longitudinal study tracks built environment change over time (2007–2016) in a fast-growing high-income city (Brisbane, Australia) and examines whether change differs by neighbourhood disadvantage and the implications for inequalities in physical activity and health.

Methods: Data come from the HABITAT study. Built environment change is tracked for every neighbourhood in Brisbane ($n = 1,680$) across five time-points: 2007, 2009, 2011, 2013, and 2016. The built environment is measured using residential density, land-use mix, street connectivity, street lights, bike paths, and parks. Neighbourhood disadvantage is measured using a Census-based index. Analyses are conducted using ANOVA and random coefficient models.

Results: Built environment increases were observed for 3- and 4-way intersections, residential density, street lights, and bike paths, whereas land-use mix decreased. Disadvantaged neighbourhoods had a higher number of 4-way intersections and street lights, they were more residentially dense, had more metres of bike path, and had a more diverse land-use mix. Advantaged neighbourhoods had more 3-way intersections and greater park coverage. The rate of built environment change differed by neighbourhood disadvantage for most of the measures.

Conclusion: The magnitude and direction of built environment change showed a complex pattern which suggested that at a minimum, inequalities in physical activity and health will be sustained in the future.

Built environmental correlates of utilitarian walking among older adults: Does the type of activity places matter?

Camille Perchoux¹, Ruben Brondeel², Rania Wasfi², Olivier Klein³, Geoffrey Caruso⁴, Julie Vallée⁵, Sylvain Klein³, Benoit Thierry⁶, Basile Chaix⁷, Yan Kestens⁸, Philippe Gerber⁹

¹Luxembourg Institute of Socio-Economic Research, ²Centre de Recherche de l'université de Montréal, Université de Montréal, ³Luxembourg Institute of socio-economic research, ⁴Luxembourg Institute of

socio-economic research, Université du Luxembourg, ⁵UMR Géographie-cités - CNRS, Université Paris 1, Université Paris 7, ⁶Centre de Recherche de l'université de Montréal, ⁷INSERM, Sorbonne Université, Institut Pierre Louis d'épidémiologie et de Santé Publique, IPLESP UMR-S1136, ⁸Centre de Recherche de l'Université de Montréal, Université de Montréal, ⁹Luxembourg institute of socio-economic research

Introduction: Evidence on environmental determinants of utilitarian walking stresses the necessity to distinguish between commuting and errand. However, this work/non-work dichotomy is an over-simplification of “how travel behavior is influenced by urban form” (Krzek, 2003). Both the location and the type of activity are critical to understand travel modes. This study examines the influence of the type of activity conducted at a given location on walking, and the interaction effect with the built environment and distance to the place of residence.

Method: This study is based on a cohort of 470 elders (≥ 65 y) from the international CURHA project (Kestens et al. 2016). Information related to demographics, health status and regular activity locations were collected using standard questionnaires and the VERITAS survey. Associations between type of activity (personal, shop, free time, visit, meal, appointment), environmental characteristics (density of amenities, diversity, connectivity, public transport frequency), distance, and walking were analysed by generalized estimating equations models with logit link accounting for demographics, neighborhood self-selection, and physical health.

Results: The type of activity is a strong correlate of walking among elders. While density and diversity of amenities were associated with walking, evidence of interactions with the type of activity is less clear. The barrier effect of distance on walking strongly differ by type of activity.

Conclusion: While increasing interest is dedicated to “when” and “where” travel behavior is realized, this study stresses the importance of “contextualized data” by looking at the type of activity conducted at a specific location.

External funding details: Fond National Recherche Luxembourg

How does the university environment influence students' physical activity patterns?

Joseph Murphy¹, Ciaran MacDonncha¹, Marie H Murphy², Niamh Murphy³, Catherine B Woods¹

¹University of Limerick, ²Ulster University, ³Waterford Institute of Technology

Introduction: Attending university often involves moving from a family home environment to a more independent living and is accompanied by unhealthy behaviour changes such as decreasing physical activity (PA). The influence of the university campus on students' PA behaviours is understudied and unclear. Thus, the purpose of this study was to investigate the influence that the university environment and characteristics have on student PA behaviour.

Methods: An environmental audit tool was completed by the relevant personnel in each university ($n = 31$). Students ($n = 8,122$; 50.9% male; 21.51 ± 5.65 years) enrolled in these universities completed a supervised online survey gathering information about their PA behaviours. Two-step cluster analysis identified any PA behavioural patterns, while binary logistic regressions examined the influence of the university environment on these patterns. Age, sex, household income, and travel time to university were all controlled for in the analysis.

Results: Five clusters were identified from the analysis and were given names based on key behaviours: Not Active, Active Commuter, Active in

University, Active outside University, and Active Everywhere. Increasing the number of organisational structures ($OR = 2.331-9.375, p < 0.01$), the indoor facilities offered ($OR = 1.189-6.297, p < 0.05$), the number of sports clubs offered ($OR = 2.031-2.490, p < 0.05$), and the current investment available ($OR = 0.390-2.297, p < 0.01$) for PA altered the odds of a student having a behavioural pattern inclusive of PA versus no activity at all.

Conclusion: Increasing our knowledge of interactions between PA and the environment can aid with the development or adaption of university campuses to create optimum conditions for increasing PA and overall health of students.

Walkability index, land-use-mix, street connectivity, residential density and walking for transportation in Sao Paulo city, Brazil

Alex Florindo, Joao Paulo dos Anjos de Souza Barboza, Ligia Vizeu Barrozo

University of São Paulo

Aim: To create walkability index based in residential density, street connectivity, land-use-mix; and to verify the relationship of these variables with walking for transportation in adults who live in Sao Paulo city, Brazil.

Methods: We used Sao Paulo Health Survey/2015 ($n = 3,145$ adults) that was conducted in five health administration areas and in 150 census tract. Walking for transportation was evaluated by IPAQ questionnaire. Walkability index was elaborated based on residential density, land-use-mix and street connectivity that were obtained on census tract level where people live. We used Kruskal-Wallis and Poisson regression for statistical analysis.

Results: Walkability index was high in North area ($p < 0.001$), residential density was high in East ($p < 0.001$), land-use-mix was high in Southeast ($p < 0.001$), and street connectivity was high in Mid-west ($p < 0.001$). Areas with high family income had high street connectivity ($p = 0.001$) and land-use-mix ($p < 0.001$), however, areas with low family income had a high residential density ($p < 0.001$). Only land-use-mix was associated with walking for transportation. People who live in places with high quartiles of land-use-mix had more prevalence ratio to walking for transportation independent of the area of the city, sex, age, education and time living in the same residence (p trend = 0.020).

Conclusion: Only land-use-mix was associated with walking for transportation in adults who live in Sao Paulo. It is important to discuss variables that compose the walkability index in megacities. Increasing land-use-mix in other areas of the city favors walking for transportation with benefits for population health. The study was supported by FAPESP (2014-12682-1) and CNPq (306635-2016-0).

Investigating the impact of urban regeneration on public health: A real world natural experiment

Deepti Adlakha, Mark Tully, Ruth Hunter, Margaret Cupples, Frank Kee
Queen's University Belfast

Introduction: There is a dearth of evidence on the effectiveness of large-scale environmental interventions to help sustain changes in physical activity (PA) behaviours. The Connswater Community Greenway (CCG) is an example of a natural experiment, providing an opportunity to evaluate the public health impact of a major urban regeneration project in Belfast, UK. The CCG aims to regenerate and physically reconnect communities by creating a 9 km linear park offering opportunities for PA and recreation through built environment improvements including the construction of bicycle paths and walkways.

Methods: A representative random sample of 1,209 adults from 62 neighbourhoods in Belfast was recruited prior to the CCG regeneration (Feb 2010 – Jan 2011).

Results: At baseline, participants ($N = 1209$, female = 60%) completed questions on neighbourhood walkability, socio-economic characteristics and PA levels. Multinomial regression models showed adjusted odds of transport-related PA increased with access to public transport (aOR = 2.4, 95% CI = 1.2, 4.8), walking paths (aOR = 1.9, 95% CI = 1.4, 2.8), shops/stores (aOR = 1.9, 95% CI = 1.1, 3.5), and green space (aOR = 1.5, 95% CI = 1.0, 2.2). Presence of walking routes was significantly associated with levels of leisure related PA (aOR = 1.5, 95% CI = 1.0, 2.2). As part of a broader mixed evaluation, household surveys are being repeated after completion of the CCG in 2018 and pre-post assessment of the effects of the CCG on physical activity and health will be conducted.

Conclusion: By evaluating a 'real world' natural experiment, this study adds to the evidence-base about impacts of urban regeneration on public health as well as has implications for the development of natural experiment methodology.

The economic merit of walkable neighbourhoods: A case study in Melbourne, Australia

Belen Zapata Diomedi¹, Lucy Gunn², Claire Boulange², Billie Giles-Corti², Lennert Veerman¹

¹Griffith University, ²RMIT University

Introduction: In Australia, health and economic outcomes of urban developments have not been formally quantified. We address this using a method that could be applied to planned urban developments.

Methods: Health and economic outcomes were compared between three urban developments in Melbourne, Australia by combining a model estimating the probability of transport walking with a proportional multi-state multi-cohort life table model. Urban developments included a greenfield development, infill development, and a composite of highly walkable areas in Melbourne. Built environment features for each development and data on 16,890 adults from the Victorian Integrated Survey of Transport and Activity were used to simulate transport walking probabilities, which were then used in the proportional multi-state multi-cohort life table model to quantify health and economic outcomes between pairs of urban developments.

Results: If an adult population living in a greenfield development was instead exposed to an infill development then health benefits of 30 health-adjusted life years (HALYs), economic benefits of A\$3 million and healthcare costs savings of A\$0.1 million could be accrued. The benefits would be approximately 40% greater if they were exposed to highly walkable urban development. 36 HALYs gained, A\$4 million of economic benefits, and A\$0.3 health care costs savings were predicted if infill development residents were instead exposed to a highly walkable urban development.

Conclusions: Quantifying health and economic outcomes for different urban developments provides important information of the unassessed consequences of city design. This research demonstrates that more walkable neighbourhoods could significantly contribute to population health and the economy.

What are the preliminary findings on the impact of city-wide 20mph/30kph legislation in Edinburgh and Belfast?

Paul Kelly¹, Glenna Nightingale¹, Andrew Williams², Ruth Hunter³, Ruth Jepson¹, Nicole Porter¹, Jillian Manner¹

¹University of Edinburgh, ²University of Exeter, ³Queens University Belfast

Implementation of 20 mph speed limits has recently taken place in Edinburgh and Belfast. This presentation will explore the preliminary

analyses in terms of: driver perceptions; public support; perceptions of safety; road speeds; number and type of road casualties; and attitudes and levels of walking and cycling.

Data sources for analyses will include routinely collected data (e.g. national surveys), naturally occurring data (e.g. automatic cycle and pedestrian counters) and purposefully collected data by external organisations (e.g. Sustrans Route User Intercept Surveys). We also implemented our own Driver and Resident Perceptions survey pre and post implementation in 3 (of 6) implementation zones in Edinburgh.

Data were collected at varying time points and with varying data collection points. As a result, we will use a number of designs and models to analyse the effects including pre-post, time-series and controlled before-and-after designs.

Preliminary data analyses are planned for April 2018. For each of the research questions we will also explore (where and when possible and using appropriate techniques) how the effects differ between areas and population groups (age, gender, and socioeconomic status) and the time-frame for different effects.

Findings will be used to test, refine and modify the Programme Theory and Logic Model. Our overarching objective is to assess the impacts and outcomes of introducing a city-wide 20 mph speed limit in Edinburgh and a city centre speed limit in Belfast.

External funding details: This research was funded by a grant from NIHR grant number 15/82/12

Session: Physical activity and older adults

Choose to Move: Evaluation of a physical activity intervention for older adults delivered at scale across BC, Canada

Heather McKay¹, Lindsay Nettlefold¹, Christa Hoy¹, Adrian Bauman², Joanie Sims-Gould¹

¹University of British Columbia, ²University of Sydney

Introduction: With BC Ministry of Health funding we engaged two community-based organizations to deliver a scalable, evidence-based PA intervention for low active (<150 min/week) older adults (≥60 y). We evaluated intervention effectiveness at both organizations.

Method: Choose to Move (CTM) is a 6-month choice-based PA intervention being scaled up across BC, Canada. Using implementation and scale up frameworks we collaborated with organizations to adapt CTM delivery to their organizational context. We gathered socio-demographic characteristics at baseline and assessed our primary (PA) and secondary (mobility and social connectedness) outcomes at baseline, 3 and 6 months via questionnaire. We explored the role of delivery organization in participant level outcomes via mixed effects models.

Results: On average, PA, and mobility increased, and loneliness decreased from 0 to 3 and 6 months. Social exclusion was decreased at 3, but not 6 months. Most socio-demographic characteristics differed between the two organizations (% female, ethnicity, educational attainment, number of chronic conditions, mobility limitations, self-rated health). Despite this, change over time for PA, loneliness and social exclusion was similar between organizations. However, at 6 months, increased mobility was only apparent at one organization.

Conclusion: The two delivery organizations appear to serve different populations which is valuable for extending reach. Despite differences at baseline, the response to the intervention was similar for many key outcomes among participants at each delivery organization.

External funding details: This work was supported by a Grant-in-Aid from the Ministry of Health, British Columbia and a project grant from the Canadian Institutes of Health Research (CIHR; PJT-153248).

The effects of a 12-week comprehensive golf training program on functional fitness in older adults

Andrea Du Bois¹, Nicole Marcione¹, Steven Castle², George Salem¹

¹University of Southern California, ²VA Greater Los Angeles Healthcare System

Introduction: Aging is associated with declines in muscular performance, cardiovascular endurance, and balance that can impair the ability to perform activities of daily living. Multimodal physical activity interventions are effective in attenuating these declines. Golf is a popular recreational activity that contains multiple components which include walking the golf course, bending over to pick up a golf ball, and high-velocity golf swings. Therefore, the purpose of this study was to investigate the effects of a comprehensive golf training program on the functional fitness of older adults.

Methods: Eight, non-golfing older adults (Age: 70.8 ± 3.5 y) completed a two days per week, twelve-week comprehensive golf training program. Training consisted of complimentary exercises, swing training, and a gradual introduction to golf play. Pre- and post-training, participants completed a six-minute walk (6MWT), 30-second chair stand (CHAIR), 8-foot up and go (UPGO), and grip strength (GRIP) test.

Results: Following the golf-training program 6MWT ($\Delta = 66.4 \pm 55.2$ yd), CHAIR ($\Delta = 1.6 \pm 1.6$ repetitions), and UPGO ($\Delta = -1.1 \pm 0.3$ s) significantly improved ($p \leq 0.024$). There were no significant changes in GRIP ($\Delta = 0.68 \pm 3.48$ kg; $p = 0.622$).

Conclusion: Cardiorespiratory endurance, lower body muscular strength/power and balance/agility all improved following participation in the golf training program. These improvements can be attributed to the multimodal nature of golf play. However, grip strength did not improve following the golf training program, likely due to the low-load, high-velocity movement pattern of the golf swing. Overall, these results support a comprehensive golf training program as a plausible activity intervention to improve function in older adults.

The impact of physical activity and sitting time on mobility disability-free life expectancy

Paul Gardiner, Wendy Brown, The University of Queensland

Introduction: Low physical activity (PA) and high sitting time (ST) are risk factors for development of mobility disability. However, their impact on mobility disability-free life expectancy has not been estimated.

Method: Six waves of data were collected over 15 years from 6,289 participants in the 1921-26 cohort of the Australian Longitudinal Study on Women's Health. Self-report data were collected on mobility disability (limited ability to climb several flights of stairs and walk 500 metres), PA (low = 0-599, high = 600+ MET minutes/week) and ST (low = 0-7.99, high = 8+ hours/week). Mortality was determined by linkage to the National Death Index. Total life expectancy and mobility disability-free life years were estimated using continuous-time multi-state survival models.

Results: Life expectancy was higher in high PA women (8.6 [95% CI: 7.9, 9.1] and 9.9 [9.5, 10.3] years for high and low ST respectively) than low PA women (8.1 [7.7, 8.5] years and 9.5 [9.1, 9.8] years for high and low ST respectively), and 1.3 and 1.4 years higher in the low ST groups within each PA category. The proportion of remaining years that were mobility

disability-free was higher in high PA women (54.7 [53.0, 56.5]% for high ST and 58.6 [56.3, 60.8]% for low ST), than in low PA women (40.7 [38.7, 41.5]% for high ST and 48.5 [47.6, 49.3]% for low ST).

Conclusion: ST had a greater impact on total life expectancy than PA, whereas PA had a greater impact on years lived without mobility disability. Targeting both behaviours will ensure longer and healthier lives for older women.

Device-measured and self-reported sedentary behaviour and quality of life: a prospective study of community-dwelling older men.

Barbara J. Jeffers¹, Daniel Aggio¹, Lucy Lennon¹, Sarah Ash¹, Olia Papacosta¹, Goya Wannamethee¹, Peter Whincup²

¹University College London, ²St George's, University of London

Background: In older adults, structured exercise is associated with better quality of life (QoL), but associations with sedentary behaviours (SB) are less clear. We investigate how SB (total and types) are prospectively related to QoL, and whether SES or presence of mobility limitations modify associations.

Methods: Cohort of men recruited in UK primary care practices. In 2010-12 1566/3137 men (aged 71-91 years) wore a GT3x Actigraph and self-reported types of SB, occupation, education and functional limitations. In 2014 Older People's QoL scale was completed. Regression models investigated associations between SB and QoL in 844 men with sufficient data. Interactions with SES and functional limitations were tested.

Results: Men spent 71% of their day sedentary (<100 counts/minute). Total SB (accelerometer-measured or self-reported) did not vary by education or occupation, but men with less education and manual occupation reported more TV and car-based SB, and less computer and reading SB. Men with mobility limitations had higher total accelerometer and self-report SB and TV SB than men without. Mean QoL was 55.8 (SD6.5). Each additional hour of total accelerometer-measured, self-reported and TV SB were associated with poorer QoL; -0.89(95%CI -1.30, -0.48), -0.13 (95%CI -0.17, -0.09) and -0.08(95%CI -0.11, -0.05). Associations between SB and QoL were not modified by SES or mobility limitations, except that accelerometer-measured SB was only associated with lower QoL in mobility-limited men.

Conclusion: In highly sedentary older men, higher total accelerometer and self-report SB and TV SB time were prospectively associated with lower QoL, mostly regardless of mobility limitations and SES.

External funding details: The British Regional Heart study is supported by British Heart Foundation grants (RG/08/013/25942, RG/13/16/30528). The British Heart Foundation had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Why do older adults start and continue to walk with organised walking groups?: A qualitative systematic review

Nicky Laing¹, Ailsa Niven¹, Samantha Fawcner¹, Anne Martin², Paul Kelly¹

¹University of Edinburgh, ²University of Glasgow

Introduction: Older adults are one of the least active groups within the UK, and the Government recommends walking for older adults to meet PA guidelines (Department of Health, 2011). Group walking also provides shared experiences and social opportunities (Killingback, 2017). Understanding why older adults start and continue to walk in groups will help promote walking. The purpose of this qualitative systematic review was to

identify why older adults start and continue walking in organised groups. Factors relating to starting, continuing will be determined, including overlap.

Method: Eleven databases were searched with keywords: walking/PA; older adult terms; and walking program(mmes) terms. Inclusion criteria comprised walkers aged 60 plus, attendance at walking groups up to 6 months (initiation phase) and 6 months plus (continuing phase). PRISMA guidelines, including PROSPERO registration, were followed. Thematic synthesis methodology was undertaken.

Results: Analysis is underway, with findings complete for ISPAH. Fourteen worldwide studies were identified for the qualitative review from 73 quantitative/qualitative combined eligible studies (9645 records identified, 9365 irrelevant and 280 full text screened). Seven studies reported initiation and continuing findings, the other seven initiation only. Preliminary findings align with the social/ecological model: individual (e.g history of walking); social (e.g companionship) and environmental (e.g walker safety). Many reasons for starting/continuing are the same but there are key differences.

Conclusion: Older adult group walkers worldwide report similar reasons for starting and continuing to walk with groups. Specific factors relating to health status, preferred environment, and older age, may assist with adherence.

External funding details: Paths for All SCO25535

A wearable technology-based intervention for breast cancer survivors: the ACTIVATE Trial

Brigid Lynch¹, Nga Nguyen¹, Marina Reeves², Melissa Moore³, Dori Rosenberg⁴, Terry Boyle⁵, Jeff Vallance⁶, Christine Friedenreich⁷, Dallas English⁸

¹Cancer Council Victoria, ²The University of Queensland, ³St Vincent's Hospital, ⁴Kaiser Permanente Washington Health Research Institute, ⁵University of South Australia, ⁶Athabasca University, ⁷Alberta Health Services, ⁸The University of Melbourne

Introduction: The benefits of physical activity after breast cancer are well recognized, but the majority of survivors are insufficiently active. The ACTIVATE Trial evaluated a 12-week intervention (Garmin Vivofit2[®]; a behavioural feedback and goal-setting session; five telephone-delivered health coaching sessions) designed to increase moderate-vigorous physical activity (MVPA) and reduce sedentary behaviour in this population.

Methods: We recruited and randomised 83 inactive, postmenopausal women (who had finished primary treatment for stage I-III breast cancer) to an intervention or control group. MVPA and sedentary behaviour were measured at baseline (T1) and end-of-intervention (T2), using the Actigraph[®] GT3X+ (MVPA) and the ActivPAL[™] (sedentary behaviour). Actigraph[®] 60 second epoch data were summarised using the triaxial cutpoint for MVPA (2691 counts per minute). Intention-to-treat linear mixed models were used to examine between-group differences post-intervention.

Results: Retention in the trial was high, with 80 (96%) participants completing T2 data collection. At T2, there was a significant between-group difference in MVPA of 68.7 min/week (95% CI: 21.7, 115.6). The trial resulted in a significant decrease in both total sedentary time and sedentary time accrued in prolonged bouts (≥ 20 mins), with between-group differences of 36.6 min/day (95% CI: -71.7, -1.6) and 42.1 min/day (95% CI: -82.7; -1.6), respectively.

Conclusion: Results of the ACTIVATE Trial suggest that wearable technology presents an inexpensive, scalable opportunity to facilitate a more active lifestyle for cancer survivors. Whether such wearable

technology-based interventions can create sustainable behavioural change should be assessed in future research.

External funding details: WCRF International Regular Grant Program 2015/1397

Physical activity and the older adult: A pragmatic, multi-perspective view of driving behaviour change in an ageing population: The REtirement in ACTION (REACT) study. A large-scale, multi-centre, pragmatic randomised control trial to prevent mobility-related disability in older adults. Successful recruitment strategies and findings from the baseline data

Janet Withall¹, Colin Greaves², Janice Thompson², Max Western³, Jolanthe de Koning¹, Jessica Bollen⁴, Sarah Moorlock², Vasiliki Zisi⁵, Afroditi Stathi¹

¹University of Bath, ²University of Birmingham, ³University of Southampton, ⁴University of Exeter, ⁵University of Thessaly

During old age, there is a population-wide transition towards frailty and increased demand for health and social care services. The US-based LIFE Study showed that improving fitness and leg muscle strength can prevent this transition to mobility-related disability in moderately frail older people. However, the LIFE intervention was highly intensive, so cost-effective “real-world” versions are urgently needed.

Aims: To adapt the LIFE intervention to a large, pragmatic UK-based multi-site trial to prevent progression to mobility-related disability in moderately frail older adults.

Methods: Using behaviour change theory and consultation with service users, service providers and experts in the field, we developed a logic model, identified targets for change and behaviour change strategies.

Results: REACT successfully recruited 777 participants at high risk for mobility-related disability. Recruitment strategies and challenges and participant baseline profiles will be presented. Twenty-seven REACT intervention groups are receiving twice-weekly aerobic, muscle-strengthening, flexibility and balance group exercise sessions (for 12 weeks), followed by weekly sessions for 9 months. Participants also attend a social/education programme to support sustainable lifestyle changes. REACT is delivered by qualified exercise professionals in voluntary sector and local authority settings.

Conclusions: This first international presentation of REACT baseline findings describes a complex, evidence-based intervention that has successfully engaged a hard to recruit group through targeted approaches that could be applied to other community-based physical activity programmes. The central role of local partners in REACT delivery has embedded skills in communities and built in future sustainability.

External funding details: REACT is funded by the English National Institute of Health Research

Session: Physical activity interventions for youths

Acute improvements in mathematics performance following randomisation to the Daily Mile (versus sedentary controls) in primary school children

Jade Morris, Andy Daly-Smith, Jim McKenna, Victoria Achrbold, Leeds Beckett University

Introduction: Despite its intuitive appeal, evidence regarding the impact of The Daily Mile™ (TDM) on academic performance (AP) is limited.

School based interventions assessing the acute impact of physical activity (PA) on AP and cognition suggest variable effects. This study explored the immediate effects of TDM on AP (mathematics fluency).

Method: In a randomised control trial, children from six schools ($n = 212$, age = 9.03 ± 0.56 , 59% girls), already participating in TDM, were individually allocated to either TDM (approximately 15-minutes aerobic exercise, $n = 112$) or control (normal academic lessons, excluding mathematics, $n = 100$). Pupils completed the Mathematics Addition and Subtraction, Speed and Accuracy Test (MASSAT) three times; familiarisation one-week prior, immediately before, and 5-minutes after both conditions. An ANCOVA (controlling for age, BMI and pre-test score) assessed changes in MASSAT total score (TS: total correct answers – total incorrect answers) and differences between control and TDM minutes in Moderate-to-Vigorous Physical Activity (MVPA) assessed by GT9 Link waist worn accelerometers using Evenson cutpoints.

Results: Baseline age, height, weight, BMI percentiles and MASSAT TS did not differ between conditions ($p > .05$). Greater post-test MASSAT TS's were observed for TDM participants ($M = 29.38 \pm 0.69$) vs controls ($M = 28.0 \pm 0.73$; $p = 0.038$, 95% CI [0.219, 7.54], $\eta^2 p = 0.021$). TDM participants accumulated significantly more minutes of MVPA ($M = 10.47 \pm 2.94$) compared to controls ($M = 0.48 \pm 0.92$; $p = 0.000$, 95% CI [9.38, 10.61], $\eta^2 p = 0.833$).

Conclusion: TDM accumulated an average 9.99 minutes/day additional MVPA, leading to significant improvements in mathematics fluency performance versus control. Subsequently, TDM may be used strategically prior to mathematics sessions to enhance performance. Longer-term studies are required to assess outcome and implementation.

“It’s a battle . . . You want to do it, but how will you get it done?”: Teachers’ and principals’ perceptions of implementing additional physical activity in school for academic performance

Vera van den Berg¹, Rosanne Salimi¹, Renate De Groot², Jelle Jolles³, Mai Chinapaw¹, Amika Singh¹

¹VU University Medical Center, ²Open University Heerlen, ³VU University

Purpose: School is an ideal setting to promote and increase physical activity (PA) in children. However, implementation of school-based PA programmes seems difficult, in particular due to schools’ focus on academic performance and a lack of involvement of school staff in program development. The potential cognitive and academic benefits of PA might increase chances of successful implementation. Therefore, the aim of this qualitative study was: (1) to explore the perceptions of teachers and principals with regard to implementation of additional PA aimed at improving cognitive and academic performance, and (2) to identify characteristics of PA programmes that according to them are feasible in daily school practice.

Methods: Twenty-six face-to-face semi-structured interviews were conducted with primary school teachers (grades 5 and 6) and principals in The Netherlands, and analysed using inductive content analysis.

Results/Conclusion: Teachers and principals expressed their willingness to implement additional PA if it benefits learning. Time constraints appeared to be a major barrier, and strongly influenced participants’ perceptions of feasible PA programmes. Teachers and principals emphasised that additional PA needs to be short, executed in the classroom, and provided in “ready-to-use” materials, i.e., that require no or little preparation time (e.g., a movie clip). Future research is needed to strengthen the evidence on the effects of PA for academic purposes, and should examine the forms of PA that are both effective as well as feasible in the school setting.

External funding details: The Netherlands Organisation for Scientific Research (NWO)

Did executive function, behavioral self-regulation, and school related well-being mediate the effect of school-based physical activity on academic performance in numeracy in ten-year-old children? The Active Smarter Kids (ASK) study

Katrine Nyvoll Aadland¹, Eivind Aadland², John Roger Andersen¹, Arne Lervåg³, Vegard Fusche Moe¹, Geir Kåre Resaland¹, Yngvar Ommundsen⁴

¹Western Norway University of Applied Sciences, ²Wester Norway University of Applied Sciences, ³University of Oslo, ⁴Norwegian School of Sports Sciences

Inconsistent findings exist for the effect of school-based physical activity interventions on academic performance. The Active Smarter Kids (ASK) study revealed a favorable intervention effect of school-based physical activity on academic performance in numeracy in a subsample of 10-year-old elementary schoolchildren performing poorer at baseline in numeracy. Aiming to explain this finding, we investigated the mediating effects of executive function, behavioral self-regulation, and school related well-being in the relation between the physical activity intervention and child's performance in numeracy. An ANCOVA model with latent variable structural equation modeling was estimated using data from 360 children (the lower third in academic performance in numeracy at baseline). The model consisted of the three latent factors as mediators; executive function, behavioral self-regulation, and school related well-being. We found no mediating effects of executive function, behavioral self-regulation or school related well-being in the relationship between the ASK intervention and academic performance in numeracy ($p \geq .256$). Our results suggest that the effect of the intervention on performance in numeracy in the present sample is not explained by change in executive function, behavioral self-regulation, or school related well-being. We suggest this finding mainly could be explained by the lack of effect of the intervention on the mediators, which might be due to an insufficient dose of physical activity.

Clinicaltrials.gov: NCT02132494.

External funding details: This work was supported by the Research Council of Norway under grant number 221047/F40, and the Gjensidige Foundation under grant number 1042294.

Reviewing peer-to-peer physical activity interventions with youth: interventions, rationales and effects

Julie Hellesøe Christensen¹, Peter Elsborg², Charlotte Demant Klinker², Glen Nielsen¹, Peter Bentsen²

¹University of Copenhagen, ²Steno Diabetes Center Copenhagen

Introduction: Peer-to-peer approaches have shown positive effects within different areas and settings for the promotion of health and well-being. Such approaches may be particularly relevant in interventions targeting youth, since young people are especially amenable to peer influences. Previous reviews have established effects of peer-to-peer interventions with youth related to e.g. tobacco, alcohol, sexual health, and nutrition. However, peer-led interventions with youth have not previously been reviewed with a primary focus on physical activity interventions.

Methods: A systematic search was conducted in five databases (Embase, Pubmed, Scopus, SPORTDiscus, and Web of Science) to explore peer-to-peer physical activity interventions with youth (age 10-25) in a peer-leader role. Two reviewers screened 1577 abstracts. Forty-five studies were selected for in-depth analysis.

Results: The review characterises and analyses the diverse range of physical activity-related peer interventions involving youth peer leaders. The study synthesises and discusses intervention characteristics; theoretical approaches; the education, role and influence of peer leaders; and health-related effects on peer leaders and participants. School- and community-based intervention studies from Africa, Asia, Australia, Europe, and North America have been included in the review.

Conclusion: The synthesis and analysis provides a knowledge base of rationales, theoretical approaches and types of physical activity interventions, as well as health-related effects on peer leaders and participants. These understandings should be of use for researchers and practitioners working with peer-to-peer approaches in this field.

External funding details: The research is funded by the Novo Nordisk Foundation (NNF17SH0026986) and Innovation Fund Denmark (7038-00204B).

The acceptability and feasibility of a novel peer-led school-based physical activity intervention for adolescent girls: The girls' peer activity (G-PACT) project

Michael Owen¹, Charlotte Kerner², Lisa Newson³, Robert Noonan¹, Whitney Curry⁴, Maria-Christina Kostel¹, Stuart Fairclough¹

¹Edge Hill University, ²Brunel University, ³Liverpool John Moores University, ⁴Cornwall Council

Introduction: This study assessed the feasibility and acceptability of a novel peer-led physical activity (PA) intervention for adolescent girls aged 13-14 years.

Methods: The intervention employed a three-tier peer-led model underpinned by Social Cognitive Theory (SCT) and Self-Determination Theory (SDT). The 8-week intervention was delivered in three schools and involved 233 participants. Each school recruited 12-16 girls to become PA-leaders, who received leadership training delivered by undergraduate PA students, who subsequently acted as their intervention mentors and role models. The PA-leaders were encouraged to support their school peers to engage in more PA. Two of the schools provided organised after-school PA opportunities which the PA-leaders actively promoted. The acceptability, practicality, engagement, and perceived success of the intervention was investigated using focus groups and interviews. Qualitative analysis adopted deductive and inductive methods, using SCT and SDT as thematic frameworks, and then exploring additional emergent themes.

Results: The intervention was perceived as feasible and acceptable between mentors ($n=6$) and leaders ($n=47$). However, the relationship between leaders and their peers ($n=196$) suggested uncertainty in delivery and engagement. Disparity was reported from the peers in how much and what information was conveyed to them by their PA-leaders.

Conclusions: This intervention was reported to be feasible and acceptable among mentors and PA-leaders. Teachers were supportive of the intervention and the intervention demonstrates innovation incorporating undergraduate students as mentors and role models to adolescent girls. Further research is needed to clarify the roles and responsibilities for the PA-leaders.

External funding details: This research was funded by Edge Hill University.

Results of a systematic and theoretical approach to scaling-up an efficacious school-based physical activity intervention for adolescents: 'Physical Activity for Everyone'

Matthew McLaughlin¹, Tom McKenzie², Rachel Sutherland², Libby Campbell², Nicole Nathan², Karen Gilham², Chris Rissel³, Nicola Kerr⁴, Ross

Morrison⁵, David Lubans⁶, Philip Morgan⁶, Luke Wolfenden², John Wiggers²

¹University of Newcastle, Hunter New England Population Health, ²Hunter New England Population Health, ³NSW Office of Preventive Health, ⁴Mid North Coast Local Health District, ⁵Department of Education, ⁶PRC for Physical Activity & Nutrition, University of Newcastle

Introduction: Comprehensive school-based physical activity (PA) interventions exist which are efficacious when tested under research conditions, however they often require adaptation for implementation at scale. We report the results of scaling-up Physical Activity 4 Everyone (PA4E1), an efficacious PA intervention conducted in Australian secondary schools.

Method: In the original cluster RCT, the PA4E1 intervention was delivered in five Australian secondary schools. Through the utilisation of implementation and scale-up frameworks and in co-production with researchers and end-users, including principals, teachers, and students, PA4E1 was subsequently scaled for delivery in 38 schools, using a four-stage iterative process which included; 1) collection of data on barriers and enablers of the intervention; 2) addressing identified barriers by developing implementation strategies using the Theoretical Domains Framework; 3) consultation with key stakeholders to prioritise these implementation strategies, and 4) an expert advisory group review of the scaled intervention.

Results: The implementation trial retains the original efficacy intervention's focus on achieving seven school PA practices, however has made modifications to the implementation support strategies by replacing: 1) face-to-face teacher professional learning with primarily online delivery methods; 2) project specific learning with accredited education sector courses; 3) verbal prompts and manually generated feedback reports with automated prompts and feedback via an online portal; 4) the external change agent with both an internal (School Champion) and an external (Support Officer) change agent; and 5) paper resources with an online portal. Conclusion: Five main modifications were made to scale the intervention, in line with implementation and scale-up frameworks.

Evidence into Practise to increase children's physical activity through schools settings: An exploration of pupils' experiences of participating in a school based running programme: Marathon Kids

Anna Chalkley¹, Ash Routen², Jo Harris², Lorraine Cale², Trish Gorely³, Lauren Sherar²

¹National Centre for Sport and Exercise Medicine, Loughborough University, ²National Centre for Sport and Exercise Medicine, School of Sport, Exercise and Health Sciences, Loughborough University, ³Department of Nursing, University of the Highlands and Islands

Introduction: There is a growing interest in school-based interventions providing additional physical activity outside of physical education. Subsequently, many school based running programmes are being implemented across the UK in a grass roots style movement. However, research on the implementation of these programmes is relatively underdeveloped. Therefore, the aim of this study was to qualitatively explore pupils' experiences of participating and identify barriers and facilitations to their participation.

Methods: Nine semi-structured focus groups were conducted with a purposeful sample of 55 pupils (27 girls and 28 boys) aged between five and ten years. Pupils were recruited from five schools in England who had implemented the programme for a minimum of one academic year. Transcripts were analysed using an inductive thematic approach.

Results: Pupils identified a range of organisational, interpersonal and intrapersonal barriers and facilitators to participation. Perceived facilitators

included enjoyment, motivation to achieve a 'personal best' and peer support and acceptance. Other important facilitators included the use of rewards and incentives, time spent outdoors, and having a structured/ formal opportunity to participate in activity during lunchtime. Cheating, inclement weather and the school's weather policy, and lack of playground space were all identified as barriers.

Conclusions: Pupils' needs and preferences for participating in a physical activity programme should be taken into consideration prior to implementation in school. Furthermore, schools should evaluate the delivery of the programme, and what impact it is having on pupils, to allow adaptation and tailoring.

External funding details: This study was funded by London Marathon Events Ltd and Kids Run Free

Session: Promoting physical activity: From mechanisms to systems

Development of an agent-based model to explore population patterns and trends of leisure-time physical activity

Leandro Garcia¹, Ana Diez Roux², André Martins³, Yong Yang⁴, Alex Florindo³

¹University of Cambridge, ²Drexel University, ³University of Sao Paulo, ⁴University of Memphis

Introduction: Most of the actions aiming to promote leisure-time physical activity (LTPA) at population level showed small or null effects. Approaching the problem from a systems science perspective may shed light on the reasons for these results. We developed an agent-based model to explore how the interaction between psychological attributes and built and social environments leads to the formation and evolution of LTPA patterns in adult populations.

Method: The modeling process consisted of four stages: (1) conceptual model development, (2) model implementation, (3) parametrization, and (4) consistency and sensitivity analyses. The model represents a stylized community containing two types of agents: people and LTPA sites. People interact with each other (proximal network and perceived community) and with the built environment (LTPA sites) over time. Decision-making is based on the person's intention to practice LTPA, conditioned to the perceived environment. Each iteration is equivalent to one week and we assessed a period of 10 years.

Results: The model was able to reproduce population temporal trends of intention and LTPA reported in literature. Sensitivity analyses indicated that population patterns and trends of intention and LTPA were highly affected by the relationship between person's behavior in the preceding week and his current intention, the person's access to built and social environment, and the proportion of LTPA sites.

Conclusions: The proposed agent-based model is suitable to explore the formation and evolution of LTPA patterns among adults, considering the dynamic interaction between individuals' psychological attributes and the built and social environments in which they live.

External funding details: LG has worked under the auspices of the Centre for Diet and Activity Research (CEDAR), a UKCRC Public Health Research Centre of Excellence, which is funded by the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust. LG was also supported by scholarships from the Brazilian Coordination for the Improvement of Higher Education Personnel. AA receives a fellowship from the Brazilian National Council for Scientific and Technological Development (CNPq) (grant 306635/2016-0).

Putting physical activity and sedentary behaviours into context: a systems science perspective for measuring the interplay of multiple lifestyle health behaviours in daily living

Tapio Paljarvi, Nichola Gale, Shantini Paranjothy, Cardiff University

Introduction: Interventions targeting multiple health behaviours may be more effective than interventions targeting only one health behaviour. The purpose of this study is to establish the multidirectional relationships between seven modifiable lifestyle risk factors (alcohol use, diet, sleep, stress, physical activity (PA), sedentary behaviours (SB), and tobacco use) by using a systems science perspective.

Methods: This study is part of a larger prospective two-site (UK and US) pilot study on lifestyle cancer risk behaviours. We aim to recruit a convenience sample of up to 60 healthy community-living adults aged 18-65 who live in the study catchment areas in Wales, UK (50%), and Ohio, US (50%). The study consists of two research laboratory visits and a 14-day data collection period between the visits, during which participants will complete daily diaries on their health behaviours, and they will wear a research-grade accelerometer (Actigraph GT9X Link) on their wrist to objectively measure PA, SB, and sleep.

Results: The results will be analysed to identify the key components of PA and SB systems, to determine how the components are related, what feedback loops operate in the system, what are potential barriers and sources of resistance to change, and to identify potential behavioural outcome delays.

Conclusion: Using a novel systems science perspective on multiple interrelated health behaviours, this study will improve our understanding on how lifestyle health behaviours are interrelated, and how to manage interdependence and potential non-linearity across multiple health behaviours in behavioural change interventions.

External funding details: Funding: Cancer Research UK International Innovation

The influence of social network structure on adolescents' level of physical activity

Tracie Barnett¹, Henderson Melanie²

¹Institut Armand Frappier- INRS, ²Université de Montréal

We examined the relationship between the structure and composition of adolescents' person social networks, and their levels of physical activity, using pilot data collected in the QUALITY study, an ongoing investigation on the natural history of obesity. Participating adolescents (egos) nominated up to 10 significant others (alters). Egos reported alter behaviours (e.g. frequency of being physical active: never to very often) and characteristics (e.g. frequency of interactions; proximity of residence) as well as ties between alters (whether or not friends knew each other and how well). Sedentary time was measured with accelerometers worn for 7 days (minimum 4 days, 10 hours per day). Relationships were examined with Spearman rank correlations.

Social network analysis was performed in 46 adolescents (mean age 16.3 yrs). On average each ego nominated 6.6 alters, and 51% lived outside ego's neighbourhood. Across networks, the average proportion of frequently physically active alters was 30%. Average degree centrality (an indicator of greater ties between alters) was 0.46, i.e. on average each alter was connected to 46% network members.

Overall, sedentary time was positively correlated with network size ($r = 0.3$) and with the proportion of friends living outside the neighbourhood ($r = 0.4$); it was negatively correlated with normalized average degree centrality ($r = -.3$) (i.e. the most sedentary adolescents had fewer friends who knew each other).

Findings suggest that fewer opportunities for face to face interactions may be contributing to increased sedentary time. The findings help identify key social and environmental targets to enhance interventions to reduce sedentary behaviour.

To what extent gender plays a role in physical activity parenting practices

Louise C Mâsse¹, Nicole S Carbert¹, Teresia M O'Connor², Tom Baranowski², Mark R Beauchamp¹, Sheryl O Hughes²

¹University of British Columbia, ²Baylor College of Medicine

Purpose: Parents play a critical role in socializing children's physical activity (PA) but the extent to which mothers and fathers differ in their PA parenting practices remains understudied. This study examined differences in mothers' and fathers' activity-related parenting practices while considering the moderating effect of child's gender.

Method: Canadian parents ($n = 602$) of 5- to 12-year old children were recruited from a web-based panel [Mean age = 42; 51% mothers; 51% white; 44% income below median]. PA parenting practices were measured using an item bank composed of 3 domains measuring 12 constructs: control – pressure; autonomy support: outdoor-encouragement, general-encouragement, guided choice, involvement/praise, and rewards; c) structure: co-participation, expectations, facilitation, modeling, and outdoor-restriction, and indoor-restriction. The scales were validated using confirmatory factor analysis and Rasch analysis (α ranged from .76 to .92 and properties invariant by gender of parents). Multivariate analyses of covariance, which controlled for household income, were computed in Stata software 15.0.

Results: Mothers reported using fewer pressuring PA practices than fathers ($p < .05$). Parents reported fewer pressure- and expectation-related PA practices for girls relative to boys ($p < .05$). Additionally, there was evidence of a moderating association of child gender as fathers reported less outdoor-restrictions for boys relative to girls than mothers ($p < .05$).

Conclusion: Gender differences in PA exist, with boys typically more active than girls. The extent to which parenting practices reinforce this socialization process needs to be further investigated in light of the study findings. Furthermore, the findings underscore the importance of de-emphasizing socialization processes that may undermine girls' participation in PA.

What physical activity parenting practices relate to children's sense of autonomy, competence, relatedness, and motivation to be physically active?

Louise C Mâsse¹, Nicole S Carbert¹, Teresia M O'Connor², Yingyi Lin¹, Tom Baranowski², Mark R Beauchamp¹, Sheryl O Hughes²

¹University of British Columbia, ²Baylor College of Medicine

Purpose: This study examined whether physical activity (PA) parenting practices are associated with children's motivation to be active and whether this association is mediated by children's sense of autonomy, competence and relatedness.

Method: Participants were 124 parents (Mean age = 44; 52% mothers; 56% white; 37% income below median) and their children aged 10 to 13 (52% boys). PA parenting practices were measured using an expert-developed item bank composed of 3 main domains of parenting practices: control, autonomy support and structure. A questionnaire administered to children assessed PA motivation and three self-determination constructs (autonomy, competence, and relatedness). Stata version 15.0 was used to conduct the path analyses, which adjusted for child's age, gender and household income.

Results: Controlling and autonomy supportive parenting practices were significantly ($p < .05$) associated with children's motivation to be physically active ($\beta = -.44$ and $.46$, respectively) as well as being significantly ($p < .05$) associated with children's autonomy ($\beta = -.38$ and $.58$, respectively), competence ($\beta = -.22$ and $.47$, respectively) and relatedness ($\beta = -.25$ and $.43$, respectively). The associations between controlling parenting practices and children's motivation weakened when children's autonomy, competence and relatedness were entered as mediators but remained significant ($\beta = -.31$, $p = .002$). In contrast, the association between autonomy supportive parenting practices was fully mediated when children's autonomy, competence and relatedness were accounted for ($\beta = .16$, $p = 0.11$).

Conclusion: Our findings highlight how controlling and autonomy supportive PA parenting practices may be associated with children's motivation to be physically active and the potential importance of addressing these aspects in lifestyle behaviour modification interventions.

Play as a context for motor development in preschool children: a compositional analysis

Dr Lawrence Fowweather¹, Matteo Crotti¹, Till Utesch², Jonathan Foulkes³, Mareesa O'Dwyer⁴, Nicola Ridgers⁵, Zoe Knowles¹, Stuart Fairclough³, Gareth Stratton⁶

¹Liverpool John Moores University, ²University of Münster, ³Edge Hill University, ⁴Government of Ireland, ⁵Deakin University, ⁶Swansea University

Introduction: Play is suggested as an important context for physical development in preschoolers. However, empirical studies examining associations between fundamental movement skills (FMS) and play behaviors are lacking. This study aimed to examine associations between play behaviours during recess and FMS in typically developing preschool children.

Method: One hundred and thirty-three children (55% male; age mean 4.7 ± 0.5 yrs) from twelve preschools completed assessments of six locomotor and six object-control skills, which were video recorded for later analysis (Champs Motor Skill Protocol). A modified version of the System for Observing Children's Activity and Relationships during Play (SOCARP) was used to record preschool children's play behaviors (including activity level, activity type, group size and social interaction). A compositional data analysis was undertaken to examine associations between these play behaviours and FMS.

Results: For activity level, total skills score was negatively associated with very active only ($\beta = -1.3080$, $p = 0.0249$). For activity type, total skills score was positively associated with time spent in play without equipment ($\beta = 1.1772$, $p = 0.0021$), but negatively associated with locomotion activities ($\beta = -1.1527$, $p = 0.0202$). No associations were found between total skills score and group size or social interaction.

Conclusion: The findings suggest that play behaviors during recess may not be associated with FMS development. Preschool children may need more structured play or a richer playground environment to foster the development of FMS (including a wider variety of fixed and mobile play equipment). However, future studies should consider more detailed systematic observation tools to assess play behaviors and observe children for a longer duration.

Physical activity and DNA methylation in peripheral blood: results from the Melbourne Collaborative Cohort Study

Eline H. van Roekel¹, Pierre-Antoine Dugué², Dallas R. English², JiHoon E. Joo³, Ee Ming Wong³, Enes Makalic⁴, Melissa C. Southey³, Graham G. Giles², Roger L. Milne², Brigid M. Lynch²

¹Maastricht University, ²Cancer Epidemiology and Intelligence Division, Cancer Council Victoria, ³Genetic Epidemiology Laboratory, Department of Clinical Pathology, The University of Melbourne, ⁴Centre for Epidemiology and Biostatistics, Melbourne School of Population and Global Health

Introduction: Emerging evidence suggests that physical activity may exert beneficial effects on health via DNA methylation. We performed an epigenome-wide association study of physical activity and DNA methylation in peripheral blood.

Methods: DNA methylation was measured using the Illumina Infinium HumanMethylation450K BeadChip array in peripheral blood samples collected from participants ($N = 1,249$) in the Melbourne Collaborative Cohort study (MCCS). The International Physical Activity Questionnaire (IPAQ) was used to assess metabolic equivalent (MET)-hours/week of total and leisure-time physical activity. Linear mixed modelling was performed to assess cross-sectional associations between the physical activity measures and DNA methylation at 484,826 individual CpG sites, with adjustment for potential confounders and batch effects.

Results: Participants (67.5% male, mean age: 69.1 years) reported a median of 17.3 (interquartile range: 6.9, 34.7) and 0.0 (0.0, 12.0) MET-hours/week in total and leisure-time physical activity, respectively. Significant associations (P -values $< 10^{-7}$) were found for total MET-hours/week of physical activity with methylation at 2 CpG sites. Suggestive associations (P -values $< 10^{-5}$) were observed for 13 additional CpG sites with total MET-hours/week and for 7 CpG sites with leisure-time MET-hours/week. Some of these CpG sites are annotated to genes involved in inflammation (*SAA2*, *SNIP1*, *CYSTMI*), brain function (*BSN*), energy metabolism (*AKDI*) and cancer development (*SNIP1*, *KFL6*).

Conclusion: Physical activity may be associated with DNA methylation in peripheral blood at specific genes potentially related to disease development. Further research using objective activity data and larger sample sizes is warranted.

External funding details: This work was supported by the Australian National Health and Medical Research Council (NHMRC) (grant 1088405). MCCS cohort recruitment was funded by VicHealth and Cancer Council Victoria. The MCCS was further supported by Australian NHMRC grants 209057 and 396414 and by infrastructure provided by Cancer Council Victoria. Cases were ascertained through the Victorian Cancer Registry (VCR) and the Australian Cancer Database (Australian Institute of Health and Welfare). The nested case-control methylation studies were supported by the NHMRC grants 1011618, 1026892, 1027505, 1050198, 1043616 and 1074383. MCS is an NHMRC Senior Research Fellow (1061177). EHvR was supported by an Endeavour Research Fellowship from the Department of Education and Training of the Australian Government (6059-2017).

Monday, 16:00–17:00

Session: Interventions to promote physical activity in schools

Implementation and maintenance of a school-based multi-component physical activity intervention

Søren Smedegaard¹, Kristine Luise Lindhardt Clausen², Thomas Skovgaard³, Lars Breum Christiansen³

¹FIIBL/SDU, ²University of Southern Denmark, ³University of southern Denmark

Introduction: School-based physical activity interventions have to a large extent shown no or small effects, which could be caused by incomplete

implementation. Current research in the field focuses mainly on measuring effects, whereas factors related to implementation and maintenance has been explored and reported much less. The purpose of this study is to explore essential implementation and maintenance factors of a school-based intervention through the teachers' perspective.

Method: The study is based on the multicomponent intervention project 'Move for Well-being in Schools'. A collective case study is used and 18 teachers from the five best implementing schools participated in focus group interviews 20 months after intervention start-up. Durlak and Dupre's implementation categories constituted the analytical frame, and results are related to characteristics of the teachers, the intervention and the school system.

Results: The interviews revealed differences in implementation and maintenance across components and between schools. Eight factors were consistent for higher implementation and maintenance: development of teacher competence and self-efficacy; shared decision-making and agreement to participate; school management prioritising, planning and structuring; long-term perspective; all-teachers-participation; preparation time; on-going support from the expert team; and compatibility between the intervention and school structure and capacity.

Conclusion: This study points the attention to eight practical factors, which future school-based interventions should attend to. Most important precautions should be taken to secure that interventions are compatible with the schools and teachers and that the intervention can be adapted without losing effect.

External funding details: The study is funded by a donation from the non-profit foundation TrygFonden, Denmark.

Translation and scale-up of interventions to reduce sedentary behaviour and increase physical activity in schools and workplaces. Scaling up the Transform-Us! program to get Australian children moving more and sitting less

Jo Salmon¹, Harriet Koorts², Adrian Bauman³, David Lubans⁴, Chris Lonsdale⁵, Amanda Telford⁶, Nicola Ridgers², Karen Lamb², Lisa Barnett², Lauren Arundell², Helen Brown², Jacqui Della Gatta², Anna Timperio²

¹Deakin University, ²Institute for Physical Activity and Nutrition, Deakin University, ³Charles Perkins Centre, University of Sydney, ⁴Priority Research Centre for Physical Activity and Nutrition, The University of Newcastle, ⁵Institute for Positive Psychology and Education, Australian Catholic University, ⁶School of Education, RMIT

Introduction: The implementation of efficacious strategies to increase children's activity and reduce prolonged sitting at scale is a major challenge in public health research, policy and practice. The Transform-Us! program incorporated novel pedagogical and environmental strategies to successfully target these health behaviours and children's health. Transform-Us! is currently being disseminated state-wide as a 'real-world' program embedded into education and health practice and policy. Key learnings and challenges faced in each phase of the Transform-Us! evolution will be presented.

Methods: Transform-Us! implementation involves teacher professional development to deliver active lessons and active breaks throughout the school day, as well as active homework. Changes to the school environment include standing easels/desks, timers, access to novel sport/circus equipment in the classroom, and playground line markings. Adaptations to the training and material delivery have been made based on extensive piloting. Real-world implementation and effectiveness of the Transform-Us! program 'at scale' in partnership with key stakeholders commenced in 2017 and will continue to 2021. All Victorian primary schools (n = 1,786) will have access to the program.

Results: Considerations in translating the efficacious Transform-Us! program into a scalable program include: training delivery, material accessibility, equipment costs, program fidelity, adherence etc. Evaluation is occurring at the Partner/State, school and individual levels to determine the program's reach, effectiveness, adoption, implementation and maintenance.

Conclusion: Learnings from this implementation trial will provide valuable information regarding the challenges and successes of research to practice translation. The generalisability of this school-based approach is also being tested in the UK.

External funding details: NHMRC Partnership Project grant

Exploring Canadian elementary school teachers' self-efficacy to instruct physical education

Stephanie Truelove¹, Andrew Johnson², Shauna Burke², Trish Tucker²

¹University of Western Ontario, ²Western University

Introduction: Physical education (PE) provides students with an opportunity to be physically active, and a chance to learn, practice, and execute new motor skills. The quality of PE varies across Canada, however, as generalist teachers (i.e., teachers not specifically trained in PE) are typically responsible for instructing PE class at the elementary school level.

Objectives: This study explored the self-efficacy of generalist and specialist teachers (i.e., those specifically trained in PE) to instruct PE.

Methods: Elementary school teachers across Canada were invited via social media to take part in an online survey to examine their self-efficacy to teach PE. The Teacher Efficacy Scale for Physical Education, a valid and reliable tool, assesses four domains of teacher self-efficacy: motivation, analysis of skill, preparation, and communication. Data collection is ongoing and will cease in Spring 2018. Data will be analyzed using independent sample t-tests to compare generalist and specialist teachers' self-efficacy for instructing PE.

Results: Mean self-efficacy scores for both generalist and specialist PE teachers for the 4 self-efficacy domains will be presented, along with any differences that may be found between groups.

Future Directions: A preliminary and detailed description of the PE instruction self-efficacy of elementary teachers in Canada will provide an important foundation upon which future research in this area can be conducted. Potential implications for school-based curriculum will also be discussed.

External funding details: This project was supported by the Mitacs Accelerate Program and the GoodLife Kids Foundation.

A school-based gamification strategy to reduce obesity: results from a pilot study

Sebastián Peña¹, Macarena Carranza², Paula Espinoza², Valeska Müller², Ricardo Cerda³, Pedro Zitko⁴, Andrea Cortinez⁵, Nicolas Loira⁶, Cristobal Cuadrado³

¹National Institute for Health and Welfare, ²Municipality of Santiago, ³University of Chile, ⁴King's College, London, ⁵Pontifical University of Chile, ⁶Independent adviser

Background: School-based interventions have shown mixed results. Most studies have lacked enough statistical power and have been carried out in North America and Europe. We report the results of the gamification strategy and effectiveness of a pilot study in Santiago de Chile.

Methods: The Juntos Santiago cluster-randomized trial uses a gamification strategy (i.e. elements of a game, points, levels and rewards) with a strong community participation component. Participants of the pilot study were 381 children in 5th and 6th grade of three schools selected by

convenience. Children voted their enrolment and collectively chose the activity reward they were playing for. The intervention consisted of a healthy snacks and steps challenge. The primary outcome was change in BMI zscore and waist circumference.

Results: Of enrolled students, 88% was examined at baseline and follow-up. Unhealthy snacks brought from home reduced by 6.5 percentage points. Data from steps challenge was not available due to encryption of activity trackers. We observed statistically significant reductions in zBMI (-0.09) and waist circumference (-0.79 cms). No difference was observed for BMI. Systolic blood pressure reduced on average 5.19 mmHg and diastolic blood pressure increased by 1.48 mmHg. The latter changes are likely due to equipment change. Results of the 2018 trial in 4000 participants will also be presented.

Conclusions: Despite the short duration of the pilot, results are promising. The gamification strategy appears to foster community engagement. Attention should be given to data extraction and quality assurance prior the beginning of the trial in 2018.

External funding details: Bloomberg Philanthropies

Using the classroom and a mix of participatory methods to engage lower education secondary school adolescents in mapping their assets to stimulate active lifestyles: the SALVO project in the Netherlands.

Gwendolijn Boonekamp¹, John Dierx²

¹HAN University of Applied Sciences, ²AVANS University of Applied Sciences

Adolescents in pre vocational education schools in the Netherlands exercise less and are less often member of organized sports organisations compared to their peers from other educational levels. Projects that have been developed and performed in stimulating physical activity in these adolescents do not seem to be effective. One of the reasons may be that many of these projects are dominated by professionals and do not take the adolescents' perspective into account.

The SALVO project in the Netherlands introduced a different approach engaging adolescents in an earlier stage of the project: as a class they were given a voice and a role in mapping their assets and prioritizing what do with them in terms of organizing interventions within the school setting. In this way we reached all children; not only the ones interested in physical activity. Two participatory methods were used: the "structured interview matrix" and "photovoice".

In this presentation we introduce the combined methods we used to map assets with adolescents in the secondary school settings and present the asset maps that were the result of both an inductive and deductive analysis, based on the results of the sessions in two classes in the Netherlands.

External funding details: This work was funded by the Netherlands Organisation for Health Research and Development (ZONmw) under the research programme "Sport" and co-funded by the HAN University of Applied Sciences, Institute of Sports and Exercise and the University of Applied Science of Amsterdam (HvA).

NAP SACC UK: feasibility cluster randomised controlled trial and process evaluation of an environmental intervention in nurseries and a web-based home intervention to increase physical activity, oral health and healthy eating in children aged 2–4 years

Ruth Kipping¹, Rebecca Langford¹, Rowan Brockman¹, Sian Wells¹, Chris Metcalfe¹, Angeliki Papadaki¹, James White², William Hollingworth¹, Laurence Moore³, Dianne Ward⁴, Rona Campbell¹, Bryar Kadir¹, Laura Tinner¹, Vanessa Er¹, Jane Collingwood¹, Alex Nicholson¹, Russell Jago¹

¹University of Bristol, ²Cardiff University, ³University of Glasgow, ⁴University of North Carolina at Chapel Hill

Background: The nutrition and physical activity self-assessment for childcare (NAP SACC) has shown evidence of effectiveness in the US but not the UK.

Methods: Feasibility cluster RCT including process and economic evaluations in nurseries in southwest England. Focus groups and interviews with staff and parents informed adaptation. Intervention comprised: two staff workshops; Health Visitor support to nurseries; web-based home component. Feasibility and acceptability of the intervention and methods assessed through observation and interviews. Feasibility of outcomes measures assessed at baseline and post-intervention: zBMI, accelerometer-measured physical activity and sedentary time, screen time, diet, child quality-of-life, health care usage, parental and nursery staff mediators and quality of nursery environment.

Results: Formative work resulted in: adding oral health; compliance with UK guidance; workshops led by local experts; and development of home component. 31.6% (12/38) of nurseries and 35.3% (168/476) of children recruited; no nurseries withdrew. Loss-to-follow-up was 14.2%. Interviews with four Health Visitors, 17 nursery staff and 20 parents. Feasibility and acceptability criteria were met; the intervention, trial design and methods were highly acceptable except for the home component (used by 14% of parents). There was suggestion of promise in intervention compared to control nurseries post-intervention for: accelerometer-measured total and moderate-to-vigorous PA; snacks; screen-time; proportion overweight/obese. Many parental and nursery knowledge and motivation mediators improved. Average cost of intervention: £1,184/nursery.

Conclusions: NAP SACC UK is feasible and acceptable, except for the home component, and effectiveness should be tested through a full-scale RCT.

External funding details: NIHR; North Somerset and Gloucestershire Councils; DECIPHER; Elizabeth Blackwell Institute.

Gerlev Playship – A successful national implementation strategy promoting physical activity in cities through political and school kids innovative processes

Finn Berggren¹, Rasmus Casper²

¹Gerlev Physical Education and Sports Academy, ²The Playship - Gerlev Center for Play and Movement

After years of traditional implementation programs in the Danish cities the Gerlev P.E & Sports Academy and Lauritzen Foundation launched in May 2015 the Gerlev Playship. The project is now finished after 4 seasons of sailing visiting more than 100 harbors introducing physical activities and games in the harbor environment. This project is the first of its kind in the world.

Methods: The Gerlev Playship – a former school ship - is the "Messenger for enjoyable Physical Activity" which creates high awareness when the sailship arrive the harbors in Denmark. The project is focusing on:

1. Policy discussions with local politicians and key-persons related to development of the harbor area during Team-building visionary sailing trips
2. Programs introducing active citizenships creating and designing local play and activity innovation by school kids
3. Activity programs for invited kindergartens, school classes and local residents

Results: All local governments/politicians in the different harbors have taken this possibility to create a new approach to discuss harbor and

activity development however the most impressive results have been educational programs for school kids to develop innovative active environments in their local community. The project has been evaluated by the University of Southern Denmark (CISC) and the evaluation and the different off spin from the project will be introduced.

Discussion: The different ways of collecting documentation will be discussed as well as future implementation programs based on the experience from Gerlev Playship

External funding details: The Gerlev Playship project has been fully economically funded by the Danish Lauritzen Foundation

Session: Physical activity and mental health

The development of an evidence-informed exercise toolkit for Canadian adults with depression

Guy Faulkner¹, Krista Glowacki²

¹University of British Columbia, ²University of British Columbia

Canadian clinical guidelines now recommend exercise as a treatment for depression. However, it is likely that most mental health professionals have not received any training in exercise prescription while similarly many exercise professionals may not have been exposed to training regarding mental health. This presentation will describe the systematic process undertaken in developing an evidence-informed toolkit for use by Canadian practitioners and patients. Using the AGREE II protocol to formulate content its development occurred over four phases. Phase 1: formative research. Interviews were conducted with patients with depression and clinicians treating patients with depression to identify their needs and preferences for support material. Phase 2: review of evidence base. A systematic review approach was used to gather the evidence to inform the recommendations. Based on this review, barriers and coping strategies were identified and communicated in the toolkit along with information on exercise prescription. Phase 3: development of evidence-informed content and format recommendations. A multidisciplinary panel of 12 leading researchers and providers in the area of exercise delivery, and depression treatment was formed to appraise the evidence from phase 2 and generate content and format recommendations for the toolkit. Phase 4: toolkit creation. The toolkit was created which is now being evaluated in practice. This project has lead to the development of the first evidence informed toolkit that can inform clinical practice by facilitating discussion of exercise with, and exercise prescription for, individuals with depression.

External funding details: Funding for this project was provided by the Canadian Institutes of Health Research (CIHR).

‘Walk This Way’: a pilot randomised controlled trial of a health coaching intervention to reduce sedentary behaviour in people with serious mental illness across UK community mental health teams

Brendon Stubbs¹, Julie Williams², Cathy Flower³, Lucy Barr-Hamilton³, Barbara Grey³, Kathryn Hubbard², Gilda Spaducci², Fiona Gaughran², Tom Craig²

¹King’s College London, ²King’s College London, ³South London and Maudsley NHS Foundation Trust

Cardiovascular disease (CVD) is the leading cause of premature death among people with severe mental illness (SMI). Sedentary behaviour (SB) is an independent risk factor for CVD and mortality and recent research has demonstrated this population spend almost 13 hours a day being sedentary. We developed a health coaching intervention (‘Walk this Way’) aiming to reducing sedentary behaviour (SB) and increasing physical activity (PA) in

people with SMI. We conducted a pilot randomised controlled trial over 17 weeks and recruited 40 people with SMI across three UK community mental health teams, who were randomised into the WTW intervention or treatment as usual. The WTW intervention consisted of an initial education session, fortnightly coaching, provision of mHealth devices and access to a weekly walking group. Objective SB and physical activity (PA) were captured with accelerometers. We recruited 40 people to the study and followed up 32 (80%). In total 65% completed the intervention. We noted positive changes in SB and PA in the intervention group compared to the control group at immediate follow up and after 6 months after the intervention. A process evaluation found that participants found the intervention feasible and acceptable and reported that this increased their confidence and reduced social isolation. Our preliminary results suggest that the intervention is feasible and acceptable to people with SMI using community mental health services in the UK. A larger study is needed to assess the effectiveness of the intervention and to assess the implementation challenges into routine NHS care.

An exercise psychology theory-based approach to addressing the treatment gap in the integration of physical activity within Australia’s Mental Health Care System

Amanda Rebar¹, Simon Rosenbaum², Benjamin Gardner³, Corneel Vandelanotte¹

¹Central Queensland University, ²University of New South Wales, ³King’s College London

Mental illness accounts for at least 13% of the total burden of disease in Australia, with 10% of the population living with long-term mental or behavioural problems. An alarming 75% of Australians with poor mental health are inactive. Although advancements have been made to integrate physical activity into the mental health care system, there remain major limitations in the national approach to prescribing physical activity for people with poor mental health. System-level barriers such as lack of referral pathways, in combination with person-level condition-specific barriers to physical activity result in major gaps in physical activity treatment. We will outline the current referral process for people with poor mental health to gain access to exercise professionals, and how this process, which is largely independent of the patients’ involvement, may be hindering an already diminished sense of perceived behavioural control. Additionally, we will present evidence from a large Queensland-based survey (N = 1244, 50% female; age: M = 55 years, SD = 15), of which the findings suggest that people with poor mental health had weaker physical activity habit than people with good mental health ($\beta = -0.06$, $p < .01$). We will discuss how this line of evidence may help to inform a revamping of the current lifestyle counselling approaches being provided by exercise professionals in Australia. This presentation will highlight the treatment gaps in the integration of physical activity within the Australian mental health care system and to take an exercise psychology theory-based approach to provide solutions to these limitations.

It’s all about the bouts: Rethinking physical activity guidelines with mental health in mind

Justin Richards¹, Barnes Michelle², Janette Brocklesby², Anna Kean³, Kris Mayo³, Glen McCarty², Hamish McEwen², Megan Walker³

¹Sport New Zealand, ²Sport NZ, ³Nielsen Research

Introduction: The association between physical activity and mental well-being is well established. However, current global physical activity recommendations are based on epidemiological evidence of its relationship with cardiovascular and metabolic health outcomes. We aim to use existing data to explore the relevance of these recommendations to mental well-being outcomes in adults.

Methods: We examined the nationally representative 2016 Active NZ survey data ($n = 18,052$). This comprised survey items for health-enhancing recreational physical activity (frequency, duration) and mental well-being (WHO-5). We used logistic regressions to examine the association of meeting physical activity recommendations (150 minutes/week) with mental well-being (dichotomised: “at-risk” threshold) adjusted for age, education and ethnicity. We repeated this analysis for incremental increases in physical activity frequency independent of duration.

Results: There was a positive dose-response association between meeting current physical activity recommendations and mental well-being ($OR = 1.58$ (95%CI:1.45-1.73). For physical activity frequency, there was only an association with mental well-being when participating at least three days/week ($OR = 1.34$ (95%CI:1.20-1.49). There was an incremental increase for each additional day to four days ($OR = 1.16$ (95%CI:1.02-1.33) and five days ($OR = 1.17$ (95%CI:1.01-1.35), but no additional increase for six days ($OR = 0.88$ (95%CI:0.73-1.06) or seven days ($OR = 1.02$ (95%CI:0.84-1.25).

Conclusion: Current global physical activity recommendations may not be appropriate for mental well-being outcomes. Our results suggest that physical activity must be spread over at least three days/week to benefit mental well-being with no additional gains from activity on more than five days/week. Further research is indicated to establish causation and the relative importance of physical activity duration for mental well-being.

Determinants of physical activity for people with serious mental illness - a qualitative study

Wolfgang Schebesch-Ruf¹, Arno Heimgartner², Sylvia Titze³

¹University of Graz, ²University of Graz, Department of Educational Science, ³University of Graz, Institute of Sport Science

Introduction: According to scientific studies, physical activity has a positive impact on symptoms of mental illness. However, there is a lack of theory-based programs how to effectively support people with mental illness to adopt regular physical activity behaviour. The aim of the presentation is to identify determinants of physical activity by analysing the individual perspective of people with mental illness.

Methods: Individuals were eligible if they had a diagnosed mental illness and attended a physical activity program run by a mental health NGO at least once a month since 2013. Semi-structured interviews were undertaken with 15 people (2 women) with a mean age of 36.7 (SD=11.8). Interview data were analysed using the “documentary method”.

Results: Three physical activity types were generated in the context of individual’s physical activity experience and family background. The first “rehabilitation-orientated” type described physical activity as a supportive measure to re-enter the labour market and develop a daily routine. For the second “social-orientated” type, the social well-being in the group was the primary motive for participating in the physical activity program. The third “trust-orientated” type described the trustful environment of the program as the main reason for participation.

Conclusion: Based on the different type-specific motives of attending a sports programme different settings (mental health care centers or sports clubs) might be needed to regularly attract people with mental illness. Furthermore, coaches with mental health literacy at sport clubs should be considered in the future.

Relatedness is a social mechanism underpinning the association between physical activity and mental health among adolescents

Isabelle Dore¹, Catherine Sabiston¹, Marie-Pierre Sylvestre², Mathieu Bélanger³

¹University of Toronto, ²University of Montreal, ³University of Sherbrooke

Introduction: Physical activity (PA) can improve mental health but underpinning mechanisms remain unclear. This study examine the associations between PA and mental health among adolescents and investigate whether relatedness in PA mediates this association.

Methods: Participants ($n = 756$, mean age = 10.3, SD = 0.6 at study inception) reported the number of days per week they were physically active for a total of at least 60 minutes (0-7 days) every 4 months for 5 years. Mental health was measured using the Mental Health Continuum and PA relatedness was assessed using the Relatedness in Physical Activity Scale. To account for temporality, measures of PA, relatedness and mental health were taken at cycle 14, 15, and 16, respectively. Multivariate linear regression was used to model the associations between PA and mental health controlling for sex, age, puberty status and neighborhood income. Mediation analyses used causal inference methods to estimate the controlled direct effect (CDE), natural direct and indirect effect (NDE, NIE) of PA relatedness.

Results: A significant positive association was observed for PA and mental health ((95%CI)=2.33 (1.17, 3.48) suggesting increased benefits on mental health for higher level of PA. A significant NIE was observed for PA relatedness (1.85 (0.87, 2.89)), suggesting that the positive association between PA and mental health is mediated by PA relatedness.

Conclusion: These results suggest that relatedness specific to the PA context represents a social mechanism through which PA impacts mental health positively. Interventions aiming at promoting mental health through PA among adolescents should encourage the development of PA relatedness.

What is it about football? The experiences of football and behaviour change among people with mental health problems

Jackie Hargreaves, Andy Pringle, Leeds Beckett University

Introduction: Physical activity is known to enhance mental health, physical health and recovery in people with mental health problems. However engagement and maintenance in physical activity is low. Football, provided by professional football teams has been found to be beneficial for people – especially men, with mental health problems. However, what happens during the football experience which engages individuals requires further exploration. The aim of this study was to explore the experiences of football provided by a professional club for people with mental health problems. A secondary aim was to explore, how people initially engage in football and how they maintain their engagement in football.

Method: Individual interviews were conducted with twelve men who played football. This football was provided by a professional football team. A hermeneutic phenomenological approach was undertaken for the thematic analysis.

Results: The analysis followed a journey from the initial engagement in football to exploring what happens to maintain engagement in football. Support and football being meaningful was essential for the initial engagement. Maintenance in football was facilitated by experiences of flow and enjoyment, through providing an optimum physical and social environment. The professional football club brought feelings of belonging and responsibility, as well as providing knowledge and skills.

Conclusion: Provision of football by a professional team was central to engaging men in the football sessions. Furthermore, to maintain engagement in football, the experiences should be enjoyable and enable experiences of flow. Outcomes could inform future football led mental health improvement programmes.

Session: Physical activity across the life course

Distinct trajectories of physical activity during life course in the general population: A systematic review

Irinja Lounassalo¹, Kasper Salin¹, Anna Kankaanpää², Mirja Hirvensalo¹, Sanna Palomäki¹, Asko Tolvanen¹, Xiaolin Yang², Tuija Tammelin²

¹University of Jyväskylä, ²LIKES Research Centre for Physical Activity and Health

Introduction: Researchers have started to use trajectory approach for identifying homogeneous subgroups of physical activity (PA) from heterogeneous populations. This study systematically reviewed the data concerning longitudinal PA trajectory classes from general population at different phases of life.

Methods: The included studies used finite mixture models for identifying trajectory classes of PA, exercise or sport participation. The four electronic databases searched were Medline Ovid, PubMed, Web of Science, and CINAHL from their launch up to August 15, 2016.

Results: Seventeen articles were included and organized into age groups: youngest (eight articles), middle (four articles), and oldest (five articles). These studies identified multiple PA trajectory classes, the most common number of classes being four, with some people being persistently active or inactive, and others changing their PA level. Several trajectory classes describing a decline in PA were identified especially among children and adolescents, while trajectory classes of increasers were observed among adults and older adults. The proportion of persistently active individuals was highest in the youngest group and lowest in the oldest group. The proportion of persistently inactive individuals was relatively high at all ages.

Conclusions: The reviewed articles identified distinct PA subgroups indicating that trajectory approach can provide novel information about the complexity of PA behavior compared to studying only population mean PA level. More variability was observed in the trajectory classes among youth than among older adults, suggesting that PA behavior stabilizes with age. The recognition of these subgroups could lead to more precise ways for targeting PA promotion.

Trajectories of physical activity types and their predictors during the transition to old age: a 20-year cohort study of British men

Daniel Aggio, Efsthios Papachristou, Olia Papacosta, Lucy Lennon, Sarah Ash, Peter Whincup, Goya Wannamethee, Barbara Jefferis, University College London

Introduction: Correlates of physical activity (PA) vary according to type. However, predictors of long-term patterns of PA types into old age are unknown. This study aimed to identify 20-year trajectories of PA types into old age and their predictors.

Methods: 7735 men (aged 40-59 years) recruited from UK towns in 1978-80 were followed up after 12, 16 and 20 years. Men reported participation in sport/exercise, recreational activity and walking, health status, lifestyle behaviours and socio-demographic characteristics. Group-based trajectory modelling (GBTM) identified the trajectories of PA types and associations with time-stable and time-varying covariates.

Results: Men with ≥ 3 measures of sport/exercise ($n = 5116$), recreational activity ($n = 5085$) and walking ($n = 5106$) were included in respective analyses. Three trajectory groups were identified for sport/exercise, four for recreational activity and three for walking. Poor health, obesity and smoking were associated with reduced odds of following a more favourable trajectory for all PA types. A range of socioeconomic, regional and

lifestyle inequalities were also associated with PA trajectories but the magnitude and direction of these inequalities were specific to PA type. For example, men with manual occupations were less likely to follow a favourable sport/exercise trajectory but more likely to follow an increasing walking trajectory compared to men with non-manual occupations. Retirement was associated with increased PA but this was largely due to increased sport/exercise participation.

Conclusion: PA trajectories from middle to old age vary by activity type. Most predictors of these trajectories were specific to the type of activity.

External funding details: BHF grants FS/15/70/32044, PG/13/86/30546 and RG/13/16/30528

The combined effects of time spent sleeping, sitting, standing and stepping on markers of cardio-metabolic health: a 24 hour behavioural paradigm using compositional analysis

Greg Biddle¹, Charlotte Edwardson², Joe Henson², Sebastien Chastin³, Melanie Davies², Kamlesh Khunti⁴, Stuart Biddle⁵, Alex Rowlands², Tom Yates²

¹University of Leicester, ^{NIHR Leicester Biomedical Research Centre}, ²NIHR Leicester Biomedical Research Centre; University of Leicester, ³Glasgow Caledonian University; Ghent University, ⁴University of Leicester; ^{NIHR Collaboration for Leadership in Applied Health Research and Care East Midlands}, ⁵University of Southern Queensland

Introduction: Given each day is bounded by 24 hours, time spent in one physical behaviour is co-dependent on time spent in another. The aim was to examine the association of time spent in different physical behaviours (sleep, sitting, standing and stepping) with adiposity and cardio-metabolic biomarkers, and to estimate change in these health markers when time is reallocated from one behaviour to another using a compositional analysis paradigm.

Methods: Adults at high risk of type 2 diabetes were recruited ($n = 1644$, age = 59 ± 5.72). Time spent sleeping, sitting, standing and stepping were measured using activPAL. These data were then combined to create a composition (24 hours). Adiposity, cholesterol (HDL, LDL) and triglycerides were measured. Data were analysed using multiple linear regression modelling with time variables transformed into isometric log ratios.

Results: Proportion of time spent sleeping, sitting, standing and stepping was associated with all markers of health (triglycerides only when adjusted for sex, age and ethnicity). Sitting and stepping (negatively and positively) were the most strongly associated behaviours within the composition. Replacing 30 minutes of sitting with stepping predicted decreases in BMI (by 5%), body fat percentage (3%) and waist circumference (1%). However, this relationship is asymmetrical, as replacing 30 minutes of stepping with sitting predicted increases in BMI (7%), body fat percentage (4%) and waist circumference (2%).

Conclusion: The composition of behaviours throughout the day are associated with markers of disease risk. Targeting both sitting time and time spent stepping are important aims of prevention programmes.

External funding details: NIHR Leicester Biomedical Research Centre

Change and stability in health and social factors in mid-adulthood and corresponding changes in leisure-time physical inactivity in a prospective cohort

Snehal Pinto Pereira, Chris Power, University College London

Background: To identify whether changes in adult health and social factors are associated with simultaneous changes in inactivity.

Methods: Health, social factors and leisure-time inactivity (activity frequency < 1/week) were self-reported at 33y and 50y in the 1958 British

birth cohort (N = 12,271). Baseline (33y) health and social factors and also change and stability in factors 33y-to-50y were related to inactivity patterns 33y-to-50y (never inactive, persistently inactive, deteriorating, or improving) using multinomial logistic regression.

Results: Approximately 31% were inactive at 33y and 50y; 35% changed status 33y-to-50y (17% deteriorating, 18% improving). Baseline poor health and obesity were associated with subsequent (33y-to-50y) inactivity; e.g. for poor health, relative risk ratios (RRRs) for deterioration (vs never inactive) and improvement (vs persistently inactive) were 1.38 (1.16,1.64) and 0.77(0.63,0.94) respectively. Adverse changes in health and weight were associated with simultaneous adverse inactivity patterns; e.g. worsening health (vs always good/excellent) was associated with higher risk of deterioration (RRR:2.20(1.85,2.62)) and lower risk of improvement (RRR:0.61(0.49,0.77)). However, improving health and weight loss were not associated with inactivity improvement. Worsening self-efficacy 33y-to-50y was associated with lower risk of inactivity improvement; there was no association between improving self-efficacy and inactivity change. Downward social mobility was not associated with inactivity deterioration or improvement. Change in depression, marriage/co-habitation and parenthood 33y-to-50y was not associated with inactivity change. No associations were observed for employment.

Conclusions: Associated changes in mid-life health factors with deleterious inactivity changes, highlight the importance of maintaining health, weight and self-efficacy across adulthood to deter inactivity.

External funding details: This work was supported by the Department of Health Policy Research Programme through the Public Health Research Consortium (PHRC) and supported by the National Institute for Health Research Biomedical Research Centre at Great Ormond Street Hospital for Children NHS Foundation Trust and University College London. SPP is funded by a UK Medical Research Council Career Development Award (ref: MR/P020372/1). The views expressed in the publication are those of the authors and not necessarily those of the Department of Health. Information about the wider programme of the PHRC is available from <http://phrc.lshtm.ac.uk>. The funders had no input into study design; data collection, analysis, and interpretation; in the writing of the report; and in the decision to submit the article for publication. Researchers were independent of influence from study funders.

Social interaction and physical activity in 6,401 older women: concurrent and 9-year prospective associations

Jannique van Uffelen¹, Kristiann C Heesch², Yolanda R van Gellecum³, Nicola W Burton⁴, Nancy A Pachana⁵, Wendy J Brown³

¹KU Leuven, ²Queensland University of Technology, Institute of Health & Biomedical Innovation and the School of Public Health and Social Work, Brisbane, QLD, Australia, ³The University of Queensland, School of Human Movement and Nutrition Sciences, and Centre for Research on Exercise, Physical Activity and Health, Brisbane, QLD, Australia, ⁴Griffith University School of Applied Psychology, Brisbane QLD, Australia, ⁵The University of Queensland, School of Psychology, Brisbane, QLD, Australia

Introduction: Although social support, including social interaction, and physical activity (PA) are important determinants of healthy ageing, the association between social interaction and PA in older women is unclear.

Method: Data were from 6,401 community-dwelling women, aged 73-78 years in 1999, who completed mail surveys in 1999, 2002, 2005 and 2008. The association between social interaction (Duke Scale; range 4-12 points; higher score indicates more interaction) and PA (Active Australia questionnaire; categorised as none, some, meeting guidelines) was assessed

using random intercept multivariable mixed models. Fully-adjusted concurrent and prospective models were run with PA as the outcome. Bidirectional associations were tested in prospective models with social support as the outcome.

Results: Concurrently, for every 1-point increase in social interaction score there was a 27% (95%CI: 23%-32%) increased likelihood of being in a higher PA category ($p < 0.001$). Prospectively, there was a 17% (12%-22%) increased likelihood ($p < 0.001$). The prospective association of PA with social interaction was small but significant: older women who did any PA scored 0.10 (0.04-0.16) points higher on future social interaction than those who did none ($p < 0.001$).

Conclusion: Social interaction is positively associated with current and future PA levels in older community-dwelling women. A small part of this can be explained by a bidirectional association. These findings emphasize the importance of strategies for increasing social interaction in older women and the inclusion of these strategies in interventions aimed at increasing PA.

External funding details: Data are from the Australian Longitudinal Study on Women's Health, funded by the Australian Government Department of Health.

Relationship of objectively measured physical activity and physical function of community-dwelling very old in Kawasaki, Japan: baseline assessment of Kawasaki well-being prospective cohort study

Yuko Oguma¹, Takayuki Tajima¹, Yoshinobu Saito¹, Shogo Fukui¹, Yayoi Kibayashi¹, Natsuko Yoshida¹, Hiroyuki Ishida¹, Takumi Hirata², Yukiko Abe¹, Yasumichi Arai¹

¹Keio University, ²Keio University

Introduction: The very old population (≥ 85 year-old) is increasing, comprising 15% of those aged ≥ 65 years in Japan. Little is known about their physical activity (PA), though PA is known to tremendously benefit their health. Therefore, we investigated their PA using the accelerometer and its relationship with physical function (PF).

Methods: Participants were 366 community-dwelling elderly aged 85-89 years (86.7 ± 1.4 years, BMI: 23.1 ± 3.0 kg/m², 53.3% female). We assessed PA with moderate-to-vigorous intensity (MVPA), light-intensity (LPA), and sedentary behavior (SB) objectively through the 7-day, waking hour tri-axial accelerometer monitoring. We performed PF assessments (hand grip strength, 5-m walk, open-eye standing, and time up-and-go), and three linear regression models: single-activity, partition, and isotemporal substitution (IS) models to assess the associations of SB, LPA, and MVPA with each measure of PF. The effects of substituting time in activity categories with equivalent time in another category on PF were examined using IS.

Results: The mean durations of MVPA, LPA, and SB were 20 ± 15 , 288 ± 94 , and 555 ± 116 min/day, respectively. There were significant positive associations of PF with LPA and MVPA in the single-activity, and only MVPA in the partition model. In IS models, replacing SB or LPA with MVPA showed significant favorable associations with all PF measures. Regarding grip strength, replacing SB with LPA showed a significantly positive association.

Conclusion: Replacing small amounts of SB and LPA with MVPA, even SB with LPA regarding grip strength, may contribute to improving PF in the very old men and women.

External funding details: This study was partly supported by JSPS KAKENHI Grant Number JP17H06151, and Keio Gijuku Academic Development Funds.

One Million Days of Mortality

Duncan McGregor¹, Sebastien Chastin², Philippa Dall¹, Javier Palarea-Albaladejo³

¹Glasgow Caledonian University, ²Glasgow Caledonian University, ³Biomathematics and Statistics Scotland (BioSS)

The “One Million Days of Mortality” study is an Open Science project organised by OpenCoDa.net to investigate the association between physical activity and mortality utilising techniques from compositional data analysis in conjunction with the more familiar Cox’s proportional hazards model. Multiple research teams will analyse their own datasets using harmonised methods (implemented in easy-to-use software provided by OpenCoDa.net) that we hope will form the basis for the largest study of its kind. Our ambition is to collect over one million person-days of mortality risk exposure.

Each team will publish their own results, but at the end of this study we will publish (with our collaborators) a harmonised meta-analysis based on the results across all of the teams, that will give us a fuller understanding of how mortality rates are associated with the allocation of time between different physical behaviours across the day.

The study will run between 1 April 2018 and 1 April 2019, and already includes well-characterised datasets such as “NHANES 2005-06”, “Health Survey for England 2008,” and “UK Biobank” but the project remains open to new teams interested in applying our software to new datasets.

The presentation will outline the current scope of the project, an update on progress to date, and the process for teams interested in participating.

External funding details: J. Palarea-Albaladejo has been supported by the Scottish Government’s Rural and Environment Science and Analytical Services Division (RESAS).

Session: Physical activity epidemiology

Increasing physical activity protects against cardiovascular, cancer and premature mortality independent of changes in diet, adiposity, comorbidities, blood pressure and lipids

Alexander Mok, Kay-Tee Khaw, Robert Luben, Nick Wareham, Soren Brage

University of Cambridge

Background: Physical activity (PA) assessed at baseline is protective against premature mortality. However, relating mortality risks to baseline PA may not account for within-person variation over the long-term. We studied the association between 10-year changes in PA and mortality from all-causes, cardiovascular disease (CVD) and cancer.

Methods: Prospective investigation of 14,443 men and women (40–79 years), with repeated lifestyle assessments in the EPIC-Norfolk study. Physical Activity Energy Expenditure (PAEE) was derived from self-report calibrated to objective data. Survival analysis (Cox-regression) with time-updated adjustments for age, sex, socio-demographics, comorbidities, overall diet quality, body mass index (BMI), blood pressure and lipids.

Results: During 169,420 person-years of follow-up, 3,121 deaths occurred. Physical activity was inversely associated with mortality. The fully-adjusted hazard ratios HR (95% CI), for each 1-kJ/kg/day per year increase in PAEE over 10-yr were: 0.77 (0.71 – 0.83) for all-cause mortality; 0.73 (0.64 – 0.84) for cardiovascular mortality and 0.89 (0.79 – 1.00) for cancer mortality. The strength of associations persisted even after adjusting for time-updated changes in diet, BMI, comorbidities, blood pressure and lipids. Joint analyses with baseline PA indicate that increases in activity irrespective of low, moderate or high baseline PA improved

longevity; fully-adjusted HRs of: 0.76 (0.65 – 0.89); 0.62 (0.53 – 0.74); and 0.48 (0.34 – 0.69), respectively.

Conclusions: In middle-aged and even older-adults, small increases in PA (irrespective of past levels) can improve longevity, independent of intermediary changes in diet, comorbidities, BMI, blood pressure and lipids. Further longevity benefits are also possible by increasing PA in already-active adults.

Burden of mortality and years of life lost by breast cancer attributable to physical inactivity in Brazilian female population

Diego Augusto Santos Silva¹, Mark Tremblay², Maria de Fatima Marinho de Souza³, Maximiliano Ribeiro Guerra⁴, Meghan Mooney⁵, Mohsen Naghavi⁵, Deborah Carvalho Malta⁶

¹Federal University of Santa Catarina, ²Healthy Active Living and Obesity Research Group, Children’s Hospital of Eastern Ontario Research Institute, Ottawa, Canada, ³Ministry of Health, Department of Surveillance of Noncommunicable Diseases, and Injuries, and Health Promotion, ⁴Federal University of Juiz de Fora, ⁵Institute for Health Metrics and Evaluation, ⁶Federal University of Minas Gerais

Introduction: The aim of this study was to estimate the mortality and years of life lost, investigated by disability-adjusted life-years (DALYs), due to breast cancer attributable to physical inactivity in Brazilian women; to compare the estimates of mortality and DALYs due to breast cancer attributable to physical inactivity and attributable to other modifiable risk factors; and to analyze the temporal evolution of these estimates within Brazilian states over 25 years (1990-2015) compared with global estimates.

Method: Databases from the Global Burden of Disease Study for Brazil, Brazilian states, and global information were used. It was estimated the total number and the age-standardized rates of deaths and DALYs in the years 1990 and 2015.

Results: Physical inactivity has contributed to a substantial number of deaths (1990: 875; 2015: 2,075) and DALYs (1990: 28,089; 2015: 60,585) due to breast cancer in Brazil. Physical inactivity was responsible for more deaths and DALYs (~12.0%) by breast cancer than other modifiable risk factors (~5.0%). From 1990 to 2015, mortality from breast cancer attributable to physical inactivity increased in Brazil (0.77%) and decreased (-2.84%) around the world. The Brazilian states with better socioeconomic indicators had higher age-standardized rates of mortality and morbidity from breast cancer due to physical inactivity.

Conclusion: These findings support the promotion of physical activity in the Brazilian female population to prevent and manage breast cancer.

External funding details: The study was supported by grants from Bill & Melinda Gates Foundation (GBD Global) and Ministry of Health from Brazil (GBD 2015 Brazil-states; Process No. 25000192049/2014-14).

The contribution of physical inactivity to cardiovascular disease, type 2 diabetes, and all-cause mortality in the Caribbean

Christina Howitt¹, Ian R Hambleton¹, Selvi Jeyaseelan², Curtis Gittens¹, Catherine Brown¹, Nigel Unwin³

¹University of the West Indies, ²Resources for Research, ³University of Cambridge

Introduction: As a major risk factor for non-communicable disease, physical inactivity contributes to morbidity and mortality. Questionnaires are commonly used to estimate inactivity, but tend to underestimate its prevalence. Objective measures such as accelerometry are a gold-standard, but are costly and technically challenging to implement. After identifying

national inactivity estimates in the Caribbean, we use objectively-derived estimates to reduce the bias associated with questionnaire-based inactivity assessment. These adjusted estimates provide a more realistic assessment of the public health impact of inactivity than currently exists.

Methods: We systematically identified studies reporting national estimates of inactivity prevalence between 2006 and 2016. One country measured inactivity using objective and questionnaire-based methods, from which we derived an adjustment factor to apply to all self-reported estimates. Using these adjusted prevalences, we calculated population attributable fractions for the amount of disease and mortality that could be averted by reducing or eliminating inactivity.

Results: We identified national estimates of inactivity prevalence for 14 countries. Adjusting self-reported inactivity measures increased the median national prevalence from 34% to 54%. We estimated that 11% of cardiovascular disease (CVD), 17% of type 2 diabetes, and 15% of all-cause mortality was attributable to physical inactivity, after confounder adjustment. Using self-reported inactivity, the estimated contribution of inactivity was: 7% for CVD, 11% for diabetes; and 9% for mortality.

Conclusions: In the Caribbean, around 1/10 CVD cases, 1/5 diabetes cases, and 1/6 premature deaths are potentially avoidable with sufficient physical activity. This burden would have been underestimated if uncorrected self-reported estimates were used.

Do the associations of sitting time with mortality from cardiovascular disease and cancer differ by different levels of physical activity?

Ulf Ekelund¹, Wendy Brown², Jostein Steene-Johannessen³, Morten Fagerland¹, Neville Owen⁴, Kenneth Powell⁵, Adrian Bauman⁶, I-Min Lee⁷

¹Norwegian School of Sport Sciences, ²Centre for Research on Exercise, Physical Activity and Health, School of Human Movement and Nutrition Sciences, University of Queensland, Australia, ³Department of Sport Medicine, Norwegian School of Sport Sciences, Oslo, Norway, ⁴Baker Heart & Diabetes Institute, ⁵Ailanta, ⁶School of Public Health, Sydney University, Australia, ⁷Division of Preventive Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

Introduction: We recently reported that the associations between sitting and mortality differed depending on how much physical activity was carried out. We here examine whether the associations between sitting time with mortality from cardiovascular disease (CVD) and cancer differ by different levels of physical activity.

Methods: Data on exposure variables were harmonised according to a predefined protocol and categorised into four groups for sitting time and into quartiles of physical activity (MET-h per week) and analysed within each individual study, and reported effect estimates for CVD or cancer mortality. We estimated summary HRs with 95% CIs across studies in separate meta-analyses for each outcome with a fixed-effect inverse variance method.

Results: Nine studies (N = 850,060; Deaths = 25,730) and eight studies (N = 777,696; Deaths = 30,851) provided data on sitting time and CVD and cancer mortality, respectively. A dose-response association between sitting time (9% to 32% higher risk; P for trend < 0.001) with CVD mortality was observed in the 'inactive', lowest quartile of PA. There was no increased risk for CVD mortality with increasing sitting-time in the most active quartile. Associations between sitting-time and cancer mortality were generally weaker; 6% to 21% higher risk with longer sitting time observed only in the lowest quartile of PA.

Conclusion: PA modifies the association between sitting time with CVD and cancer mortality. Moderate intensity PA commensurate with meeting

or exceeding current physical activity guidelines for public health ameliorate or even eliminate the risk of sitting with CVD and cancer mortality.

Non-occupational physical activity and risk of cardiovascular disease, cancer, and mortality: a dose-response meta-analysis of prospective studies

Soren Brage¹, Ali Abbas¹, Alexander Mok¹, Leandro Garcia¹, Eoin McNamara², Alessio Crippa³, Thiago Sá⁴, Andrea Smith⁵, Dani Kim⁶, Justin Im⁷, Oluwaseyi Olayinka⁸, Rajna Golubic⁹, Matthew Pearce¹, Marko Tainio¹, Katrien Wijndaele¹, Phillip Edwards¹⁰, James Woodcock¹

¹University of Cambridge, ²Economic and Social Research Institute, ³Karolinska Institutet, ⁴University of Sao Paulo, ⁵University College London, ⁶Imperial College London, ⁷International Vaccine Institute, ⁸Old Dominion University, ⁹Addenbrooke's Hospital, ¹⁰London School of Hygiene & Tropical Medicine

Introduction: Physical activity (PA) has been associated with reduced risk of all-cause mortality, cardiovascular diseases, and several cancers. However, dose-response relationships remain unclear. Our objective was to estimate dose-response relationships for non-occupational PA and chronic disease incidence and mortality.

Method: We systematically searched for prospective cohort studies with adults without pre-existing conditions, >10,000 participants, and results for all-cause mortality, cardiovascular disease, stroke, coronary heart disease, total cancer, colon, lung, endometrial, or breast cancer. PA exposure was harmonised to PA energy expenditure in marginal MET-hours per week (MMET.h/week). We performed a restricted cubic splines random-effects meta-analysis and calculated potential impact fractions for all outcomes.

Results: 104 papers were included, covering 74 cohorts. The evidence base was largest for all-cause mortality (24 associations; 2,116,548 individuals), cardiovascular mortality (21 associations; 2,001,351 individuals), and total cancer mortality (15 associations; 1,208,839 individuals). In general, inverse non-linear relationships were observed, steeper up to 8.75 MMET.h/week (current PA recommendations) with smaller gains above this point to 17.5 MMET.h/week, beyond which additional benefits were uncertain. Benefits were larger for all-cause and cardiovascular mortality than for cancer mortality. Risk reductions were observed for incidence outcomes but weaker than for mortality. If all insufficiently active individuals in the cohorts met the recommended level, 11.9% (95%CI: 8.6 to 15.1%) of all premature deaths could be averted.

Conclusion: Our findings support the current PA recommendations, with inverse non-linear dose-response relationships indicating that most of the benefit is accrued by small increases from inactive lifestyles.

Is volume of physical activity more important than pattern of accumulation for onset of cardiovascular disease? A prospective study of objectively measured physical activity intensities and sedentary behaviour in older men

Barbara J. Jefferis¹, Tessa Parsons¹, Claudio Sartini¹, Sarah Ash¹, Lucy Lennon¹, Olia Papacosta¹, Goya Wannamethee¹, I-Min Lee², Peter Whincup

¹University College London, ²Harvard University, ³St George's University of London

Objectives: To understand how device-measured sedentary behaviour and physical activity are related to cardiovascular disease (CVD) events in older men, an age-group with high levels of inactivity and sedentary

behaviour. Total amount and pattern of each activity intensity are investigated.

Methods: Prospective population-based cohort study of men recruited from 24 UK General Practices in 1978-80. In 2010-12, 3137 surviving men were invited to wear an Actigraph GT3x accelerometer for 7 days; 1566 (50%) returned accelerometer data. Men were followed up for CHD and stroke morbidity and mortality up to 1st June 2016.

Results: After median 4.6 years follow-up, 82 CVD events occurred in 1,181 men without pre-existing CVD. For each additional 30 minutes in sedentary behaviour, light PA, 10 minutes in MVPA, or 1000 steps/day, hazard ratios (HRs) for CVD mortality were 1.08(95%CI 0.98, 1.18), 0.96(95%CI 0.85, 1.08), 0.89(95%CI 0.81, 0.98) and 0.86(95%CI 0.77 to 0.96) respectively. Adjustments for confounders little changed the estimates. The HR for accumulating 150 minutes MVPA/week irrespective of bout length (achieved by 66% of men) was 0.54 (95% CI, 0.34 to 0.87) and 0.49 (95% CI, 0.21 to 1.13) for accumulating 150 minutes MVPA/week in bouts lasting ≥ 10 minutes (achieved by 16% of men). Sedentary breaks were not associated with CVD events.

Conclusions: In older men, higher number of steps per day or accumulating more MVPA, irrespective of bouts lasting ≥ 10 minutes reduced CVD risk. Light PA and sedentary behaviour were not associated with CVD risk. Findings can inform physical activity guidelines for older adults.

External funding details: This work was supported by the British Heart Foundation (PG/13/86/30546 and RG/13/16/30528). The funders had no role in the design and conduct of the study; collection, management, analysis, interpretation of the data; preparation, review, approval of or decision to publish the manuscript.

Moderate-to-vigorous intensity physical activity and all-cause mortality: Do bouts matter?

Pedro Saint-Maurice¹, Richard P. Troiano¹, Charles E. Matthews¹, William E. Kraus²

¹National Cancer Institute, ²Duke University

Introduction: The 2008 Physical Activity Guidelines for Americans recommends that adults accumulate moderate-to-vigorous intensity physical activity (MVPA) in bouts ≥ 10 -minutes for substantial health benefits. To what extent the same amount of MVPA accumulated in bouts vs. sporadically reduces mortality risk remains unclear.

Methods and Results: We analyzed data from the 2003-06 National Health and Nutrition Examination Survey (NHANES) and death records available through 2011 (follow-up period of ~6.6 yrs; 700 deaths) to examine the associations between objectively measured physical activity accumulated with and without a bout criteria and all-cause mortality in a representative sample of U.S. adults ≥ 40 yrs (n = 4,840). Physical activity data were processed to generate minutes/day of total and bout MVPA. Bouted MVPA was defined as MVPA accumulated in bouts of a minimum duration of either 5 or 10 minutes allowing for 1-2 minute interruptions. Hazard ratios for all-cause mortality associated with total and bout MVPA were similar and ranged from 0.24 for the third quartile of total to 0.44 for the second quartile of 10-minute bouts. The examination of jointly classified quartiles of total MVPA and tertiles of proportion of bout activity revealed that greater amounts of bout MVPA did not result in additional risk reductions for mortality.

Conclusion: These results provide evidence that mortality risk reductions associated with MVPA are independent of how activity is accumulated and can impact the development of physical activity guidelines and inform clinical practice.

Session: Physical activity evidence, guidelines and messaging

Digital behaviour change interventions to address sedentarism. Technology within a national integrated social marketing approach to address inactivity: Active 10

Michael Brannan, Justin Varney, Anand Amlani, Public Health England

Introduction: Insufficient physical activity is amongst the top ten causes of the health burden in the UK and addressing inactivity is prioritised in national guidelines, plans and strategies. As part of a broader programme to improve the health of low income, middle-age adults, a national social marketing programme was developed to get inactive, low income 40-60 year olds to move out of inactivity towards recommended physical activity levels.

Methods: Based on ethnographic research and published literature a national social marketing programme was produced based on what works to move inactive adults out of inactivity with a focus on 10 minute daily bursts of walking. Active 10 is an integrated programme involving national and local media and advertising campaigns, cross-sector partnerships and an innovative mobile phone app. The app is a central focus of the campaign and its behaviour change approach, as it supports users to understand periodicity, intensity and accumulation of physical activity over time; the app also generates geographic and demographic profile data for use by local public health and physical activity planners.

Results: An evaluation is underway (due 2018), but early evidence is positive. Over 600 pieces of coverage were achieved with #Active10 trending top five on Twitter. The app has been downloaded 480,000 times and was ranked number one Health and Fitness download.

Conclusion: Technology can play a role within integrated marketing and behaviour change campaigns to drive penetration and improve effectiveness of programmes.

Summary of evidence to include Light activity in physical activity promotion messages.

Sebastian Chastin¹, Marieke De Craemer², Katrien De Cocker³, Lauren Powell⁴, Jelle Van Cauwenberg³, Philippa Dall¹, Mark Hamer⁵, Emmanuel Stamatakis⁴

¹Glasgow Caledonian University, ²Ghent University, ³Ghent University, ⁴Sydney University, ⁵Loughborough University

Introduction: Recently there has been more interest in understanding the role played by light activity (LIPA) in health and it is starting to be explicitly included in guidelines. The aim of this study was to summarise the evidence on the relationship between LIPA and cardiometabolic health.

Method: Systematic review and meta-analysis. Medline, Embase, PsycInfo, CINAHL were searched complemented by three rounds of hand searches for experimental (including acute mechanistic studies and physical activity intervention programme) and observational studies (excluding case and case control studies) conducted in adults (aged ≥ 18 yrs) published in English before February 2017 and reporting on the relationship between light physical activity (< 3 METs) and cardiometabolic health outcomes or all-cause mortality.

Results: 21 experimental studies and 37 observational studies were eligible. Acute mechanistic experimental studies showed that short but frequent bouts of light intensity activity throughout the day significantly reduced post-prandial glucose (-18.37% CI [-28.47, -8.27]) and insulin (-27.12% [-35.77, -18.48]) levels compared to continuous sitting, but there was very limited evidence for other cardiometabolic markers. Three physical activity programme intervention studies (n ranging from 12 to 58) showed reduced adiposity, improved blood pressure and lipidaemia for light

intensity activity programmes of at least 150 min/week lasting for at least 12 weeks. Five prospective observational showed beneficial associations between more time spent in daily light activity and reduced risk of all-cause mortality (HR 0.70 CI [0.61 0.79]).

Conclusions: Light intensity physical activity may potentially play a role in improving adult cardiometabolic health and reducing mortality risk.

Development and testing of the new Flemish physical activity model versus the traditional physical activity pyramid

Ragnar Van Acker, Luc Lipkens, Femke De Meester, Flemish Institute for Healthy Living

Introduction: Very few physical activity (PA) models have been systematically tested in the general public. This new PA model aims to make people aware of its main health messages, and motivate them to be more physically active and to limit sedentary behaviour (SB).

Method: (1) A literature review on national PA models, recommendations, and communication; (2) a panel of independent experts in PA, SB, behavioural change and communication; (3) a focus group protocol with 237 physically inactive and active participants from priority target groups (low SES). Drafts of the new model were also compared with the PA pyramid; (4) collaboration with stakeholders.

Results: After 3 rounds of focus groups and improvements, the prefinal new PA model was evaluated positively by the majority of participants. Its main health messages were perceived well, except for the differentiation in the recommended variety of light, moderate and vigorous intensity PA. Final improvements resolved this issue. For the inactive group, the new PA model outperformed the PA pyramid: the new model was more realistic and implementable with achievable goals. The active groups considered the PA pyramid more comprehensive at first glance, yet found it to be rather illogical (sequence of layers) and less flexible (too directive and structured) after a more thorough reflection.

Conclusion: The new Flemish PA model is a feasible instrument for the general public. For inactive groups it outperforms the golden standard of the PA pyramid. The model is now being disseminated, supported by tools and partners.

External funding details: Funded by the Flemish Government.

Health Promotion across the 24 Hour: New Messages and Strategies for Sleep, Sedentary and more Active Behaviors

Matthew Buman, Arizona State University

Sleep, sedentary, and more active behaviors (i.e., physical activity) disproportionately make up our 24 hours (24 h); however, these behaviors are often viewed in isolation in their relationship to health and health behavior change. By virtue of a fixed 24 h, increasing one behavior inevitably means decreasing another, and the broader impact of any single behavior change (e.g., reducing sedentary time) on other behaviors (e.g., sleep, physical activity) is not fully understood. This presentation will focus on understanding the dynamic interplay of behaviors across the 24 h, the potential for synergy among these behaviors for maximal health behavior change, and their single and combined impact on cardiometabolic and quality of life (QOL) related parameters. A summary of results from three randomized controlled lifestyle interventions will be presented, with a particular focus on novel messages and strategies used to leverage potential synergies for behavior change across the 24 h. Also, the use of smartphone and wearable technologies will be introduced as novel medium for delivery of 24 h interventions, given their ubiquity and ability to track behaviors and provide timely feedback. Collectively this work demonstrates: (a) feasible approaches for intervening on behaviors across the 24 h; (b) physiological and behavioral synergies among behaviors such that impact on one behavior

can improve other 24 h behaviors; and (c) enhanced cardiometabolic and QOL benefit when addressing the full 24 h spectrum of behaviors relative to focusing behavior change approaches on any single behavior.

External funding details: Virginia G. Piper Charitable Trust; National Institutes of Health (R01CA198971; R21NR016046; R18DK109516)

Sitting less and moving more: convergent evidence for informing programmes and policy - Public health messaging on sedentary behaviour and health: what should we say and to whom?

Katrien Wijndaele¹, Stuart J.H. Biddle²

¹MRC Epidemiology Unit; University of Cambridge, ²University of Southern Queensland

With sedentary behaviour catching the eye of researchers from the early 2000s, and policy makers some 5-10 years later, it is important to appraise the state of evidence that should underpin appropriate messages in this field. It is now recognised that there is a 'movement' continuum that includes sleep, sedentary behaviour, light physical activity and moderate-to-vigorous activity. It makes no sense pitting one of these against others as they all exist in interdependent ways and are important in their own right. However, the field is guilty of interpreting evidence in an inconsistent way—the glass half full vs. glass half empty argument. This will be illustrated by discussing findings on sedentary behaviour and adiposity in young people and mortality in adults. In both cases, alternative and apparently contradictory messages are possible and plausible. This may reflect the 'decline effect' where improved measurement and methods, and more nuanced research, provide a better understanding after initial, possibly simplistic and uncritical, messages have been made. Our analysis of campaigns suggested that certain simplistic assumptions were being made about substituting sitting for physical activity, and that sitting was 'demonised'. Yet there are good examples of media messaging showing an appropriate balance between less sitting and more movement. Finally, it is argued that reductions in sitting can achieve multiple perceived benefits beyond physical health, and that small changes from sitting to light physical activity may be an important starting point for promotion of active lifestyles. 'Sit less, move more' may well still be the best message.

Citizen science to communicate about public health messages: the reach of a playful online survey on sitting time and physical activity

Katrien De Cocker¹, Sebastian Chastin², Ilse De Bourdeaudhuij¹, Jeroen Stragier¹, Greet Cardon¹

¹Ghent University, ²Glasgow Caledonian University

There is a lack of research on how to communicate public health guidelines. Citizen science has been an effective way to involve the public in research. This study analyses the reach of a well-established citizen science experiment, launched during an annual national science event, to understand if it could be used as communication strategy for public health issues.

A short playful online survey contained tailored health-related messages associated to an 'animal totem' profile, based on the combination of sitting time and physical activity levels (koala: high sitting, low activity; gorilla: high sitting, high activity; zebra: low sitting, low activity; bee: low sitting, high activity). Tweets, radio interviews, radio and online advertisements, press articles and a press conference were used to promote the citizen science experiment. Google Analytics and Facebook graph Application Programming Interface were used to report on the use and spread.

Descriptive statistics were used to describe the adults completing the experiment. 6,246 adults completed the experiment, with a peak of views

($n = 5,103$) and completions ($n = 1,209$) a couple of days before the event. Completers were mostly female (65.8%), on average 37.5 years old and had a healthy BMI (23.8 kg/m^2). 46.4% had the most beneficial profile ('bee'), 26.5% the least healthy profile ('koala').

Citizen science as part of a national science event is a good platform for health communication as 1 in 1,000 Flemish adults could be reached. However, those completing the experiment were not representative of the general Flemish adult population and reported to be more active.

An exploration of how the UK physical activity and sedentary behaviour guidelines for the early years may be improved for parents: A qualitative study

Georgina Bentley, Katrina Turner, Russ Jago, University of Bristol

Background: Research suggests that many mothers believe their pre-school child achieves the UK physical activity (PA) guideline targets (three hours of PA per day) but have also reported difficulties in assessing what counts as PA. Mothers have reported that the UK PA guidelines for the early years were not relatable or constructive. This study explored how these guidelines could be better presented and disseminated to be more useable for parents of pre-schoolers.

Methods: Six focus groups were held with parents of pre-schoolers from areas of varying socio-economic status within Bristol, UK. Alternative wording to describe PA intensities (sedentary, low, and moderate to vigorous), examples of play activities to illustrate these intensities, and how best to disseminate PA guideline information were explored.

Results: Alternative terms for PA intensities included: 'Still' for sedentary; 'Pottering' for low-intensity; 'Huff & Puff' for moderate to vigorous-intensity. Parents found thinking of pre-schoolers play in intensity categories problematic and it was more helpful to think of intensity on a spectrum. They felt that moderate and vigorous intensities should not be combined because they involved different forms of play. Parents suggested that guideline information should be provided from an early age (e.g. anti-natal classes and health-visitor check-ups). Many parents said they would prefer information online or through an app rather than having a printed leaflet.

Conclusion: PA and SB guideline information should provide an explanation of what counts as PA, alongside clear descriptions of levels of PA intensity and examples of play activities to illustrate these levels.

Session: Using technology in interventions and research

Harnessing gamification for population level changes in physical activity: Findings from 18 UK interventions.

Marc Harris, William Bird, Intelligent Health

A recent systematic review concluded insufficient evidence for current population physical activity (PA) interventions, citing scalability as a major contributory factor.

Beat the Street aims to address this key implementation issue by turning a town/city into a game where players register their walking and cycling journeys by tapping a smartcard on RFID readers called 'Beat Boxes' placed on lampposts around the town or city. Players monitor their progress via a website where they can see their own and their team's progress, and the overall city/town target. During registration, participants complete a questionnaire which includes a validated PA measure³. Follow up surveys take place at the end of the game and 6 months later.

In 2016, 18 community-wide interventions were delivered throughout the UK. $N = 300,053$ people played the game, $N = 64,512$ registered online, N

$= 6,767$ completed a follow-up survey immediately following the game period and $N = 3,103$ people completed a follow-up survey 6 months post-intervention. Pre-test/post-test analyses revealed a 9% increase in the proportion of people meeting the WHO PA guidelines and a 5% decrease in the proportion of people reporting being inactive ($p < .05$). Further analysis revealed a 8% increase in the proportion of people meeting the CMO PA guidelines and a 4% decrease in the proportion of people reporting being inactive, six-months post-intervention ($p < .05$).

The findings from 18 Beat the Street interventions delivered across the UK in 2016 suggests that gamification is a promising approach to changing population levels of PA.

Calibration of the UK Youth Activity Profile

Danielle Christian¹, Pedro F. Saint-Maurice², Paul Hibbing³, Robert J. Noonan¹, Lynne M. Boddy⁴, Greg J. Welk⁵, Stuart J. Fairclough¹

¹Edge Hill University, ²National Cancer Institute, ³University of Tennessee, ⁴Liverpool John Moores University, ⁵Iowa State University

Introduction: Physical activity self-report methods are cost-effective and straightforward to use with large samples, but their ability to accurately estimate levels of physical activity is limited. This study describes the development of algorithms to calibrate self-reported physical activity from the online UK Youth Activity Profile (UKYAP) survey into estimates of moderate-to-vigorous physical activity (MVPA) and sedentary time (ST).

Method: Four primary schools and five secondary schools were selected to participate, with participants across Year 5 ($n = 133$, 53% boys), Year 8 ($n = 132$, 44% boys) and Year 10 ($n = 137$, 60% boys). Participants wore a multi-sensor Sensewear Armband Mini (SWA) for eight days and completed the 15-item UKYAP online survey on the eighth day. UKYAP scores were temporally matched to SWA MVPA and ST data. Quantile regression generated gender and age group-specific algorithms to estimate in-school, out-of-school, and weekend MVPA, and out-of-school ST.

Results: The in-school algorithm performed well, and predicted 49.6 minutes of MVPA per day (UKYAP) compared to the objectively measured 53.1 minutes MVPA per day (SWA). An underestimation of 11.8 minutes/day was reported for out-of-school MVPA, and 26.4 minutes/day for weekend MVPA. Conversely, out-of-school ST algorithms overestimated by 36.6 minutes/day.

Conclusion: For in-school, out-of-school and weekend segments, the calibration algorithms predicted estimates that were comparable to objectively measured MVPA and ST in both primary and secondary school aged children. Prediction accuracy was higher at the group level than individual.

External funding details: This study was funded by the Youth Sport Trust and Edge Hill University.

Beyond cut-points: Introducing a novel accelerometer metric that captures the physical activity intensity distribution

Alex Rowlands¹, Charlotte Edwards², Melanie Davies², Kamlesh Khunti², Deirdre Harrington², Tom Yates²

¹University of Leicester, ²Leicester Diabetes Centre

Overall activity level, defined as average acceleration over a 24 h period, is directly measured and comparable across studies. However, it tells us little about the intensity distribution. It is important to capture both overall activity and the intensity distribution as, for some health markers, it appears the volume of activity is more important than the intensity, but for others the converse appears to be true.

Herein we introduce a new metric, the intensity gradient, that: captures the entire intensity distribution; does not rely on calibration protocols (that, by

nature, are population- and protocol-specific); and is independent of overall activity level, thus can be used alongside average acceleration.

The intensity gradient is taken from the log-log regression line of the negative curvilinear relationship between intensity and time accumulated at that intensity. To demonstrate its potential we applied it to two datasets: 1669 adolescent girls, and 295 adults with type 2 diabetes. The intensity gradient was negatively associated with body fatness in the girls and positively associated with physical function in the adults; associations were independent of average acceleration and co-variables. In contrast, moderate-to-vigorous physical activity was not independently associated with body fatness or physical function.

In summary, collectively the average acceleration and the intensity gradient provide a complementary description of a person's entire activity profile, facilitating investigation of the relative importance of intensity and volume of activity for a given outcome. Crucially, the metrics are not subject to the error and population-specificity associated with converting acceleration into physical activity outcomes.

Characterizing the activity-friendly built environment using space syntax: The role of urban design in the decision to commute by bicycle: An application using space syntax

Greg Rybarczyk, University of Michigan-Flint

Introduction: Many previous works attempting to forecast the potential for bicycling have included urban design factors in their approaches; however, only a scant amount of work has assessed these at a micro-scale using space syntax. The purpose of the current study was to investigate the effects of several urban design metrics derived from Space Syntax on the probability of bicycle mode-share use for commuting.

Methods: The National Household Travel Survey (NHTS) was used contained a slew of personal travel related variables. Several neighbourhood scale demographic, socioeconomic, and environmental factors were considered control variables during the modelling stage of the analysis. These factors, along with space syntax measures, were examined near each person's residence (i.e. trip origin) using Geographic Information Systems and a binomial logit discrete choice model.

Results: The urban morphology metrics from space syntax elevated the discrete choice model's overall robustness by approximately 4%, when compared to models including, personal, household, and environmental factors. The statistically significant space syntax explanatory factors included: integration (OR=12.7, $p<0.10$), entropy (OR=.001, $p<0.05$), and clustering coefficient (OR=0.00, $p<0.001$). These measurands displayed reasonable influences and directionality towards bicycle mode choice while controlling for personal, household, and environmental variables.

Conclusions: In this study, we estimated the importance of individual, household, environmental, and urban morphological variables in the decision to commute via bicycle. The research confirms the hypothesis that visibility and perception, as governed by urban form, affect the probability of utilitarian bicycling.

Using location technology to explore physical activity in indoor environments

Clover Maitland¹, Gareth Stratton², Sarah Foster³, Michael Rosenberg⁴

¹University of Western Australia, ²Applied Sports Technology Exercise Medicine Research Centre, College of Engineering, Swansea University, ³Centre for Urban Research, School of Global, Urban and Social Studies, RMIT University, ⁴School of Human Sciences, University of Western Australia

Introduction: GPS location data has been vital for understanding built environmental influences and informing policy interventions to increase physical activity (PA). However, investigation of how the structure of indoor built environments may promote or hinder movement is limited, with no gold-standard technology for determining indoor location based activity. This study validated a portable location and PA monitoring system for use with children in homes.

Methods: The RFID location system was deployed in a simulated home environment. Twenty-five children wearing sensor tags and Actigraph GTX3+ accelerometers moved around seven locations at specified time intervals under a range of sedentary and activity conditions (e.g., watching TV, playing, talking). Accuracy to detect room-level location was validated against direct observation. Customised software matched and analysed data to determine time and PA levels in each location.

Results: The system showed 85%, 94% and 97% specificity for detecting location inside monitored rooms in two, five and ten minute trials. Time spent in PA levels was accurate compared to Actilife (ICCs ≥ 0.98). Children spent 82% of time indoors sedentary and 3% in MVPA. Time in the computer room was most sedentary (92%) whereas time outdoors was most active (54%).

Conclusions: The system uses technology novel to the PA and public health field to provide accurate information on PA and sedentariness at indoor room-level. The methodology and resulting data can help to better understand the environmental context of PA and sedentariness in homes and other indoor environments where people spend the majority of their time.

External funding details: Healthway (#21357)

The development and co-design of the PATHway intervention: A theory-driven eHealth platform for the self-management of cardiovascular disease

Catherine Woods¹, Lauri McDermott², Deirdre Walsh², Veronique Cornelissen³, Roselien Buys³, Jomme Claes³, Paolo Zampognaro⁴, Fabio Melillo⁴, Nicos Maglaveras⁵, Ioanna Chouvarda⁵, Andreas Triantafyllidis⁶, Dimitris Filos⁶, Kieran Moran²

¹University of Limerick, ²Dublin City University, ³KU Leuven, ⁴Engineering Ingegneria Informatica, ⁵Aristotle University of Thessaloniki, ⁶Centre for Research and Technology, Institute of Applied Biosciences

Background: Cardiovascular diseases (CVD) are a leading cause of premature death and disability and an economic burden worldwide. International guidelines recommend routine availability and delivery of all phases of cardiac rehabilitation (CR). Uptake of traditional cardiac rehabilitation remains suboptimal, as attendance at formal hospital-based CR programmes is low, with community-based CR rates and individual long-term exercise maintenance even lower. Home-based CR programs have been shown to be equally effective in clinical and health-related quality of life outcomes, and yet are not readily available. The aim of the current study was to develop the PATHway intervention (Physical Activity Towards Health) for the self-management of cardiovascular disease.

Methods: The PATHway intervention was theoretically informed by the Behaviour Change Wheel (BCW) and Social Cognitive Theory (SCT). All relevant intervention functions, behaviour change techniques (BCTs) and policy categories were identified and translated into intervention content. Furthermore, a person-centred approach was adopted involving an iterative co-design process and extensive user-testing.

Results: Education, enablement, modelling, persuasion, training and social restructuring were selected as appropriate intervention functions. Twenty-two BCTs, linked to the 6 intervention functions and 3 policy categories

were identified for inclusion and translated into PATHway intervention content.

Conclusions: The BCW and SCT was used within a person-centred framework to develop an eHealth intervention for the self-management of CVD. The systematic and transparent development of the PATHway intervention will facilitate the evaluation of intervention effectiveness and future replication.

External funding details: This project has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation Action.

Benefits and risks associated with children and adolescents' interactions with electronic screens: A synthesis of 474 systematic reviews

Chris Lonsdale¹, Stuart Biddle², Phil Parker¹, Jo Salmon³, Kylie Hesketh³, George Thomas², Nicole Weeks¹, Taren Sanders¹

¹Australian Catholic University, ²University of Southern Queensland, ³Deakin University

Introduction: Systematic reviews have provided evidence for guideline development regarding children and adolescents' screen time; however, no review has synthesised the evidence across the many relevant outcomes, including physical and psychosocial health, behaviour, and education.

Method: We searched for systematic reviews in 12 databases in September 2017 (no date restrictions). Inclusion criteria were: (1) Sample age < 19 yrs; (2) Measured exposure to any type of electronic media during typical daily living (e.g., school, home); (3) Measured relationship between screen time and a variable that is a plausible outcome of this exposure; (4) Systematic review or meta-analysis/meta-regression of quantitative evidence. Two reviewers independently screened titles and abstracts and then reviewed full-text articles.

Results: We retrieved 14,153 records and reviewed 1,351 full-text articles, with 474 review articles (K) meeting our inclusion criteria. Reviews focused on physical health (K = 118), psychology/behaviour (K = 120), education (K = 97), and health behaviours (e.g., sleep, nutrition) (K = 139). The majority of evidence has been collected using subjective measures and most analyses have only considered linear relationships. Moderator variables have been explored in-depth in a limited number of areas (e.g., violent television content).

Conclusion: There are potential benefits and risks to youth when interacting with electronic media, depending on the content and context of the exposure and the outcome of interest. Future guidelines should reflect these nuances and scalable interventions need to be developed to enable stakeholders, especially parents and teachers, to promote beneficial interactions with screens for children and adolescent

Parallel Oral Sessions: Tuesday 16 October

Tuesday, 13:30–14:40

Session: Developments in wearable devices and analysis

Individualizing cutpoints for moderate-to-vigorous physical activity: a new approach for analysing accelerometry data

Alice Bellicha¹, Cécile Ciangura², Céline Roda³, Jean-Luc Bouillo⁴, Adriana Torcivia⁵, Karine Clément⁶, Christine Poitou⁶, Jean-Michel Oppert²

¹Pitié-Salpêtrière Hospital, ²Assistance Publique-Hôpitaux de Paris (AP-HP), Pitié-Salpêtrière hospital, Department of Nutrition; Sorbonne University, Faculty of Medicine, Institute of Cardiometabolism and Nutrition (ICAN); Paris, France, ³Barcelona Institute for Global Health; Barcelona, Spain, ⁴Assistance Publique-Hôpitaux de Paris (AP-HP), Ambroise Paré hospital, Department of Visceral Surgery; University Versailles-Saint-Quentin; Boulogne, France, ⁵Assistance Publique-Hôpitaux de Paris (AP-HP), Pitié-Salpêtrière Hospital, Department of Digestive and Hepato-Pancreato-Biliary Surgery; Sorbonne University, Faculty of Medicine; Paris, France, ⁶Assistance Publique-Hôpitaux de Paris (AP-HP), Pitié-Salpêtrière hospital, Department of Nutrition; Sorbonne University, Faculty of Medicine, Institute of Cardiometabolism and Nutrition (ICAN); INSERM, UMRS NutriOmics Team; Paris, France

Introduction: Moderate and vigorous-intensity physical activity (PA) can be defined in absolute (e.g. 3-6 MET) or relative (e.g. 50-70% $\text{VO}_{2\text{max}}$) terms. We aimed to compare habitual PA level of women with obesity when using either absolute-intensity or relative-intensity accelerometer cutpoints.

Methods: Habitual PA was measured during 7 days with Actigraph GT3x accelerometers in 67 obese women candidates to bariatric surgery. Cardio-respiratory fitness, measured by indirect calorimetry during a maximal exercise test, was expressed in MET ($\text{MET}_{\text{max}} = \text{VO}_{2\text{max}} [\text{mL/kg/min}] / 3.5$). Freedson cutpoints were used as absolute-intensity cutpoints. Relative-intensity cutpoints were calculated as corresponding to 52% and 68% MET_{max} . Time spent in moderate or vigorous-intensity PA obtained with relative and absolute cutpoints were compared using Wilcoxon test.

Results: Mean [SD] age was 43 [10] years, BMI 44.0 [6.0] kg/m^2 and MET_{max} 5.2 [1.2]. Relative cutpoints for moderate and vigorous intensity (1,675 [745] and 2,747 [975] counts/min, respectively) were lower than Freedson cutpoints ($P < 0.001$). Using absolute cutpoints, patients accumulated 28 [18] min/d of moderate-intensity PA and 0 [1] min/d of vigorous PA. Using relative cutpoints, moderate-intensity PA was not modified whereas vigorous PA increased significantly (19 [25] min/d, $P < 0.001$). Using absolute cutpoints, 92% patients were found inactive. Using relative cutpoints, 23% inactive patients were reclassified as active.

Conclusion: Taking into account individual fitness to define accelerometer cutpoints resulted in a higher estimation of habitual PA in obese subjects. This may have implications to refine our interpretation of accelerometry data in such subjects and, more broadly, in subjects with low cardiorespiratory fitness.

From total volume to patterns: sophisticated accelerometer data analysis taking into account how SB and PA bouts are accumulated and alternated throughout the day

Mai Chin A Paw, Xinhui Wang, Teatske Altenburg, VU University Medical Center

Purpose: To date, epidemiological studies have focused on the potential health effects of total volume of physical activity (PA) or sedentary behaviour (SB). However, two persons may have the same volume of PA or SB but accumulated in a completely different sequence. The pattern of accumulating PA and SB may be far more important for health effects than the total volume. We therefore aimed to develop a sophisticated algorithm translating accelerometer data into detailed sequence maps considering how PA and SB are accumulated throughout the day.

Methods: A novel algorithm to convert accelerometer counts into a sequence map based on behaviour states defined by a combination of intensity (SB, light, moderate, and vigorous intensity PA) and duration (sporadic accumulation or in bouts of different duration) was developed. Additionally, hierarchical cluster analysis was applied to identify clusters of children with similar sequence maps.

Results: Clustering resulted in seven groups of children with similar PA and SB sequence maps: 3 larger clusters (2, 1 and 4) with 33%, 31% and 26% of the children respectively, and four very small clusters (3, 5, 6 and 7) with 7% of the children or less. Clusters 3, 4, and 7 consisted of relatively more girls (68-83%), clusters 6 and 7 relatively more overweight children (33%). Clusters 5 and 6 and 7 stood out with relatively few high fit children (0-33%).

Conclusion: This novel algorithm is a next step in more sophisticated analyses of accelerometer data considering how PA and SB are accumulated throughout the day.

Predicting sleep, sedentary behaviour, and physical activity from commercially available wearable devices using Rotation Forest models

Daniel Fuller, Faramarz Dorani, Hui Luan, Javad Rahimpour Anaraki, Majid Beheshti Mohtasham, Memorial University

Background: Our objective was to predict sleep, sedentary behaviour, and physical activity using commercially available wearable devices.

Methods: We collected five days of data on seven participants using GENEActiv, Apple Watch, and FitBit. The sample included four men and three women ranging in age from 22 to 42 years. Apple Watch and GENEActiv were worn on the non-dominant wrist, and FitBit on the dominant wrist. We used existing methods to label sleep, sedentary behaviour, and physical activity from GENEActiv data. We collected minute level heart rate, steps, floors climbed, energy expenditure, and distance from Apple Watch and Fitbit. We aggregated the GENEActiv data to the minute and used a Rotation Forest classifier. The data were split into training (70% of data) and test sets (30% of data).

Results: We were able to correctly classify 71% and 56% of the data for Apple Watch and FitBit, respectively. The confusion matrix for Apple Watch showed that classification accuracy ranged from 72% (sedentary) to 18% (light activity). FitBit classification accuracy ranged from 59% (sleep) to 0% (light activity). The majority of data were sleep and sedentary behavior making classification of less common light, moderate, and vigorous activity a challenge with our small dataset.

Conclusions: Findings suggest that considerable work is required to correctly classify sleep, sedentary, and physical activity behaviours using data from commercial wearable devices. However, with large samples of high quality data and advances in machine learning methods, we believe highly accurate classification is possible.

External funding details: Health Behaviour Data Challenge

Backward compatibility of sedentary time estimates derived from wrist worn GENEActiv accelerometers

Lynne Boddy¹, Robert Noonan², Alex Rowlands³, Liezel Hurter⁴, Zoe Knowles⁴, Stuart Fairclough⁵

¹Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, ²Edge Hill University, ³Diabetes Research Centre, University of Leicester, NIHR Leicester Biomedical Research Centre, ARENA University of South Australia, ⁴The Physical Activity Exchange, Liverpool John Moores University, ⁵Edge Hill University

Introduction: This secondary data analysis examined the backward compatibility of wrist-worn accelerometer estimates of sedentary time (ST) with ActiGraph 100 count·min⁻¹ waist ST estimates using a range of raw data thresholds.

Methods: One hundred and eight 10-11 year old children (65 girls) wore an ActiGraph GT3x accelerometer (AG) on their right hip and a GENEActiv accelerometer (GA) on their non-dominant wrist for seven days. GA data were processed using the GGIR R package and signal vector magnitude was calculated using the ENMO approach. GA ST data were classified using published thresholds: 23 mg, 36 mg, 52 mg and 56 mg and arbitrary thresholds: 30 mg, 40 mg and 45 mg. The resultant ST estimates were compared to AG ST data classified using 100 count·min⁻¹. Cronbach's alpha, intraclass correlation coefficients (ICC), limits of agreement (LOA) and percent agreement were calculated.

Results: Percent agreement ranged from 68-69.9%. Cronbach's alpha values were all $\geq .88$. ICCs ranged from .594 (23 mg threshold) to .861 (36 mg). Mean ST was significantly different between AG and all GA thresholds ($p < 0.001$), with the exception of the 36 mg threshold ($p = 0.09$). LOA were wide for AG - GA comparisons, with the narrowest observed for the AG v 36 mg comparison (-230.47 - 194.81 minutes).

Conclusions: Despite observing high ICC and Cronbach's alpha values, the results suggest that wrist mounted, raw acceleration derived ST estimates should not be directly compared at the individual level with those derived from the 100 count·min⁻¹ waist mounted AG threshold. The 36 mg threshold may provide comparable ST estimates at the group level.

How well do smartphones measure steps in free-living conditions?

Shiho Amagasa¹, Masamitsu Kamada², Hiroyuki Sasai³, Noritoshi Fukushima¹, Hiroyuki Kikuchi¹, I-Min Lee⁴, Shigeru Inoue¹

¹Tokyo Medical University, ²Harvard T.H. Chan School of Public Health, The University of Tokyo, ³The University of Tokyo, ⁴Harvard T.H. Chan School of Public Health, Harvard Medical School

Introduction: Despite a great potential for monitoring physical activity (PA) by smartphones in public health and clinical settings, little evidence on their accuracy in free-living conditions in their ordinary usage currently exists. The aim of this study was to assess the accuracy of step counts measured by iPhone in free-living conditions.

Method: We recruited 54 adults (31 $\pm$ 10 years) who owned an iPhone. Step count was measured using both a validated pedometer (Kenz Lifecorder) and the iPhone simultaneously. Participants were asked to use their own iPhones

as usual and wear a pedometer on their waist for 7 consecutive days during waking hours. A recorded day was deemed valid if the pedometer was worn for ≥ 10 hours a day on at least 3 days. To assess the agreement between the two measurements, we calculated Spearman's correlation coefficients and created a Bland-Altman plot.

Results: Mean (SD) step count of iPhone was 9,253 (3,787) steps/day and it was significantly lower than that of the pedometer, 10,530 (3,490) steps/day, by 12% ($P < 0.001$). The Spearman correlation coefficient between devices was 0.78 ($p < 0.001$). Compared between groups, the largest underestimation of steps by iPhone against a pedometer was observed among those who seldom carry their iPhones [seldom: -3,036 (2,990) steps/day, sometimes: -1,424 (2,619) steps/day, and almost always: -929 (1,443) steps/day; P for linear trend = 0.081].

Conclusion: Smartphone may be of practical use to individuals, clinicians, and researchers for monitoring PA and for health promotion. However, caution should be paid in their underestimated outputs and non-carrying time.

External funding details: This study was supported by a Grant-in-Aid for Scientific Research (16H03249) from the Japan Ministry of Education, Culture, Sports, Science and Technology, and the Uehara Memorial Foundation.

ActiGraph and Fitbit cadence (steps/min) thresholds for moderate intensity walking in 21-60 year olds: The CADENCE-Adults study

Elroy Aguiar¹, Scott Ducharme¹, Christopher Moore¹, John Schuna Jr², Tiago Barreira³, Stuart Chipkin¹, Catrine Tudor-Locke¹

¹University of Massachusetts Amherst, ²Oregon State University, ³Syracuse University

Introduction: A directly observed walking cadence of ~ 100 steps/min has been established as a heuristic (evidence-based, practical, rounded) threshold associated with absolutely-defined moderate intensity (3 metabolic equivalents; METs). It is unclear whether this same threshold can be applied to commonly used research- and consumer-grade wearable devices.

Method: 156 participants (50% women, mean age = 40.6 $\pm$ 11.5 years; height = 1.7 $\pm$ 0.1 m, BMI = 25.4 $\pm$ 3.7 kg/m²) completed a treadmill walking protocol comprised of 5-min bouts at incrementally faster speeds (0.5-5.5 mph) while wearing an ActiGraph GT9X and Fitbit One on a waistband. Fitbit cadence was calculated as displayed steps per bout divided by 5-min. ActiGraph cadence (downloaded after testing) and metabolic intensity (METs; indirect calorimetry) were averaged over the final 2-min of each bout. Receiver Operating Characteristic (ROC) analysis was used to determine optimal cadence thresholds associated with 3 METs.

Results: Cadence ROC models for predicting 3 METs demonstrated excellent fit for both devices (all areas under the curve > 0.94). Optimal cadence thresholds (95% CI) were 96 (94-100) steps/min for the ActiGraph and 97 (94-102) steps/min for the Fitbit. Sensitivity and specificity values for these thresholds were all $\geq 85\%$, indicating high classification accuracy.

Conclusion: A cadence of ~ 100 steps/min appears to be a reasonable heuristic threshold representative of absolutely-defined moderate intensity walking when assessed using the ActiGraph GT9X or the Fitbit One. This finding suggests that walking thresholds are translatable across observed and technology-detected cadences. Future studies should determine whether this heuristic threshold can be consistently applied to other popular research- and consumer-grade wearable devices.

External funding details: NIH/NIA Grant 5R01AG049024

Development and feasibility of a wearable infant wrist band for the objective measurement of physical activity using accelerometer

Alessandra Prioreschi¹, Thomas Nappey², Kate Westgate³, Patrick Olivier², Soren Brage³, Lisa Micklesfield¹

¹University of the Witwatersrand, ²Open Lab, ³University of Cambridge

Background: This study aimed to describe the development of an infant wearable wrist-worn band for the measurement of physical activity; to determine the feasibility of the device data for observational measurement of physical activity; and to determine the caregiver reported acceptability of the infant wearable wrist band.

Methods: A wearable band was designed to fit an Axivity AX3 monitor. Mother and infant/toddler (aged 3-24 months) pairs (n = 152) were recruited, and mothers were asked for their child to wear the band with enclosed monitor at all times for one week (minimum 3 days). Feasibility was assessed by determining technical reliability of the data, as well as wear time and compliance according to requirements for observational measurement. Acceptability was assessed via questionnaire.

Results: Technical reliability of the Axivity AX3 monitors in this age group was good. After excluding days that did not have at least 15 hours of wear time, 94% of participants were compliant, thus providing enough valid data for observational measurement. The majority (60%) of mothers reported being “very happy” with the safety of the device, while only 8% were “a little worried”. Most (80%) of participants rated the comfort of the band as “comfortable”, and 10% rated it as “very comfortable”.

Conclusions: The infant wearable band proved to be feasible and acceptable according to the criteria tested, and compliance wearing the band was good. We have therefore provided a replicable, comfortable, and acceptable wearable band for the measurement of infant and toddler physical activity.

Session: National policy approaches from around the world

The Australian Approach

Lindsey Reece, University of Sydney / Office of Sport NSW Government

In Australia, the national physical activity guidelines are consistent with the World Health Organisations recommendations, however much of the population are not sufficiently active to maintain overall good health. Whilst information on physical activity for health is captured through annual health surveys, participation in sport and active recreation is the primary indicator of success in Australia, measured through AUSPLAY. A national policy review identified that different approaches and metrics for success have been adopted across the different states and territories to increase the amount of physical activity and sport the population engages in. No single strategy will be effective to increase participation - a comprehensive, multifaceted, multi-sector approach is required. In response, the Australian Government in May 2017 announced the development of the National Sport Plan which will be delivered through four, interrelated pillars of participation, performance, preventive health through physical activity, and integrity. The development of the National Sports Plan envisions an Australia where everyone can be a part of sport and can be engaged in healthy living. At a state level, the NSW government has invested in a new research partnership with University of Sydney, SPRINTER, that uniquely positions academia alongside policy makers to inform policy, enhance practice to drive population changes in sport and

physical activity participation whilst aligning with national priorities. Reflections on the newly announced national sports plan along with critical insights from the SPRINTER partnership will be presented.

External funding details: Office of Sport NSW government financially supports the SPRINTER partnership.

Everybody Active, Every Day, the England experience

Lindsey Reece¹, Dr Justin Varney²

¹University of Sydney / Office of Sport NSW Government, ²Public Health England

In 2014 Public Health England led the co-production of a national evidence-based framework for action to reduce inactivity and increase health promoting physical activity. Everybody Active, Every Day (EAED) was developed through evidence reviews and co-production with over 1,000 stakeholders. It built on the Legacy established by the 2012 Olympics, the UK Chief Medical Officers guidelines on Physical Activity and the evolving narrative and evidence base within the sport and fitness sector led by Sport England. The UK Government accepted the recommendations for action made in EAED at a national level. Since its publication Sport England and Public Health England have worked in synergy with the Department of Health and Department of Digital, Culture, Media and Sport to implement the framework. EAED has been referenced and its recommendations integrated into government policy on sport, welfare reform, transport investment and across a broad range of health related policies. In 2017/18 PHE commissioned an external review of the impact of the framework in two of the four domains of action: creating an active society and creating active environments. This presentation will share the findings of this review as well as reflect on the journey over the last four years and the opportunities moving forward to accelerate change.

Building bridges among policy, practice, research, and communication: Finland's most successful government programme: Finnish Schools on the Move

Antti Blom¹, Kaarlo Laine², Annaleena Aira², Eino Havas², Tuija Tammelin²

¹Finnish National Agency for Education, ²LIKES Research Centre for Physical Activity and Health

Finnish Schools on the Move (FSM) is a national action programme to establish a physically active operating culture in schools. Schools and municipalities participating in the programme implement their own plans to enhance PA during the school day, mostly during recess and academic lessons. The programme supports the dissemination of the ideas and practises developed by schools through organising seminars and producing and distributing educational materials. FSM operates in close interaction with the central government and has been implemented from the bottom-up and top-down simultaneously. FSM is funded by the Ministry of Education and Culture and organised by the National Board of Education, regional state administrative agencies and various other organisations. In 2010 programme began with 45 comprehensive schools, and at the begin of 2018 total of 2,053 schools (84% of all comprehensive schools) were registered to the programme. Recently FSM has become a priority government programme regarding know-how and education with the financial support of 21 million euros from the Ministry of Education and Culture for 2016–2018 to FSM to operate in municipalities. The objective of the Government is to expand the Schools on the Move programme across the country. The successes and challenges related to the coordination and administration of the programme will be discussed.

External funding details: Ministry of Education and Culture, Finland

Fostering partnership to advance global and national physical activity agenda: Lesson Learned from Thailand

Niramon Rasri¹, Orana Chandrasiri², Sigit Arifwiododo³

¹Thai Health Promotion Foundation, ²International Health Policy Programme, ³Kasetsart University

Although evidence has shown health benefits of increased physical activity (PA), many people in the world remain physically inactive and sedentary. In Thailand, less than one third of Thai population exercises on a regular basis. In recognition to the slow progress of implementation of interventions to promote physical activity at the global and national levels, Thailand see the importance of hosting the 6th International Congress on Physical Activity and Public Health (ISPAH2016) as a stepping stone to advance the national PA agenda. The congress opens new window opportunity to be more actively involved in the global PA movement. Thai Health Promotion Foundation (ThaiHealth) as one of the major actor in PA promotion then collaborates with national and international partners such as Ministry of Public Health, Ministry of Foreign Affairs, Ministry of Tourism and Sports, International Society for Physical Activity and Health, and World Health Organization. This partnership started with arranging the 69th World Health Assembly (WHA) side event as a scene-setting. It has resulted in two important milestones: the 69th South-East Asia Regional Committee Resolution and proposal to establish Global Action Plan on Physical Activity (GAPPA) during the 141st WHO executive board meeting. This document serves as an important policy guidance to renew global commitment in the form of World Health Assembly resolution which is expected to be endorsed in this May 2018. Thailand's involvement in global PA movement triggers the high-level actors to start to see the importance of advancing national PA agenda.

Applying a global promotion plan to a European country: What does the WHO Global Action Plan for Physical Activity (GAPPA) mean for Austria?

Randy Rzewnicki, ECF - European Cyclists' Federation

Introduction: The World Health Organization decided in early 2017 to launch a Global Action Plan for Physical Activity (GAPPA), which was adopted in May 2018. What do such plans mean for public health, active transport planning, and people who are or want to be walking and cycling in a well-developed member-state of Europe like Austria?

GAPPA contains several key proposals and approaches to convince politicians and decision makers to take action and commit resources for the promotion of physical activity. They include:

1. Existence of a decidedly sufficient evidence base to justify taking action ("we know enough to act and how to deliver results");
2. An absolute prerequisite is the multi-sectoral approach incorporating transport, health, environment, urban planning, economics, finance and education.
3. Valuing cycling (economic contributions including jobs, monetization of health benefits, and harm reduction)

How do these and other recommendations compare with the Austrian experience? This study explores the utility and degree of potential benefit to public health of applying a framework promotion scheme like the GAPPA to Austria.

Conclusions: While GAPPA is not limited to cycling promotion, the argument can be made that global promotion of active transport can make the greatest contribution to increasing levels of physical activity. The results of this study can serve as a basis for the application of GAPPA recommendations in Austria and other EU member states.

Application and evaluation of the 'Urban Health Check': an evidence-based planning support system to assist a State Government department with the design and creation of health-promoting communities

Paula Hooper¹, Sarah Foster²

¹The University of Western Australia, ²RMIT

Introduction: Despite a growing acceptance of the need for planning interventions that are health enhancing, planning professionals lack easy access to quantifiable evidence-based information about how their decisions impact community health. This study presents an overview of the application and evaluation of an interactive, empirically-driven, evidence-based health impact planning support system (the 'Urban Health Check') developed in partnership with the Western Australian State Government's Land Development Agency (LandCorp) to embed the consideration of health outcomes across its organisational structures, work practices and into the built environments they are designing and constructing.

Methods: The Urban Health Check was applied to real world development projects to 'health check' design concepts, run facilitated design review sessions and assist with communicating the outcomes and health benefits with planning consultants, local governments, elected members and the wider community. Evaluation, through surveys and focus groups, examined the capability of the Urban Health Check to support the planning tasks and activities of professionals, the experiences of using the tool, and the impact or added value of the Urban Health Check on supporting 'healthier' planning practices.

Results: Preliminary results indicate that the provision of health focused guidance through the Urban Health Check has assisted LandCorp embed community wellbeing outcomes in its projects and improved staff understanding of the planning and design decisions that impact negative and positive health outcomes.

Conclusion: The ongoing application of the Urban Health Check will help to stimulate strategic decisions and prioritisation of design solutions that are tailored to optimising the community health outcomes.

Session: Physical activity interventions for youths

Testing a social network vlog intervention to promote physical activity among adolescents: A randomized controlled trial

Thabo Van Woudenberg, Kirsten Bevelander, William Burk, Crystal Smit, Laura Buijs, Moniek Buijzen, Behavioral Science Institute, Radboud University

Introduction: The current study will examine the effectiveness of a short video (i.e. vlog) intervention to promote physical activity among adolescents. In addition, this study will test whether a social network vlog interventions is more effective than a mass media vlog intervention. A specific subset of adolescents (i.e. influence agents) will be asked to create six vlogs in which they promote physical activity, based on the behavior change mechanisms proposed by the Fogg's behavior model.

Method: Thirty classes (N = 1250) will be allocated via cluster randomization to one of the three conditions. Participants will receive a research smartphones to watch the vlogs, fill out the sociometric nominations and measure the covariates. An accelerometer (Fitbit Flex) is used to measure daily physical activity. At baseline, peers will nominate each other on sociometric questions (e.g. friendship) and the most central adolescents will be approached, on the last day of the baseline measures, to become an influence agents. During the intervention week, participants receive a vlog per day of the influence agents in their class (social network condition), from influence agents of another school (mass media condition) or no vlogs (control condition). Follow-up measurement will be five weeks after the intervention.

Results: Mixed models will be used to test the effectiveness of the interventions, controlling for clustering of the data within classes, participants and days.

Conclusion: This study is the first social network intervention that uses vlogs to promote physical activity in adolescents and compare this to a mass media campaign and control condition.

Evidence into practise to increase children's physical activity through schools settings: Does the Daily Mile improve the physical activity and physiological health of primary school children?

Colin Moran¹, Ross Chesham¹, Josie Booth², Emma Sweeney³, Gemma Ryde¹, Trish Gorely⁴, Naomi Brooks¹

¹University of Stirling, ²University of Edinburgh, ³Northumbria University, ⁴University of the Highlands and Islands

Introduction: The Daily Mile is a physical activity programme made popular by a primary school in Stirling, Scotland. The aim is that each day, during class time, pupils run/walk outside for 15 minutes (~1 mile) at a self-selected pace. It is anecdotally reported to have a number of physiological benefits. However, no study yet has investigated these reports.

Method: We conducted a quasi-experimental repeated measures study in two primary schools in the Stirling Council area: one school with, and one without, intention to introduce the Daily Mile. Pupils at the control school followed their usual curriculum. Of the 504 children attending the schools, 391 children in primary 1-7 (age 4-12 years) at baseline assessment took part. Follow-up assessment was the same academic year. Outcomes were accelerometer assessed average daily moderate to vigorous intensity physical activity (MVPA) and average daily sedentary behaviour, 20 metre shuttle run fitness test performance and adiposity assessed by sum of four skinfolds sites.

Results: After correction for age and gender, significant improvements were observed in the intervention school relative to the control school. MVPA, 9.1 min/day increase (95%CI 5.1-13.2 mins, SMD=0.407, $p=0.027$); sedentary time, 18.2 min/day decrease (10.7-25.7 mins, SMD=0.437, $p=0.017$); shuttle run, 39.1 m increase (21.9-56.3, SMD=0.236, $p=0.037$); and, skinfolds, 1.4 mm decrease (0.8-2.0 mm, SMD=0.246, $p=0.036$).

Conclusion: In primary school children the Daily Mile intervention seems effective at increasing levels of MVPA, reducing sedentary time, increasing physical fitness and improving body composition. These findings have relevance for education and health policy.

"4PC": An integrated model to promote Active School in Thailand

Panya Choolers, Narakorn Wongsingha, Piyawat Katewongsa

Institute for Population and Social Research, Mahidol University

Introduction: Recent data from the survey on physical activity of Thai children and youth indicated that only 23.2% of Thai population aged 6 to 17 years met the PA guidelines of 60 min MVPA daily. This study aims to develop a school-based prototype for physical activity promotion in Thailand by considering the context, culture, curriculum and teaching personnel in Thailand.

Method: It was school-based research using a quasi-experimental approach implemented in 15 schools; seven schools classified as experimental group and eight schools as control group. A total of 526 students aged between 9-10 years was drawn from the population in a probability random manners to be enrolled in a three years study.

Results: The prototype development process of active school was based on participatory action research method consisting of educational policy

makers, school administrators, teachers, students and research teams. For "4PC" model comprised of 5 essential elements: 1) active Policy 2) active Program 3) active Place 4) active People and 5) active Classroom. During the first year, the participants in the experimental group had an increased in overall physical activity level approximately of 6% (from 55.4% to 61.6%). Furthermore, comparing to control group, it is found that students in the experimental group have reported 9% of higher happiness and school engagement (77.9% and 69.0%).

Conclusion: The findings suggest that 4PC model positively influences the physical activity, emotional quotient, and school engagement of students.

External funding details: This project has been supported by Thai Health Promotion Foundation, Thailand

Evaluation of the Girls Active school-based physical activity programme: Implications for resourcing and delivery

Deirdre Harrington¹, Melanie Davies¹, Joanna Charles², Trish Gorely³, Kamlesh Khunti¹, Alex Rowlands¹, Lauren Sherar⁴, Rhiannon Tudor Edwards², Thomas Yates¹, Charlotte Edwardson¹

¹University of Leicester, ²Bangor University, ³University of the Highlands and Islands, ⁴Loughborough University

Introduction: Evidence from well-designed, adequately powered evaluations of programmes tackling low physical activity (PA) in UK adolescents are emerging. In light of the results of, and experiences from, the randomised controlled trial of the "Girls Active" school-based PA programme, the aim is to discuss the implications for putting this research evidence into practice.

Methods: Named investigators independently evaluated the Youth Sport Trust (YST) Girls Active programme. Twenty UK schools (10 intervention, 10 control) and 1,752 adolescent females were recruited. Effectiveness, economic analysis and process evaluations were undertaken.

Results: Evidence produced can impact the design and resourcing of similar programmes: programme effectiveness on PA and related outcomes; human resource and financial costs of programme implementation; qualitative information on how well Girls Active was received and valued by teachers and pupils and school-level constraints to implementation; and identification of commitments dictated by the national educational landscape that impeded implementation. The level and amount of on-going support offered by the YST was well-received and has merits for replication. Practical challenges encountered highlight the complexities of delivering school-based PA programmes effectively and should be addressed in future programmes.

Conclusions: Schools continue to be a key location for PA programming. Evidence suggests that unless schools are adequately resourced and the policy environment (the wider context) challenged to sustainable delivery of school-based PA programming there are limitations to the success of PA programmes.

External funding details: Girls Active is funded by the Youth Sport Trust. The evaluation was funded by the NIHR Public Health Research Programme.

Move well, move often: Understanding motor competence in children and young people: New horizons in movement skill assessment: sensors

Cain Clark¹, Claire Barnes², Paul Rees², Huw Summers², Gareth Stratton²

¹Coventry University; ²Swansea University, ²Swansea University

Introduction: Accelerometers are widely used to study physical activity and have been shown to be informative of motion mechanics. Whilst Process-oriented assessment is an important tool in the development of

children's fundamental movement skills, current methods of assessment are cumbersome and subjective. We present a novel analysis framework for activity assessment that uses accelerometry to create sophisticated motion maps and demonstrate their utility in profiling and categorising movement mechanics, objectively, in a diverse range of fundamental movements.

Methods: Acceleration data were collected from ankle and wrist mounted sensors. Children aged 9 - 12 years were assessed in a multi-stage fitness test and a fundamental movement skill (FMS) challenge. Acceleration and magnetometer data were used to construct spectrograms, phase maps of motion and a performance sphere. Specific activity components were analysed through pattern recognition using machine learning, and dynamic time-warping.

Results: Novel analyses of FMS displayed patterns clearly linked to specific activities such as throwing, jumping and body roll. These were sufficient to classify performance into activity categories using pattern recognition and a training set from expert observer scores.

Discussion: Novel analyses of children's mechanical motion patterns can be achieved for FMS using lightweight, low cost wearable sensors. These motion maps can be predictive of performance based on limited sampling allowing population profiling of FMS. Further, the use of computerised pattern recognition and classification gives an objective scoring of complex motion, normally requiring subjective assessment by expert human observers.

24-Hour Movement Guidelines for the Early Years: A collaborative approach to adopting/adapting guidelines. The Australian 24-Hour Movement Guidelines for the Early Years (Birth to 5 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep

Anthony Okely¹, Davina Gherzi², Kylie Hesketh³, Rute Santos¹, Sarah Loughran¹, Dylan Cliff⁴, Trevor Shilton⁴, David Grant⁵, Rachel Jones¹, Rebecca Stanley¹, Julie Sherring¹, Trina Hinkley², Stewart Trost⁶, Clare McHugh⁷, Simon Eckermann¹, Karen Thorpe⁸, Karen Waters⁹, Tim Olds¹⁰, Tracy Mackey¹¹, Rhonda Livingstone¹², Hayley Christian¹³

¹University of Wollongong, ²National Health and Medical Research Council, ³Deakin University, ⁴National Heart Foundation, ⁵Department of Health, Government of Australia, ⁶Queensland University of Technology, ⁷Early Childhood Australia, ⁸The University of Queensland, ⁹Children's Hospital Westmead and University of Sydney, ¹⁰University of South Australia, ¹¹New South Wales Department of Education, ¹²Australian Children's Education & Care Quality Authority (ACECQA), ¹³The University of Western Australia

Introduction: The purpose of this paper is to outline the process and outcomes for adapting the Canadian 24-Hour Movement Guidelines for the Early Years to develop the Australian 24-Hour Movement Guidelines for the Early Years guided by the GRADE-ADOLOPMENT framework.

Methods: A Leadership Group and Consensus Panel were formed and existing credible guidelines identified. The draft Canadian 24-hr integrated movement guidelines for the early years best met the criteria established by the Panel. These were evaluated based on the information from the Canadian Draft Guidelines. Updates to each of the Canadian systematic reviews were conducted and the Consensus Panel reviewed the evidence for each behaviour and made a decision to adopt or adapt the Canadian recommendations. An online survey was then conducted (n = 302) along with five focus groups (n = 30) and five key informant interviews (n = 5) to obtain feedback from stakeholders on the draft guidelines.

Results: Based on the evidence from the Canadian systematic reviews and the updated systematic reviews in Australia, the Consensus Panel agreed to adopt the Canadian recommendations and, apart from some minor changes to the wording, keep the wording of the guidelines, preamble and title of the Canadian Guidelines.

Conclusion: Following this approach allowed the Australian Guidelines to be developed much faster and at lower cost. As such, we would recommend the GRADE-ADOLOPMENT approach, especially if a credible set of guidelines, with all supporting materials and developed using a transparent process, is available. Other countries may consider using this approach when developing and/or revising national movement guidelines.

Children's active transportation: The interplay of individual, parental and social factors

Richard Larouche¹, Sébastien Blanchette², Guy Faulkner³, Geneviève Leduc⁴, Negin Riaz³, François Trudeau², Mark Tremblay⁵

¹University of Lethbridge, ²Université du Québec à Trois-Rivières, ³University of British Columbia, ⁴Fillactive, ⁵Children's Hospital of Eastern Ontario

Introduction: Active transportation (AT) is an important source of moderate- to vigorous-intensity physical activity (MVPA) among children, but most previous studies have focused only on the trip to/from school. We investigated the correlates of AT to/from a broader range of destinations including school, parks, shops, sport venues, etc.

Methods: 1,892 children in grades 4-6 were recruited in 37 schools from 3 diverse regions of Canada: Ottawa, Trois-Rivières, and Vancouver. Children completed a questionnaire on AT and independent mobility and wore a SC-StepRX pedometer (capable of measuring time spent in MVPA) for 7 consecutive days. One of their parents completed a questionnaire that included items on their child's behaviours, perceptions of the environment and socio-demographic characteristics. We used generalized linear mixed models with a negative binomial distribution to investigate the correlates of the number of active trips reported by children while adjusting for gender, school, school-area income, and urbanization.

Results: Children who were granted more independent mobility ($\exp(b) = 1.06$ for each additional mobility license), whose parents reported higher social cohesion ($p_{\text{trend}} = 0.025$), or owned fewer cars ($p_{\text{trend}} < 0.001$) reported more active trips. Conversely, children who accumulated an average of <60 min/day of MVPA ($\exp(b) = 0.88$), did not go home for lunch ($\exp(b) = 0.64$), spent less time outside ($p_{\text{trend}} < 0.001$), did not attend the closest school ($\exp(b) = 0.74$), or spoke a language other than English or French at home ($\exp(b) = 0.76$) reported fewer active trips.

Discussion: Children's AT is associated with multiple characteristics of the child, the parents, and the social environment. AT interventions should target multiple levels of influence.

Session: Physical activity for people with disabilities: Evidence, interventions and evaluation

Trajectories of health-related quality of life after rehabilitation: results from the longitudinal cohort study ReSpAct

Bregje Seves¹, Femke Hoekstra², Florentina Hettinga³, Rien Dekker⁴, Lucas van der Woude¹, Trynke Hoekstra⁵

¹University of Groningen, ²The University of British Columbia, ³University of Essex, ⁴University Medical Center Groningen, ⁵VU University Amsterdam

Purpose: To identify trajectories of health-related quality of life (HR-QoL) among people with physical disabilities or chronic diseases after rehabilitation, and to determine which factors are associated with trajectory membership.

Method: Patients (N = 1719) with physical disabilities or chronic diseases were followed at baseline (T0: 3-6 weeks before discharge) and 14 (T1), 33 (T2) and 52 (T3) weeks after discharge from rehabilitation in the longitudinal cohort study Rehabilitation, Sports and Active lifestyle (ReSpAct). Latent class growth mixture modelling was used to determine trajectories of HR-QoL, a data-driven approach, based on self-reported data of the RAND-12. Descriptive statistics were used to determine personal and lifestyle related factors associated with trajectory membership.

Results: Four trajectories of HR-QoL were identified, whereof two small and dynamic trajectories ('fluctuating' (N = 25) and 'recovery' (N = 13)). Two large and stable trajectories were distinguished and used for further analysis: 'high HR-QoL' (N = 489) and 'low HR-QoL' (N = 656). Patients with 'high HR-QoL' reported higher levels of physical activity than patients with 'low HR-QoL' on each measurement occasion (1617 ± 1305 versus 1121 ± 1170 minutes/week on T3). Patients with 'high HR-QoL' were more often male (56.0% versus 44.0%), older (52.6 ± 13.4 versus 49.8 ± 13.3), had a lower Body Mass Index (26.5 ± 5.1 versus 27.8 ± 6.0), smoked less (13.9% versus 20.4%), consumed more alcohol (48.4% versus 36.6%), and had fewer comorbidities (62.9% versus 50.1% with one comorbidity).

Conclusion: This study identified four trajectories of HR-QoL: 'fluctuating', 'recovery', 'high' and 'low'. The associated personal and lifestyle related factors will help healthcare professionals to identify vulnerable patients and provide them with tailored advice regarding a physically active and healthy lifestyle.

Richmond Group's physical activity programme movement for all: A realist evaluation of Get Set to Go: A multi-site, community based, peer-led physical activity intervention for people with mental health problems.

Dr Florence Emilie Kinnafick¹, Hayley Jarvis², Lorna Tweed¹, Emma Adams¹, Musgrove Madeline², Jacob Diggle²

¹Loughborough University, ²Mind

Introduction: Limited research has explored the complex relationship between physical activity (PA) and mental health (MH) in community based interventions. Get Set to Go (GStG), a 3 year PA programme funded by Sport England and National Lottery, and delivered by Mind, a UK based MH charity, used online support and face-to-face group based, peer-led PA taster sessions across eight local Mind services in England. We aimed to answer the question, how might we best deliver interventions to capitalise on associations between PA and MH.

Method: Using a Realist evaluation approach (i.e., to understand what works for whom, in what contexts, and how, in complex social phenomena) our methods included nine focus groups with peer-volunteers (4: n = 28), Sport-Coordination (1: n = 8), and participants (4: n = 35). Using an inductive thematic approach data was analysed first by sample group, then across sample groups to develop meaningful themes.

Results: Analysis highlighted context specific areas for feasible and successful methods of engaging adults with poor MH to support behaviour change; lived experience of MH problems for a supportive socio-contextual environment within group sessions; personalised text messages for participants to facilitate feelings of value and care; a support structure for peer-volunteers; clear line of communication to create stability for participants and peer-volunteers; positive relationships with sports facilities and staff to reduce perceived stigma of poor MH.

Conclusion: Group based, peer-led community programmes can successfully engage those with MH problems, via conducive change mechanisms,

by facilitating a supportive socio-contextual environment encompassing the lived experience of MH problems.

A participant-led physical activity programme for disabled people who are ready to become physically active

Eva Jaarsma, Brett Smith, University of Birmingham

Background: Despite physical and psychosocial benefits of participating in physical activity, disabled people are amongst the most inactive people in the community. To successfully increase physical activity participation in disabled people it is crucial that people have the intention to become physically active. Therefore intenders are the ideal target for physical activity promotion interventions.

Objective: Objective of this study was to evaluate a 30 week participant-led physical activity programme for disabled intenders. Second objective was to explore positive and negative experiences of disabled people during the process of becoming physically active.

Methods: A mixed method design using thematic analysis to analyse data from focus groups as well as Friedman tests to determine differences in physical activity, sitting time and self-efficacy in week 1, 12 and 30. Post hoc tests were performed using Wilcoxon tests.

Results: 15 participants completed a 30 week physical activity programme, showing short term improvements (week 1 vs week 12) with increases in vigorous activity ($p = 0.068$) and self-efficacy ($p = 0.017$) and a decrease in sitting time ($p = 0.026$). Participants expressed that being physically active improved their self-confidence and that action plans helped to include physical activities in their daily routine. Long term differences (week 1 vs week 30) will also be determined.

Conclusion: Physical activity programmes for inactive disabled people should start with reducing sitting time before improving physical activity and focus more on 'every active minute helps'. Finally action plans were useful tools to become physically active.

External funding details: This study was funded by the English Federation of Disability Sport.

The impact of sport and physical activity as a rehabilitation tool upon Invictus Games Competitors

Ian Brittain¹, Jason Bocarro², Michael Edwards²

¹Coventry University, ²NC State University

Introduction: There is a growing body of research highlighting the positive impacts of sport and physical activity upon the physical and mental well-being of traumatically injured military personnel. This study carried out at the 2015 Invictus Games in Orlando, Florida, aimed at better understanding the role of sport-based physical activity in the rehabilitation process of military personnel who have undergone traumatic injury or chronic illness.

Methods: Data were derived from the following: (1) Five in depth focus groups consisting of 19 competitors from 4 countries; (2) Semi-structured interviews were conducted with ten team managers; (3) 153 Competitors (23 female, 130 male) completed open ended questions as part of a survey. The average length of time since the onset of injury for all respondents was just under eight years.

Results: Six main themes around how sport had helped in their rehabilitation process were discernible from the data. These were: sense of camaraderie and achievement, sport providing participants with increased sense of purpose, motivation and confidence, sport providing a safe channel for aggression, sport participation had led to improved physical

and psychological wellbeing, and that sport kept their mind off what had happened to them.

Conclusion: Findings appear to indicate that the use of sport and physical activity as an effective rehabilitation tool. Tactics such as goal setting and team mentality, often critical components of both sport and fundamental parts of military training, is helpful in allowing these competitors to reconnect with their military identity, without the negative implications of self-comparison.

External funding details: The authors would like to acknowledge the assistance of the Invictus Games Foundation in providing access to the competitors, friends and family and spectators at the 2016 Invictus Games in Orlando, Florida, which made this research possible. This research was supported by a Marie Curie International Research Staff Exchange Scheme Fellowship within the 7th European Community Framework Programme.

Enabling access for people with mental impairments

Roger Mackett, University College London

Travel provides access to everyday activities including those providing physical activity. Disabled people have greater barriers to travel than other people despite equality legislation in many countries. Arguably, fewer adjustments are made to transport supply for people with mental impairments such as dementia, autism and mental health conditions than for people with physical impairments.

The purpose of this presentation is to identify the factors that deter people with mental impairments from travelling and interventions that can help to overcome these barriers. The research in the paper is based on the analysis of data from the UK Life Opportunities Survey, the National Rail and Bus Passenger Surveys, interviews with stakeholders and examination of the literature, particularly the grey literature.

The main factors that deter people with mental impairments from travelling are anxiety and lack of confidence which stem from two concerns: finding the way (and not getting lost) and interacting with other people. Wayfinding involves the process of decision-making based on the integration of information from two sources: memory recall and perception of the local environment including sources carried by the traveller. All these processes can be challenging for people with mental impairments, as can be communication with travel staff and fellow travellers. There may also be concerns about behaviour, both that of fellow travellers and how one's own behaviour is perceived.

A number of interventions which can increase confidence and reduce anxiety are examined, including travel training, clear travel planning information, legible local environments, safe places and mobile phone apps.

Benefits or being fit: benefits and disabled people's fear of being seen to be active

Elliott Johnson, Activity Alliance (formerly English Federation of Disability Sport)

Introduction: Anecdotal evidence from EFDS' partners has identified a fear among disabled people of losing benefits as a result of being seen to be active. Disabled people are twice as likely as non-disabled people to be inactive but at least seven in 10 would like to do more.

EFDS, on behalf of Dwarf Sports Association UK (DSAuk), undertook a study to examine this fear, with a particular emphasis on experiences of the main disability benefits (PIP, DLA and ESA).

Method: EFDS commissioned Flex^{MR} who employed a mixed-methods approach. An online quantitative survey of 206 disabled people was designed to measure activity levels and particular experiences of benefits as well as recruit for a second stage. Twenty-six of those with physical

impairments took part in this qualitative stage and discussed their experiences in depth in an online private 'diary' and a question board shared with all participants.

Results:

- 65% rely on benefits to be active
- 47% are fearful of losing their benefits if they are more active
- 34% have had, or know someone who has had, benefits removed as a result of being active
- 55% are likely to be more active if benefits couldn't be taken away

Conclusion: The fear among disabled people that being active could lead to losing benefits and, therefore, their independence, is a real and quantifiable issue in increasing activity levels. It is essential that broader social considerations are addressed by those responsible for promoting physical activity and policy makers more generally.

External funding details: DSAuk and Sport England

Accessibility and usability of parks by older adults with disability

Meredith Perry¹, Hemakumar Devan¹, John Sullivan¹, Christina Ergler¹, Pauline Boland²

¹University of Otago, ²University of Limerick

Background: Over 2/3rds of older adults (>65 years) report having a disability. Persons with disability are less likely to be physically active yet are at greater risk of poorer physical, psychological and social wellbeing. Urban parks are free and are associated with better health outcomes. However, the accessibility and usability of urban parks by older adults with disability is unknown.

Methods: This mixed-methods study randomly surveyed 1,000 older adults. Questionnaires included the Perceived Access to Urban Parks, and the EQ-5D-5L. Interviews were conducted post survey with older adults who identified as having a disability.

Results: Over 450 older adults with a mean(SD) age of 74(7) years, including 150 with self-reported disability, completed the survey. Significantly more older adults with disability never visited an urban park in the last year compared to older adults ($p < 0.01$). Private vehicle ownership significantly increase the odds of visiting urban parks ($p < 0.01$), OR 3.99 (1.48, 10.8) in older adults. Mobility in the park significantly increased the odds of visiting ($p < 0.01$), OR 9.55 (1.95, 46.8) in older adults with disability. Older adults with disability reported that the natural environment, amenities, community interactions and finding a place to 'be' influenced their decision to visit urban parks.

Conclusions: Older adults with disabilities are less likely to visit and report accessibility issues. Given the ageing population and the health benefits from urban park use inclusive, accessible and intergenerational urban parks requires serious consideration.

External funding details: This research was funded by a University of Otago Research Grant.

Session: Physical activity, physical fitness and disease risk

The longitudinal associations between physical fitness, fundamental movement skills and academic achievement

Heidi Syvoja¹, Anna Kankaanpää¹, Laura Joensuu², Jouni Kallio¹, Harto Hakonen¹, Charles H. Hillman³, Tuija Tammelin¹

¹LIKES Research Centre for Physical Activity and Health, ²LIKES Research Centre for Physical Activity and Health/ Faculty of Sport and

Health Sciences, University of Jyväskylä,³Department of Psychology and Department of Health Sciences, Northeastern University

Introduction: This study examined the longitudinal associations of physical fitness (PF) and fundamental movement skills (FMS) with academic achievement.

Methods: 970 adolescents (9–15 y, 52% girls) from 9 schools throughout Finland participated in a two-year follow-up study. Academic achievement scores (grade point average [GPA]), PF and FMS were assessed in the spring of 2013–2015. Aerobic fitness was measured with a maximal 20-m shuttle run test, muscular fitness with curl-up and push-up tests, locomotor skills with a 5-leaps test and manipulative skills with a throwing-catching combination test. Structural equation modelling was applied to examine the longitudinal associations adjusting for age, gender, mother's education and children's learning difficulties.

Results: Changes in aerobic and muscular fitness were positively associated with change in GPA ($B=0.244$, $p=0.002$; $B=0.328$, $p<0.001$, respectively). Changes in locomotor or manipulative skills were not associated with change in GPA ($B=0.175$, $p=0.073$; $B=0.188$, $p=0.138$, respectively), but these skills in 2014 predicted GPA in 2015 ($B=0.048$, $p=0.002$; $B=0.033$, $p=0.011$). GPA in 2013 predicted aerobic fitness and manipulative skills in 2014 ($B=0.074$, $p=0.001$; $B=0.089$, $p=0.004$, respectively). However, neither GPA nor PF/FMS predicted one another systematically.

Conclusion: In this study, change in PF was positively associated with change in academic achievement, while FMS, although not systematically, predicted academic achievement, and vice versa. Developmental changes in adolescence may induce parallel and simultaneous changes in academic achievement, PF and FMS.

External funding details: This study was funded by the Academy of Finland (grant 273971) and the Finnish Ministry of Education and Culture (OKM/92/626/2013).

German percentile curves of physical fitness from childhood to early adulthood- the MoMo-Study

Claudia Albrecht¹, Doris Oriwol¹, Anke Hanssen-Doose², Alexander Woll¹, Annette Worth²

¹Karlsruhe Institute for Technology, ²University of Education Karlsruhe

Introduction: The aim of this analyses is to report sex- and age-specific physical fitness (PF) percentile curves from childhood to early adulthood in a nationwide sample in Germany. Already in childhood PF is considered as one of the most important health markers. From a developmental and preventive perspective, PF levels are relatively stable from childhood to early adulthood, thus, it is important to monitor population PF levels being able to intervene at early stages.

Methods: Data stem from the nationwide representative MoMo-Study in Germany (data collection wave 1: 2009–2012; age: 4–23 y.; $n=3,770$; 50,2% female). PF was assessed by means of the MoMo-test-profile covering four dimensions of PF (strength, endurance, coordination, flexibility). Percentile curves were fitted using the LMS transformation method of Cole and Green (1992).

Results: Data on 3.770 individual with a mean age 12.5 ± 4.8 years, were submitted for analyses. Standardized age- and sex-specific PF percentiles were calculated for eight items covering health-related (endurance, strength endurance, maximal strength, flexibility) and skill-related fitness dimensions (balance, coordination). Percentile-curve-shapes differ between sexes. PF improvements with age are linear (e.g. max. strength) or curvilinear (e.g. coordination) depending on PF dimension.

Discussion: Our results provide for the first time sex- and age-specific PF percentile curves for Germany from childhood to early adulthood. Differences in curve-shapes indicating a timed and capacity-specific PF development. Nationwide German PF percentiles can be useful in comparing populations (e.g. cross-country) and assessing initiatives that aim to improve childhood PF.

External funding details: Federal Ministry of Education and Research 01ER1503

Identifying correlates and determinants of cardiorespiratory fitness: a systematic review

Johannes Zeiher¹, Katherine J. Ombrellaro², Gert B. M. Mensink², Finger Jonas D.²

¹Robert Koch Institute, ²Robert Koch Institute

Introduction: Cardiorespiratory fitness (CRF) is an established predictor of adverse health outcomes. Therefore, it is important to understand why some people are more fit than others, in order to develop and improve public health interventions.

Method: This systematic review of studies, from databases including MEDLINE, EMBASE and Cochrane Library (no time or language restrictions) investigates the relationship between CRF (measured by treadmill or cycle ergometer test) and individual or interpersonal influencing factors among the general, non-symptomatic, non-institutionalized adult population. Risk of bias is evaluated using a customized quality assessment tool. To date, study selection is complete. Final results, including strength and direction of the association between CRF and identified factors, will be presented.

Results: 3.005 studies were identified in the literature, 86 met the inclusion criteria. Studies were heterogeneous with respect to sample size, country of origin and CRF measurement. Included studies were observational, mostly cross-sectional. Ongoing extraction indicates that, aside from sociodemographic factors such as age and sex, biomarkers and anthropometric measures are the most frequently investigated correlates and determinants. Studies included in the review also analyze the association between CRF and behavioral or socioeconomic factors. Commonly adjusted confounding variables include sex, age, physical activity level, anthropometric measures, vital parameters and smoking status.

Conclusion: In synthesizing the current research on correlates and determinants of CRF among adults, this systematic review could identify gaps in the current understanding of factors influencing CRF and aid public health measures promoting the fitness of risk-groups and the general population.

Genetic risk, physical fitness and incident coronary heart disease.

Youngwon Kim¹, Luca Lotta², Stephen Sharp², Katrien Wijndaele², Felix Day², John Perry², Nick Wareham², Soren Brage²

¹University of Utah, ²University of Cambridge School of Clinical Medicine

Introduction: The purpose was to examine the associations of grip strength (GS) and cardiorespiratory fitness (CRF) with incident coronary heart disease (CHD) across different levels of genetic susceptibility to CHD.

Method: UK Biobank is a prospective cohort of >0.5 million adults: baseline (2006–2010) and repeat-assessment (2012–2013). Participants' polygenic risk scores (PRS) were calculated to represent each individual's genetic risk for CHD. GS and CRF were measured through hand dynamometers and sub-maximal bike tests, respectively. Incident CHD was

defined as the first occurrence of non-fatal/fatal CHD (accrued until 2015). Analyses were performed on 306,530 individuals (9,201 CHD cases) with no cardiovascular disease at baseline and no covariates missing.

Results: Over 6.9-year follow-up, each standard deviation increase in GS was associated with lower incident CHD hazards in women (hazard ratio [HR]: 0.81; 95% confidence interval [CI]: 0.78-0.84) and men (HR: 0.86; 95% CI: 0.84-0.88), independently of PRS and other confounders. In the sub-sample of 43,286 with CRF measures, each standard deviation increase in CRF was associated with lower CHD hazards (HR: 0.89; 95% CI: 0.83-0.95), independently of confounders including PRS. The lowest GS level showed higher CHD hazards compared with the highest across all genetic risk levels in women (p-for-interaction:0.159) and men (p-for-interaction:0.008). The lowest CRF level had higher CHD rates compared with the highest at each genetic risk (p-for-interaction:0.228).

Conclusions: Higher physical fitness was associated with lower CHD risk at high as well as low genetic risk. Similarly, CHD risk was higher at low genetic risk if physical fitness was lower.

External funding details: This work was supported by the British Heart Foundation (PG/13/86/30546 and RG/13/16/30528). The funders had no role in the design and conduct of the study; collection, management, analysis, interpretation of the data; preparation, review, approval of or decision to publish the manuscript.

Muscle-strengthening exercise participation patterns among 397,423 American adults and associations with health-related outcomes

Jason Bennie¹, Asaduzzaman Khan², Dc Lee³, Glen Wienser⁴, Adrian Bauman⁵, Emmanuel Stamatakis⁵, Stuart Biddle¹

¹University of Southern Queensland, ²The University of Queensland, ³Iowa State University, ⁴Victoria University, ⁵University of Sydney

Introduction: There is limited research on muscle-strengthening exercise (MSE) participation patterns and its independent associations with health-related outcomes among American adults.

Methods: Data were drawn from the American 2015 Behavioral Risk Factor Surveillance System. During telephone surveys, respondents reported how many times during the past week they engaged in MSE. Weighted weekly MSE frequencies were calculated for the total sample and across sociodemographic and lifestyle characteristics. Multivariate logistic regression models assessed the odds of reporting 'poor' self-rated health and being classified 'obese' (BMI ≥ 30 kg/m²) according to weekly MSE frequency, adjusting for covariates.

Results: Data were available on 397,423 adults (18-80 years). Overall, 30.2 (95% CI: 29.9%-30.5%) met the MSE recommendations (≥ 2 times/week) and 57.8% (95% CI: 57.5%-58.2%) reported no MSE. Older age, insufficient aerobic activity, lower education, poor self-rated health, female sex and being overweight/obese were independently associated with lower odds of meeting the MSE recommendations. There were U-shaped association for frequency of MSE and poor self-rated health, and a reverse J-shaped association for obesity. When compared to those who did none, those reporting MSE 1-6 times/week were less likely to be classified 'obese' or report 'poor' self-rated health. However, there was relative increase in odds for these outcomes among those reporting MSE ≥ 7 times/week.

Conclusions: Almost 60% of American adults do not engage in any MSE. Future public health strategies should focus on getting greater proportions of the population going from doing 'no' MSE, to doing 'some' to 'moderate' amounts of this activity.

The effect of age on the association between muscular strength and mortality in overweight or obese men

Angelique Brellenthin¹, Angelique Brellenthin¹, Xuemei Sui², Steven Blair²

¹Iowa State University, ²University of South Carolina

Introduction: To determine the effect of age on the associations of muscular strength (MS) with cardiovascular disease (CVD) and all-cause mortality in overweight or obese men.

Method: Participants were 5,071 men aged 18-100 years (mean age 43) with a medical examination during 1980-1990 in the Aerobics Center Longitudinal Study. They had body mass indexes (BMI) of ≥ 25 kg/m² without CVD or cancer at baseline. We measured MS by one repetition maximum of bench and leg press and used tertiles of the age-specific total MS scores from both tests. Mortality was ascertained using the National Death Index. Cox regression models included baseline age, examination year, BMI, smoking, alcohol intake, parental CVD, medical conditions, physical activity, and cardiorespiratory fitness from a maximal treadmill test.

Results: During 19 years of follow-up, 114 CVD and 356 all-cause deaths occurred. We found a significant interaction by age on the associations of MS with CVD and all-cause mortality (both $p < 0.01$). In men ≥ 50 years old, the hazard ratios (95% confidence intervals) for CVD and all-cause mortality were 0.65 (0.36-1.16) and 0.67 (0.47-0.95), respectively, in the middle MS tertile, and 0.41 (0.20-0.84) and 0.61 (0.42-0.90), respectively, in the upper MS tertile, compared with the lower MS tertile. However, the associations of MS with CVD or all-cause mortality were not significant in younger men < 50 years old.

Conclusion: Higher muscular strength was associated with lower CVD and all-cause mortality risk in older men who were overweight or obesity.

External funding details: Supported by NIH Grants AG06945, HL62508, DK088195, and HL133069.

Muscular strength and association with cluster of cardiovascular risk factors in adults

Tiago Lima¹, David González-Chica², Diego Santos Silva¹

¹FEDERAL UNIVERSITY OF SANTA CATARINA, ²The University of Adelaide

Introduction: Muscle strength is inversely associated with cardiovascular risk. The aim of this study was to investigate the relationship between muscle strength and clusters of metabolic syndrome components (MetS) in adults.

Methods: Cross-sectional population-based study including 533 adults (45.3 ± 11.1 years, 42.2% men) of Florianópolis, Southern Brazil. Muscle strength [calculated as absolute strength (kg) / body mass (kg)] was measured by manual dynamometry. Data on blood pressure (BP), waist circumference (WC), lipids and glycemia were used to identify the components of MetS, which were analyzed as individual factors and clusters (number of positive components or combinations of components). Multiple linear regression adjusted for age, sex, family income, educational level, smoking, alcohol consumption, saturated fat consumption, sugar consumption, calories from alcohol, food fiber consumption, sodium intake and physical activity level was used.

Results: The mean of muscle strength was 0.87 kg (± 0.26). When analyzed as clusters, the number of positive risk factors in the same individual (1, 2, 3 and 4 factors, β of at least -0.05 kg) or the different combinations (clusters of 2, 3 and 4 components; β of at least -0.09 kg) were inversely associated with muscle strength. In addition, the individual

presence of Mets components was inversely associated with muscle strength (β of at least -0.08 kg).

Conclusion: Interventions aimed at coping with risk factors for cardiovascular diseases should consider the maintenance of muscle strength levels.

Session: Social dimensions of physical activity and health

How can social practice theories help us understand the physical activity culture of a school?

Gareth Wiltshire¹, Fiona Spotswood², Sara Spear², Liza Liew²

¹University of Bath, ²University of the West of England

Introduction: Underpinned by the understanding that behaviour change requires a conceptualisation of both individual and social determinants, there is a growing interest in exploring social practice theory to address a range of harmful behaviours. As social practice theory is yet to be developed in physical activity (PA) research, the purpose of this study was to investigate how it could be utilised in the context of understanding children's PA in primary schools. The three-elements model consisting of materials, competences and meanings was used to frame our approach.

Methods Focus group, survey, observation, and interview data were collected with pupils, staff, and parents at one primary school setting in England. Analysis involved identifying physically active practices which comprise the school PA culture and thematically coding those practices using the three-elements model.

Findings Analysis revealed how seven clusters of physically active practices throughout the school day were sustained by and interrupted by the configurations of (1) physical resources (e.g. playground space and equipment), (2) practical know-how (e.g. a skilled understanding of performing the activity), and (3) the socio-cultural significance of those practices (e.g. the values and meanings of the activity). Findings also illuminate how physically active practices are contingent on whether conflicting or complementary social practices exist. In this way, practices such as walking to school were sustained by the complimentary practices involved with 'doing' parenthood.

Conclusion: Social practice theory offers new ways of conceptualising PA in schools and may help identify opportunities and frameworks for simultaneous policy, school and individual level interventions.

Safe HABITATS: Does the association between crime and walking differ by area disadvantage?

Sarah Foster¹, Paula Hooper², Nicola Burton³, Wendy Brown⁴, Billie Giles-Corti¹, Jerome Rachele⁵, Gavin Turrell¹

¹RMIT University, ²University of Western Australia, ³Griffith University,

⁴University of Queensland, ⁵University of Melbourne

Introduction: Residents in socio-economically disadvantaged areas are typically exposed to more crime and tend to be more fearful about crime than those in advantaged areas – but often walk in spite of these heightened exposures. This study examines whether crime is a barrier to walking, and tests whether associations differ by area disadvantage.

Methods: HABITAT participants (n = 6680) lived in 200 neighbourhoods that spanned the most and least disadvantaged areas in Brisbane, Australia. They completed questions on their perceived crime and walking behaviours, and objective crime and walkability measures were generated for the 1000 m euclidean distance around participants' homes. Multi-level models examined associations between perceived and objectively measured 'crime' and recreational and transport walking, with progressive adjustment for area-level socio-economic disadvantage and walkability

components (density, land-use mix, street connectivity). Interactions tested whether patterns differed by area-level disadvantage.

Results: Higher actual and perceived crime were associated with reduced odds of recreational walking (albeit non-significant). In contrast, actual crime and perceived crime were significantly associated with transport walking, but patterns differed. High perceived crime was associated with reduced odds of transport walking (OR = 0.65, 95% CI = 0.54-0.77), whereas high objective crime was associated with increased odds of transport walking (OR = 1.65, 95% CI = 1.23-2.17). Patterns did not differ by area-level disadvantage.

Conclusion: The counter-intuitive positive association between objective crime and transport walking was partly explained by the correlation between crime and more walkable environments. Inter-relationships between crime, the built environment and area disadvantage may help explain the inconsistencies in the crime and walking evidence base.

External funding details: DE160100140

A longitudinal study of friends' and parents' social norms on physical activity

Kirsten Bevelander, Thabo van Woudenberg, William Burk, Laura Buijs, Crystal Smit, Moniek Buijzen, Radboud University

Introduction: This is the first study that investigates whether misperceived peer norms can predict youth's personal physical activity. In addition, the study examines the long-term effect of friends' and parents' role modeling ('descriptive norms') and social approval ('injunctive norms') on youth's physical activity.

Method: The study is part of the MyMovez research project that consists of a large-scale cross-sequential cohort study (N = 953; 8-12 and 12-15 y/o). The study uses three data collection waves conducted in February/March 2016, 2017 and 2018. Daily physical activity was measured by means of an accelerometer and self-reported survey data was assessed via a smartphone with the MyMovez research application.

Results: Preliminary findings suggest that youth often underestimate how often their peers reach the norm for being physically active. Cross-lagged structural equation models are used to investigate the influence of friends' and parents' descriptive and injunctive norms on objectively measured as well as self-reported physical activity.

Conclusion: Determining the role of (mis)perceived social norms and social expectations deserves more attention in research. Social norms may contribute to youth being less physically active. Strategies may be required to correct misperceived social norms contributing to healthier behavior change.

External funding details: The MyMovez project is funded by the European Research Council (ERC).

A longitudinal study exploring the social and built environmental influences on children's physical activity during the transition from primary to secondary school.

Peter Collins¹, Matthew Hobbs², Stephen Zvolinsky¹

¹Leeds Beckett University, ²Leeds Trinity University

Background: Children's physical activity (PA) levels significantly decline during the transition from primary to secondary school. However, little is known about how the change in the social and physical environment may contribute to this decline. **PURPOSE:** To investigate whether changes in the physical and social environment during the transition from primary to secondary school influences children's PA levels.

Methods: 181 children (M = 85; F = 96) participated. In 2 schools, 74 students in year 6 primary school transitioned to a different secondary

school in year 7, whilst in 2 middle schools 107 students remained in the same school environment from year 6 to year 7. Children wore ActiGraph accelerometers and Garmin GPS devices for 5 consecutive days on four occasions (year 6 winter and summer; year 7 winter and summer). Self-report surveys and focus groups captured children's perceptions of their social and physical environment.

Results: Significant declines in average daily moderate to vigorous PA ($p < 0.05$) were observed in children when transitioning from primary to secondary school (-83 mins) and in children remaining in middle school (-62 mins). For transitioning children and those in middle schools, significant declines in MVPA were evident in school lessons and recess, as well as free-time after school (all $p < 0.05$). Social and environmental factors became less positive towards PA as children aged, although this was consistent between children changing and not-changing schools.

Conclusion: Changes in the social and physical environment during the transition from Primary to Secondary school do not appear to be primary determinants of the decline in children's PA.

An assessment of physical environment characteristics related to older adult walking behaviours using an audit tool (MAPS Senior): Findings from urban cities in Brazil and the UK

Ruth Hunter¹, Sara Ferguson¹, Hermes Koller de Paiva², Adalberto Lopes², Adriano Akira Ferreira Hino², Ruth Hunter¹, Claire Cleland¹, Rodrigo Siqueira Reis³, Geraint Ellis¹

¹Queen's University Belfast, ²Pontifical Catholic University of Parana, ³Washington University in St Louis

Introduction: The influence of environments upon older adult physical activity (PA) is becoming increasingly widely documented. However, whilst our understanding of 'macroscale' influences (e.g. walkability) advances, there remains limited understanding on the influence of 'microscale' features, i.e. those characteristically found along streetscapes older adults may encounter as part of typical walking routines. Combined with walking data, environmental audit tools could provide an effective means of assessing the potential importance of these streetscape environments for promoting older adult PA.

Methods: To ensure the audit tool had a specific relevance to older adult populations, findings from a systematic review and focus groups were used to make adaptations to MAPS Global (Microscale Audit of Pedestrian Streetscapes). This present study examines associations between microscale attributes and (i) self-reported and (ii) objectively measured PA behaviours of older adults (≥ 60 years) ($n = c.600$) living in neighbourhoods of varying walkability and income. Using virtual methods, the audit tool will capture land uses, streetscape and sidewalk qualities and amenities, and aesthetic and social elements of; routes, segments and crossings encountered by older adults in Curitiba (Brazil) and Belfast (UK). The tool is to be implemented along the first 400 m of GPS-captured walking routes taken from participant residences. Mixed linear regression analyses adjusted for macro-level walkability will be conducted to assess relationships.

Discussion: Considering microscale environment changes may be easier and more feasible to implement than those at the macroscale, advancing the understanding of this topic may be central to the creation of both activity- and age-friendly environments.

The impact of improvements in urban green space on older adults' physical activity and wellbeing: a natural experimental study

Jack Benton, Jamie Anderson, Sarah Cotterill, Matthew Dennis, Sarah Lindley, David French, University of Manchester

Introduction: Creating or improving urban green space has the potential to be an effective and sustainable intervention that has reach in increasing physical activity and improving wellbeing. However, there is a dearth of well-conducted natural experimental studies examining the causal effect of changing urban green space on older adults' physical activity and wellbeing. This natural experimental study measures the effect of four urban street greening interventions in Manchester on older adults' physical activity and wellbeing over a one-year period.

Methods: Four sites where improvements were planned were matched to eight comparison sites based on a systematic matching process using objective and subjective environmental correlates of older adults' physical activity. The outcome measures are physical activity and two other indicators of wellbeing (connecting with others and taking notice of the environment), collected using a newly developed observation tool, at baseline, 6 and 12 months. Eight hours of observation were conducted for each site; counterbalanced over four days across two weeks.

Results: Baseline data collection occurred in September 2017 before the interventions were installed in November 2017. Eighty-eight hours of data were collected at baseline and 176 hours of data are planned at follow-ups. There was high inter-rater reliability between observers at baseline (ICCs > 0.9). Results will be presented.

Conclusion: This study contributes to improving natural experiment methodology in this field by addressing methodological weaknesses causing high risk of bias in previous natural experimental studies; key improvements include rigorous matching of multiple comparison sites and appropriate statistical control of key confounders.

External funding details: This work is carried out as part of the Green infrastructure and the Health and wellbeing Influences on an Ageing population (GHIA) project Funders: Natural Environment Research Council, the Arts and Humanities Research Council and the Economic and Social Research Council under the Valuing Nature Programme. NE/N013530/1

Pooling and synthesising qualitative datasets to develop a new social science approach to promote active living

Emily Haynes¹, Ruth Garside², Judith Green³, Micheal. P Kelly⁴, David Ogilvie⁵, James Thomas⁶, Cornelia Guell²

¹University of Exeter, ²European Centre for Environment and Human Health (ECEHH), University of Exeter, ³Department of Global Health and Social Medicine, Kings College London, ⁴Primary Care Unit, Institute of Public Health, University of Cambridge, ⁵MRC Epidemiology Unit, University of Cambridge, ⁶UCL Institute of Education, University College London

Innovative approaches are required to better address physical inactivity. To move beyond individual approaches to behaviour change, and develop more appropriate insights for the persistent and complex challenge of increasing population levels of activity, recent research has drawn on social practice theory. This describes the recursive and relational character of active living and related social practices. However, to date these investigations are limited to small-scale, inherently context-specific qualitative research studies. To uncover conditions for change across these data sets, we explored the value of novel approaches to qualitative data synthesis. This study pools and compares qualitative accounts of one important component of physical activity, 'active travel', across different contexts, drawn from five studies conducted in the UK, which included data from Belfast, London, Glasgow, Cambridge and Gwynedd. Two key approaches were applied: a meta-ethnography to synthesise cross-study themes from a conceptual, theoretical perspective; and one text mining strategy, an unsupervised machine learning approach to identify

unanticipated patterns within text. We report these findings in the context of method feasibility, comparability, strengths and limitations, and application to other research areas where qualitative data are abundant. This study contributes new insights into the application of machine learning to qualitative social science research, and towards a social science approach to behaviour change. The findings have implications for future research and policy decisions about social environments for promoting social practices which increase physical activity.

External funding details: Research funded by an Academy of Medical Sciences and Wellcome Trust grant: Springboard - Health of the Public 2040 (HOP001\1051).

Tuesday, 14:40–15:40

Session: Physical activity and mental health

An innovative approach to integrating physical activity (PA) into the management of mild-to-moderate depression (MMD)

Katarzyna Machaczek¹, Melanie Gee¹, Peter Allmark², Scott Weich², Elizabeth Goyder², Mark Shea³

¹Sheffield Hallam University, ²University of Sheffield, ³Improved Access to Psychological Therapies, Sheffield

Introduction: Physical activity (PA) has been shown to be as effective as medication or psychological therapies in reducing mild-to-moderate depression (MMD). Despite this, support for increasing PA is not routinely included in the management options offered to MMD patients. We therefore undertook a preliminary study to investigate the potential for the integration of PA into MMD management delivered within the Improving Access to Psychological Therapies (IAPT) service. The study explored: the acceptability of integrating PA into MMD management amongst IAPT staff; the extent to which IAPT already integrates PA into MMD management; infrastructure and training needs of IAPT staff related to promoting PA engagement; and, patients' experiences of barriers and enablers to PA initiation.

Methods: In-depth interviews were conducted with eight IAPT staff (Psychological Wellbeing Practitioners and Cognitive Behavioural Therapists) and twelve individuals with MMD. Transcripts were analysed using [inductive/thematic] approach.

Results: The integration of PA into MMD management were seen as enhancing treatment options and having the potential to improve recovery. For IAPT practitioners barriers included uncertainty about negative consequences; lack of time; limited links to local PA providers. For individuals, many personal, social, and cultural factors affected their ability to initiate PA; including the nature of the condition, but also the wider determinants of health such as socioeconomic status, physical and social environments.

Conclusion: Whilst integration of PA in MMD management is seen as appropriate and feasible by both patients and practitioners, there are many wider and condition-related factors that will influence successful implementation.

External funding details: RCB - SHSC Foundation Trust

Social relationships mediate the relationship between physical activity and mental well-being

Ben J Smith¹, Tilahun Haregu¹, Adrian Bauman²

¹School of Public Health and Preventive Medicine, Monash University,

²School of Public Health, University of Sydney

Introduction: Regular physical activity (PA) is known to improve vitality and mental well-being. It has been reported that social connectedness is an underlying driver of this relationship, with those who have stronger relationships being more active and experiencing greater well-being. This study aimed to examine the pathways between PA, social relationships and mental well-being in a population cohort.

Methods: We used data collected from 1,320 inactive adults who were enrolled in the MOVE Frankston study, conducted in Melbourne Australia. PA, social connectedness and mental well-being were measured at baseline, 12 and 24 months, using validated instruments. Generalized Structured Equation modelling was used to examine the direct and indirect relationships between the variables, with stratified analysis undertaken to identify factors that moderated the mediation pathways.

Results: We found that social connectedness fully mediated the relationship between PA and mental well-being. Personal friendships mediated 73% of the association between total minutes of PA and mental well-being, and 59% of the association between attaining 150 mins/wk of PA and well-being. On the other hand, community connectedness mediated 11% of the relationship between total PA minutes and mental well-being, and 6% of the relationship between achieving 150 mins/wk and this outcome. Household income and presence of chronic conditions moderated these mediation relationships.

Conclusion: Social relationships, particularly personal friendships, play an important role in achieving the mental health benefits that can be derived from PA. Promoting PA in social contexts is not only helpful for behaviour change, but for achieving well-being outcomes.

External funding details: Australian Research Council

Safe, Fit & Well - protecting and improving young people's mental health through sport

Paul Jarvis-Beesley¹, Louise Mansfield PhD², Alistair John³, Prescott Amy⁴

¹StreetGames, ²Institute for Environment, Health and Societies, Brunel University, ³Division of Sport, Health & Exercise Sciences, Brunel University, ⁴Brunel University

Following a scoping review, carried out in 2016 into the connections between community sport and young people's mental health and wellbeing in disadvantaged areas, StreetGames commissioned researchers at Brunel University London to conduct primary research on the 'Safe, Fit and Well' pilot project between February 2017 and March 2018. The overall aim of the research was to develop understanding of the type of sport offer that can effect change and support the mental health and wellbeing of young people (14-24 years) living in areas of high, socio-economic deprivation.

This presentation presents the preliminary findings from a mixed-method qualitative case study approach including: telephone interviews with the Streetgames core team, the national pilot project leads, and doorstep delivery staff, participatory observations of safe, fit and well delivery activities, and observations and face-to-face interviews with young people taking part in a residential training programme for peer mentors.

The discussion explores both the common and diverse ways that decision makers, delivery experts and participants conceptualise and experience wellbeing in the 'Safe, Fit & Well' projects. Pathways for wellbeing are identified, including peer support and workforce development approaches. The potentials and challenges for planning, delivering and evaluating future sport programmes to promote wellbeing are discussed.

A Theory of Change is presented, for further testing in the field, suggesting causal links between the activities and components of a purpose-designed

sports programme and the desired outcomes of increased resilience and protected mental wellbeing amongst disadvantaged adolescents.

External funding details: Sport England, Souter Charitable Trust, Garfield Weston Foundation

Physical activity, mental health and academic achievement among pupils in lower secondary schools in Norway

Ingeborg Barth Vedøy¹, Sigmund Alfred Anderssen², Hege Eikeland Tjomsland¹, Knut Ragnvald Skulberg¹, Miranda Thurston¹

¹Inland Norway University of Applied Sciences, ²The Norwegian school of Sport Sciences, Norway

Background: The proportion of youth in Norway stating that they experience mental health problems has increased. For example, 30% report stress-related problems and pressure related to academic achievement (AA) has been identified as a specific stressor. Physical activity (PA) may influence various dimensions of mental health (MH) and research findings suggest that PA and MH may also influence AA. Nevertheless, knowledge about how these factors are associated among pupils at lower secondary schools in Norway is lacking. The aim of this study is to investigate such associations in this pupil group.

Method: This study is an ongoing prospective cohort study involving 11 strategically selected schools in Norway. Annual data collection is conducted from 2016-2018. The 2016 participation rate was 60% (599 participants, 54.4% girls). PA is measured objectively using ActiGraph GT3X+/BT. Data on MH are collected using validated questionnaires (SDQ, SPPA-R and WEMWBS). AA is measured using pupils' grade point average (GPA). Height, weight and waist circumference are measured objectively.

Results: Based on 2016-data: Higher levels of PA were associated with higher levels of mental well-being ($p=0.001$). Higher levels of PA were also associated with a higher GPA in practical subjects ($p=0.001$). Self-perception of scholastic competence was associated with a higher GPA ($p<0.001$), whereas higher levels of mental health complaints were associated with a lower GPA ($p<0.001$).

Conclusion: Physical activity is associated with some dimensions of mental health, and positive mental health is associated with higher academic achievement.

External funding details: This project is funded by the Norwegian Research Council

Feasibility and acceptability of a home-based physical activity program for postnatal women with depressive symptoms: A pilot study

Megan Teychenne¹, Paige van der Pligt¹, Gavin Abbott¹, Leah Brennan², Ellinor Olander³

¹Deakin University, ²Australian Catholic University, ³City University

Background: New mothers, particularly those with heightened depressive symptoms, experience several challenges to being active such as lack of time and childcare, and therefore home-based programs using hired exercise equipment may help overcome these barriers. This study tested the feasibility and acceptability of a home-based treadmill intervention among postpartum women with heightened depressive symptoms.

Methods: Participants were 11 insufficiently active women (3-9 months postpartum) experiencing heightened depressive symptoms (using the Edinburgh Postnatal Depression Scale). Women received a 12-week physical activity (PA) support program, which included free treadmill

hire and access to a purposely-designed smartphone web-app. Following participation in the program, one-on-one semi-structured interviews were conducted. Depressive symptoms were assessed at weeks 4 and 8. Thematic analyses were used to identify key themes in qualitative data. Change in depressive symptoms was analysed using repeated-measures analysis of variance (ANOVA).

Results: Overall, postpartum women perceived the program to be convenient, flexible and acceptable. Women suggested the program was useful in overcoming key barriers to PA (e.g. lack of motivation, being housebound), and perceived that the program increased their PA and improved their mental health. There was a significant change over time (i.e., reduction) for depressive symptoms ($F_{2,20}=29.928$, $P<0.0005$).

Conclusion: A home-based PA program involving cost-free exercise equipment hire was feasible and well accepted by postpartum women. Although confirmation of findings using controlled trials is required, pilot data suggests that the program could potentially be used to treat postnatal depressive symptoms.

Healthy on the way (HOTway): Perceived stress of different modes of commuting

Matteo Sattler, Gottfried Köberl, Tanja Färber, Katharina Traußnig, Johannes Jaunig, Pavel Dietz, Mireille van Poppel, University of Graz

Introduction: A large portion of the employed population have high levels of psychological distress combined with low physical activity levels. However, to improve and maintain one's health, recovering activities such as leisure time physical activity or active transport are important. Current evidence suggests that using active modes of transport for commuting can play an important role in reducing chronic stress levels. However, whether mode of transport also affects acute stress has not been investigated so far. In the HOTway pilot study, we investigated whether different modes of commuting (i.e. active [walking, cycling], passive) are associated with different perceived stress levels.

Methods: Of 227 participants invited, 201 ($M_{age}=27.8\pm9.9$, 98 female) reported on commute-specific characteristics (e.g. duration, length, route, construction zones, traffic density), and completed a perceived stress questionnaire on three working days, respectively in the morning (i.e. before commuting) and immediately after arriving at work.

Results: Compared to passive commuters, active commuters showed a significant reduction in perceived stress ($d=-0.52$, 95% CI [-0.81,-0.24], $p<0.01$) from before to after travelling to work. This effect was influenced by duration of commuting, revealing increasing differences between the two groups with longer durations. In particular, longer durations were associated with increased perceived stress of passive commuters.

Conclusion: Active commuting may be beneficial for acute and chronic stress levels as well as maintaining and improving health. Further studies with objective measures of physical activity and stress are needed to strengthen the observed relationship.

Bristol Active Life Project (BALP), provision of physical activity in the community for people with Severe and Enduring Mental Illness (SMI)

Margot Hodgson, Avon and Wiltshire Mental Health Partnership NHS Trust

Purpose: BALP provides sport and physical activity for people with SMI and opportunities for achieving sports qualifications as a pathway to employment.

Relevance:

- Mental health is a priority for health improvement, requiring new approaches of physical healthcare to improve health for people with SMI (Department of Health, 2010:2004: 2006).

- Reduction of health inequalities (www.nice.org.uk.2008, Social Exclusion Unit, 2004, CSIP/NIMHE, 2006).

Description: BALP facilitates healthy lifestyles through regular participation in physical activity. It is a partnership between Avon and Wiltshire Mental Health Partnership NHS Trust (AWP), Local Authority, Service Users, Leisure providers and Voluntary Sector.

Evaluation: Evaluation (University of Bristol 2012) identified BALP as a model of good practice for sport and physical activity in mental health, addressing barriers to participation for people with SMI and breaking down barriers of stigma and discrimination.

Conclusions: BALP models good practice in mental health through promoting positive health, wellbeing and social inclusion through physical activity. Further research is needed to develop service delivery and target resources more effectively to provide increased sport and physical activity opportunities for SMI.

Implications: This successful model has the potential to be replicated in other areas of the NHS. It demonstrates that partnership working between Mental Health Services and Local Authorities combines the knowledge, skills and facilities necessary to enable those with SMI to increase their participation in regular physical activity.

External funding details: The Football Foundation awarded BALP £80,000 (2005 – 2008) and £138,000 (2009 – 2012)

Session: Physical activity epidemiology among children

Associations between self-reported physical activity and sedentary behaviour with cardiometabolic risk factors in adolescents: findings from 1993 Pelotas (Brazil) Birth Cohort Study

Gregore Mielke¹, Wendy Brown², Fernando Wehrmeister³, Helen Gonçalves³, Isabel Oliveira³, Ana Menezes³, Pedro Hallal³

¹Federal University of Pelotas / The University of Queensland, ²The University of Queensland, ³Federal University of Pelotas

Purpose: This study aimed to examine the combined association of screen time (ST) and physical activity (PA) at ages 11, 15 and 18 on cardio-metabolic risk factors at 18 years among Brazilian adolescents.

Methods: Data from the 1993 Pelotas (Brazil) Birth Cohort Study were analysed (N = 3,613). Self-reported physical activity and screen time were collected at 11, 15 and 18 years. Cardio-metabolic risk factors (fat mass index, waist circumference, triglycerides, blood glucose, non-HDL cholesterol and resting diastolic blood pressure) were examined at age 18. Multivariate linear regression was used to examine the association between four mutually exclusive PA/ST groups: 1) active (≥ 1 h/day PA) and low ST (< 5 h/day screen time); 2) active (≥ 1 h/day PA) and high ST (≥ 5 h/day screen time); 3) inactive (< 1 h/day PA) and low ST (< 5 h/day screen time); 4) inactive (< 1 h/day PA) and high ST (≥ 5 h/day screen time) at each age and outcomes at age 18.

Results: There were no significant association between PA/ST at ages 11 and 15 with outcomes at 18 years. In the cross-sectional analyses, adolescents in the most active group had significantly better levels of all the outcomes, regardless of ST. Inactive participants with high ST had the highest levels of glucose and non-HDL-C. For diastolic blood pressure, values were higher among inactive participants.

Conclusion: Overall, higher levels of physical activity appeared to be more important than low levels of screen time for cardio-metabolic health in adolescents.

Physical activity and obesity in the Eastern Mediterranean Region: Results from the Global School Health Survey, 2007-2012

Tom Loney¹, Marilia Silva Paulo², Faisal Aziz²

¹Mohammed Bin Rashid University of Medicine and Health Sciences,

²Institute of Public Health, College of Medicine and Health Sciences, United Arab Emirates University

Background: Our study estimated (i) the prevalence of physical activity (PA) and obesity across 17 Eastern Mediterranean Region (EMR) countries; and (ii) the association between these variables and the individual country Human Development Index (HDI).

Methods: Data from the Global School-Based Health Survey conducted in 17 EMR countries (N = 42,139; aged 13-17 years) between 2007 and 2012 was used to determine the prevalence of physical activity and obesity by country. Physical activity variables were aligned with the indicators used in the Global Matrix 2.0 on Physical Activity for Children and Youth.

Results: Lebanon had the highest proportion (24.5%) of children achieving the daily physical activity recommendations, Tunisia had the highest prevalence (70.5%) of children walking or riding a bike to school at least once a week, and Oman had the highest proportion (47.8%) of children participating in at least 150 minutes of physical education per week. Pakistan had the highest proportion (91.9%) of children sitting less than two hours per day and Kuwait had the highest prevalence of obese children. There was an inverse trend between sitting time (< 2 h/d) and individual country HDI and a positive trend between HDI and both the proportion of children participating in ≥ 150 minutes of PE per week and the prevalence of obesity.

Conclusions: Physical inactivity and obesity are major public health issues in all 17 EMR countries. Culturally-appropriate community- and school-based physical activity interventions are required to improve the overall physical levels of school children in EMR countries.

Are active boys and girls at increased risk of hospital attendance or admission for injury? A longitudinal study in Wales and Scotland using linked cohort and health service records

Lucy Griffiths¹, Mario Cortina-Borja², Karen Tingay¹, Amrita Bandyopadhyay¹, Ashley Akbari¹, Bianca DeStavola², Helen Bedford², Sinead Brophy¹, Ronan Lyons¹, Carol Dezateaux³

¹Swansea University, ²UCL Great Ormond Street Institute of Child Health, ³Queen Mary University London

Introduction: The association between objectively measured physical activity (PA) in childhood and hospital attendances or admissions for injuries is unclear. We hypothesised that higher intensity PA at age seven years corresponds to higher rates of subsequent injury-related health service utilisation.

Method: We analysed accelerometer-based estimates of moderate and vigorous (MVPA) and vigorous PA (VPA) from 1585 (777 [46w%] boys) seven-year-old Millennium Cohort Study members, living in Wales or Scotland, whose parents consented to linkage of cohort to routine health records. We fitted negative binomial regression models to estimate the effects of average daily minutes of MVPA and VPA on the number of hospital in-patient admissions and emergency department attendances for injuries from seven to 13.9 years.

Results: Children spent respectively a median of 59.5 (IQR 46.4, 75.2) and 18.1 (12.5, 25.3) minutes in MVPA and VPA/day, with boys on average more active than girls. Overall, 38% of children experienced at least one injury-related admission/attendance. Associations of each 10 minute increment in MVPA and VPA with number of admissions/attendances were

significant in boys: confounder-adjusted rate ratio [RR] (95% CI): 1.11 (1.02, 1.20) and 1.19 (1.01, 1.39), respectively; but not in girls: 0.94 (0.85, 1.04) and 0.83 (0.65, 1.06), respectively.

Conclusion: Seven-year-old boys who engaged in more intense physical activity had higher injury-related admission/attendance rates in the next 7 years than less active boys. Significant associations were not found in girls. This may reflect gender differences in choice of active pursuits and will be the subject of future analyses.

External funding details: Wellcome Trust (087389/B/08/Z)

24 hour movement behaviours of school children: associations with academic performance

Erin Howie¹, Courtenay Harris², John Joosten³, Leon Straker²

¹University of Arkansas, ²Curtin University, ³John XXIII College

Introduction: Physical activity, sedentary behaviours and sleep are known to have important influences on health throughout life. Schools are an important context to promote positive movement behaviours by children, but these behaviours are often seen as only of secondary importance compared to academic performance – by both parents and schools. Some evidence suggests that promoting good movement behaviours would also promote better academic performance. Thus, the purpose of this study was to examine physical activity, sedentary behaviour and sleep associations with academic performance.

Methods: Children attending a school with a high social resources score and well-developed health policies completed an online survey. Physical activity, sedentary behaviours and sleep were self-reported. Maths and English subject scores were collated from school records and weighted by class.

Results: In total 924 children (50% girls, mean age 14.7 (SD 2.7) years) from school grades 5 to 11 participated. There were no associations of days meeting physical activity guidelines nor sport participation with academic performance. Reported hours spent in sedentary activities was negatively associated with Maths (β -0.28 [95%CI: -0.43, -0.14], $p < .001$) and English scores (-0.13 [-0.22, -0.05], $p = .002$). Later weekend bedtimes were also associated with poorer academic performance in Maths (-1.07 [-1.63, -0.51], $p < .001$) and English (-0.54 [-0.86, -0.23], $p = .001$). Hours of sleep on weekends were positively associated with English scores (0.6 [0.1, 1.0], $p = .019$).

Conclusion: Higher self-reported sedentary time, later weekend bedtimes and less weekend sleep were associated with decreased academic performance. To promote student success, school policies should address multiple activity behaviours.

The relationship between meeting the Australian 24-Hour Movement Guidelines for the Early Years and Pre-schooler Obesity and Social-Emotional Development

Hayley Christian¹, Stewart Tros², Michael Rosenberg³, Leanne Lester³, Jasper Schipperijn⁴, Gina Trapp⁵, Pulan Bai³

¹The University of Western Australia, ²Queensland University of Technology, ³Ther University of Western Australia, ⁴University of Southern Denmark, ⁵Telethon Kids Institute

Introduction: New Australian 24-hour movement guidelines for the early years provide recommendations on daily physical activity (PA), sedentary screen time (SED), and sleep (SP) for children 2-5 years. This study uses a large representative sample to examine the association between meeting 24-hour movement guidelines, obesity and social-emotional development in young children.

Methods: PLAYCE study data was collected for 1490 children 2-5 years from 122 long daycare centres in metropolitan Perth, Australia. Centres were recruited based on size and SES. PA was assessed using 7 day accelerometry. Parent reported SED and SP was determined using established items. Height and weight were objectively measured and WHO weight status classifications applied. The Strengths and Difficulties Questionnaire was used to measure social-emotional development.

Results: Overall, 30% of children met the 24-hour movement guidelines for PA, 31% for SED and 83% for SP. Only 6.9% of children met guidelines for all three movement behaviours. Children meeting guidelines for two movement behaviours was 8% for PA and SB, 26% for PA and SP and 26% for SED and SP. Children meeting both SED and SP guidelines had 40% decreased odds of being overweight/obese (OR = 0.58; 95% CI: 0.35-0.96). Meeting PA and SED guidelines was associated with decreased odds of being at risk of conduct problems (OR = 0.48; $p < 0.1$).

Conclusion: Less than 7% of young Australian children meet the 24-hour movement guidelines. Meeting movement guidelines is associated with healthier weight status and social-emotional development. Findings suggest that effective scalable integrated interventions targeting multiple movement behaviours in preschool-aged children are needed.

External funding details: Healthway#24219

Trajectories of physical activity and sedentary behaviours in children and adolescents: The UP & DOWN Study

Kate Parker¹, Anna Timperio¹, Jo Salmon¹, Karen Villanueva², Helen Brown¹, Irene Esteban-Cornejo³, Veronica Cabanas⁴, José Castro-Piñero⁵, David Sánchez-Oliva⁵, Óscar Luis Veiga Núñez⁴

¹Deakin University, ²RMIT University, ³Northeastern University, ⁴Autonomous University of Madrid, ⁵University of Cádiz

Introduction: Physical activity declines and sedentary behaviour increases across childhood and adolescence. It is unknown, however, whether all youth follow the same physical activity and sedentary behaviour trajectories, or whether they differ among those with different activity-related profiles. This study compared longitudinal physical activity and sedentary behaviour trajectories between groups of children and adolescents with different baseline typologies (combinations) of activity-related behaviour.

Methods: Longitudinal study of Spanish children ($n = 600$, mean age = 9.15 ± 0.44 years, 50.3% girls) and adolescents ($n = 1037$, mean age = 13.57 ± 1.67 , 48.4% girls). Latent class analyses identified activity-related behaviour typologies based on self-reported screen-based, educational, social and relaxing sedentary time, active travel, muscle strengthening and sport at baseline. Within each typology, linear growth models of accelerometer-derived physical activity and sedentary behaviour explored longitudinal trajectories.

Results: Three typologies were identified for children ('sedentary', 12.8%, 'exercisers', 61.5%, 'inactives', 25.7%) and adolescents ('active screenies', 43.5%, 'active academics', 35%, 'inactives', 21.5%) at baseline. Sedentary behaviour followed a positive trajectory among all typologies. Among children, for each typology, physical activity followed negative trajectories. In adolescents, a negative physical activity trajectory was found only among the 'active academic' typology. Physical activity remained stable among 'active screenies' and 'inactives'.

Conclusions: The results support the need to intervene at all ages to promote physical activity and prevent increases in sedentary behaviour. Furthermore, adolescents characterised as 'active academics' may require specific interventions to maintain their physical activity over time.

External funding details: UP&DOWN Study: DEP 2010-21662-C04-00 grant from the National Plan for Research, Development and Innovation (R + D + i) MICINN.

Born to move? Prenatal and birth predictors of physical activity and sedentary time in three population representative birth cohorts in Pelotas, Brazil

Ding (Melody) Ding¹, Gregore Mielke², Inacio Silva², Pedro Hallal², Ulf Ekelund³

¹University of Sydney, ²Universidade Federal de Pelotas, ³Norwegian School of Sport Sciences

Introduction: According to the Developmental Origins of Health and Disease theory, health outcomes appear partly “programmed” in utero and during early life. While animal studies suggest biologically plausible programming effects of physical activity (PA) and sedentary behaviour, evidence from humans is limited. This study examines the association between prenatal/birth predictors and objectively measured PA/sedentary time (ST) in childhood, adolescence and young adulthood.

Methods: Data were from the 1982, 1993, and 2004 Pelotas Birth Cohorts, which represent >98% of all live births in respective years in Pelotas, Brazil. Infants were measured, and their mothers interviewed within 24 hours of delivery. Predictors were of biological (sex, birth weight, gestational age, birth order, mode of delivery and pre-pregnancy body mass index) and socioeconomic nature (maternal education and family income). Objectively measured overall and moderate-to-vigorous PA and ST were collected using GENEActiv accelerometers following standard protocols in 2010-13. Linear regression models with multiple imputation were used, analysis was further stratified by socioeconomic status (SES).

Results: Across all cohorts and outcomes, males and those with lower maternal education and family income were consistently more active and less sedentary. Less consistently, those with lower birth weight (<2500 g) and higher birth order (4+) were more active and less sedentary, particularly in medium and high SES strata.

Conclusion: In Brazil, SES at birth is the strongest predictor of PA and ST later in life, persisting from childhood to adulthood. Some population subgroups that are at risk of an inactive lifestyle may be identified at birth.

External funding details: Wellcome Trust (WT086974MA)

Session: Physical activity interventions for adults

“SitLess@Work” – developing an evidence-based framework to support the development, implementation and evaluation of interventions to reduce workplace sitting

Kelly Mackenzie¹, Elizabeth Goyder², Paul Norman³, Elizabeth Such²

¹University of Sheffield, ²School of Health and Related Research, University of Sheffield, ³Department of Psychology, University of Sheffield

Introduction: Prolonged sitting is associated with increased risks of chronic disease and premature mortality. Given workplaces contribute to a large proportion of daily sitting time, interventions to reduce workplace sitting are important public health initiatives. Previous systematic reviews suggest such interventions can be effective, but there is a need to explore the factors that might explain variation in effectiveness of workplace sitting interventions in more detail.

Methods: A qualitative systematic review was conducted. Four health and social science databases were searched for studies set in the workplace with

desk-based employees and the primary aim of reducing workplace sitting. Extracted data were primarily from author descriptions of intervention implementation. Thematic synthesis was undertaken.

Results: Forty studies met the inclusion criteria. Ten descriptive themes were identified from which emerged three higher-order themes: the development, implementation and evaluation of workplace sitting interventions. Key findings included: balancing top-down and bottom-up approaches; grounding interventions in theory; and conducting comprehensive process and outcome evaluations. Contextual information related to implementation was generally underreported.

Conclusions: These findings provided the basis for a framework to support workplace sitting intervention development, implementation and evaluation which incorporates all ten descriptive themes, and the detailed reporting of contextual information. After formal testing, the framework will be used to develop a practical toolkit to be used by a range of organisations to develop, implement and evaluate their own interventions to reduce workplace sitting time.

External funding details: KM’s Doctoral Research Fellowship is funded by the National Institute for Health Research (DRF-2016-09-023).

Effects of reducing sitting time on adiposity measures in adults: A meta-analysis of intervention studies

Nyssa Hadgraft¹, Elisabeth Winkler², Rachel Climie³, Megan Grace⁴, Lorena Romero⁵, David Dunstan⁴, Neville Owen⁴, Genevieve Healy², Paddy Dempsey⁴

¹Swinburne University of Technology, ²The University of Queensland, ³Paris Centre de Recherche Cardiovasculaire, ⁴Baker Heart and Diabetes Institute, ⁵The Alfred

Introduction: High levels of sedentary behaviour are associated with cardio-metabolic risk. A systematic review and meta-analysis was conducted to assess whether interventions to reduce sitting can positively impact on measures of adiposity—an important indication of cardio-metabolic risk.

Methods: A systematic database search identified 14 peer-reviewed studies (n=1796 participants) detailing the impact of adult sedentary behaviour interventions (≥ 1 week, with control group, not receiving other interventions e.g., diet) on adiposity outcomes: body mass; BMI; waist circumference; or, fat mass (percentage and total). Meta-analyses using fixed-effects models, or random-effects models (DerSimonian-Laird) for heterogeneous outcomes, were used to summarise pooled effects of the interventions relative to control.

Results: Body mass was reported in 12 studies, waist circumference in 11, BMI in 8, percent fat mass in 7 and fat mass (kg) in 5. Most (93%) intervened for 6 months or less and were workplace-based (57%). Meta-analyses revealed significant (p<0.05), beneficial, pooled intervention effects: for body mass (-0.67 kg [95% CI: -1.30, -0.05]); BMI (-0.26 kg/m² [-0.51, -0.02]); and percent fat mass (-0.61% [-0.95, -0.27]). Effects for fat mass (-0.29 kg [-0.61, 0.04], p=0.08) and waist circumference (-0.47 cm [-1.13, 0.18], p=0.16) were modest and non-significant. Effects were often heterogeneous.

Conclusions: Interventions targeting sedentary behaviour reductions can lead to statistically significant, albeit modest and variable improvements in some adiposity markers. The short intervention timeframes and healthy study populations may underestimate potential health benefits. Future research should examine long-term interventions and explore reasons for the variable success (for example, what activity replaces sitting).

Dose-response between frequency of breaks in sedentary time and glucose control in Type 2 Diabetes

Aye Paing¹, Kathryn McMillan², Alison Kirk², Andrew Collier³, Allan Hewitt², Sebastien Chastin³

¹Glasgow Caledonian University, ²Physical Activity for Health Group, School of Psychological Sciences and Health, University of Strathclyde, Glasgow, ³School of Health and Life Sciences, Glasgow Caledonian University, Glasgow

Objective: To investigate dose-response between frequency of light-intensity walking breaks (LIWB) in sedentary time and glucose control in type 2 diabetes.

Method: Twelve adults with type 2 diabetes participated in a randomised two-period balanced incomplete block trial consisting of three conditions: sitting with 3-min of LIWB every (1) 60 minutes; (2) 30 minutes; and (3) 15 minutes. FreeStyle Libre glucose monitoring system and activPAL3 were used to assess glucose and physical activity/sedentary behaviour. Standardised meals were provided. Incremental area under curves (iAUCs) for postprandial glucose and 21-h glucose were calculated.

Results: Breakfast and 21-h glucose iAUCs were lower in LIWB every 15 min ($4.0 \pm 0.3 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$, $P < 0.03$) ($8.1 \pm 1.2 \text{ mmol} \cdot \text{L}^{-1} \cdot 21 \text{ h}^{-1}$, $P < 0.04$) compared with LIWB every 60 min ($7.2 \pm 1.2 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$) ($15.5 \pm 3.9 \text{ mmol} \cdot \text{L}^{-1} \cdot 21 \text{ h}^{-1}$). There was attenuation of lunch and dinner glucose iAUCs in LIWB every 15 min ($1.6 \pm 0.9 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$, $P < 0.04$) ($0.9 \pm 0.8 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$, $P < 0.04$) and LIWB every 30 min ($1.6 \pm 0.3 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$, $P < 0.03$) ($1.3 \pm 0.7 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$, $P < 0.03$) relative to LIWB every 60 min ($4.1 \pm 1.1 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$) ($3.4 \pm 0.7 \text{ mmol} \cdot \text{L}^{-1} \cdot 3.5 \text{ h}^{-1}$).

Conclusions: Frequency of LIWB in sedentary time has dose-response effect on glucose, and this might be a simple therapeutic tool.

External funding details: This work is supported by PAL technologies Ltd (Glasgow, UK) and School of Health and Life-Sciences, Glasgow Caledonian University. The authors thank Prof. Joanne Booth (Glasgow Caledonian University) who provided financial support for participants' meals. The authors also thank the participants who volunteered and devoted their time to the study.

Low dose physical exercise training improves physical literacy in physically inactive adults

Peter Holler¹, Johannes Jaunig², Silvia Tutter¹, Othmar Moser³, Mireille van Poppel², Frank-Michael Amort¹

¹FH JOANNEUM, ²University of Graz, ³Swansea University

Introduction: Physical literacy (PL), as a holistic construct, is considered a person's capacity and commitment to a physically active lifestyle. Considering that lack of time is the most common exercise barrier, we investigated the effect of a low dose physical exercise training on PL among physically inactive adults.

Methods: A non-randomised controlled trial was conducted. Twenty-three physically inactive adults allocated to the intervention group (IG; 91% female; 53 ± 10 years) participated in a supervised physical exercise intervention (one session of 50–100 min/week for 14 weeks, moderate intensity). A matched, non-exercising control group (CG) consisted of twenty-two physically inactive adults (96% female, 50 ± 11 years). PL, $\text{VO}_{2\text{max}}$, compliance and sociodemographic parameters were measured. PL was evaluated by a questionnaire, covering five domains: physical activity behaviour, attitude towards a physically active lifestyle, exercise motivation, knowledge and self-confidence/self-efficacy. Data was

analysed by ANOVA and ANCOVA models, using age, gender, BMI and baseline values as covariates.

Results: Mean compliance was 65%. PL increased significantly in the IG ($p < 0.01$), while CG showed no changes. Similar improvements were observed for the domains physical activity behaviour ($p < 0.01$), attitude towards a physically active lifestyle ($p < 0.01$), exercise knowledge ($p < 0.05$) and self-confidence/self-efficacy ($p < 0.05$) in the IG at post-training intervention. No changes in the domain exercise motivation were found in IG. CG remained unchanged for all domains.

Conclusion: Low dose physical exercise training is a safe and feasible intervention to improve PL among physically inactive adults

External funding details: Gesundheitsfonds Steiermark

High Intensity Interval Training (HIIT) for smoking cessation in women

Toby Pavey¹, Coral Gartner², Wendy Brown²

¹Queensland University of Technology, ²University of Queensland

Introduction: Evidence for the efficacy of physical activity as a quit smoking aid is mixed, with insufficient exercise intensity a potential limitation. This study aimed to assess the effects of high-intensity-interval-training (HIIT) and lifestyle physical activity on smoking cessation in female smokers.

Methods: Forty-three women (18–55 y), who smoked ≥ 5 cigarettes/day, were randomised. Group-1 completed two gym-based supervised HIIT sessions/week over 12-weeks. Group-2 received a resource pack and pedometer, with the aim to increase steps to 10,000 steps/day over 12-weeks. Data on smoking and health outcomes were collected at baseline, post-intervention and follow-up. Data were analysed using Chi-squared test and factorial ANOVA.

Results: For those women who completed ($n = 12$ HIIT, 10 step-group), there was no significant group difference in quit rates ($p > 0.05$). However, quit rates at post intervention were 42% (HIIT) and 35% (step-group). There was a time effect for number of cigarettes smoked, with a significant reduction from 10.4 (SD4.8) at baseline, to 5.6 (SD5.6; $p < 0.01$) post-intervention, and 6.5 (SD6.7; $p < 0.001$) at follow-up. There was a significant interaction for fitness ($\text{VO}_{2\text{max}}$; $f_{2,40} = 4.3$, $p = 0.020$). Women in the HIIT group significantly increased their $\text{VO}_{2\text{max}}$ post-intervention (40.1, SD8.5) compared to the step group (33.4, SD7.8; $p > 0.001$).

Conclusion: The quit rate of completers was high, suggesting that physical activity can be used as an aid to help quit smoking. Importantly the HIIT group improved their cardiovascular fitness. Coupled with the quit rates, HIIT can potentially address two major contributors to cardiovascular disease (smoking and fitness) in one intervention.

External funding details: Funding: Heart Foundation Vanguard Grant

Success, struggle and defeat; narrative typologies of exercise referral experience

Coral Hanson¹, Emily Oliver², Caroline Dodd-Reynolds², Linda Allin³

¹Edinburgh Napier University, ²Durham University, ³Northumbria University

Objectives: Exercise referral schemes are an internationally widespread physical activity intervention. This study examined narratives of those referred by health professionals to a scheme recognised as emerging best practice to understand whom this service served well, or poorly, and why.

Design: The study employed a qualitative longitudinal approach.

Method: Participants were 11 individuals referred to a northeast England exercise referral scheme, with a range of long-term conditions including cardiovascular disease, mental health issues, diabetes, overweight/obesity and musculoskeletal problems. Participants took part in two interviews, prior to commencing the scheme and 12-20 weeks later. A holistic-form-based mode of analysis focused on the plot of participant narratives and understanding personal constructions of referral experience.

Results: Three narrative typologies emerged. First, success, with engaged participants focused on health outcomes and able to access social support. Second, struggle, short-term success but with concerns regarding continued engagement due to scheme dependency or cyclical needs. Participants focused on regaining structure and control following life events causing a breakdown in their social order. Finally, defeat, where illness, impaired social circumstances, restrictive interpersonal relationships, and/or poor participation experience made engagement difficult.

Conclusion: Participants drew on different narratives to explain engagement/non-engagement with the scheme, providing insight regarding for whom it worked or did not work. Collectively the narrative typologies highlight the complexity within such schemes, and inequality of access for those with challenging health and social circumstances. Improved, or different, behaviour change support is required for those who find engagement difficult, to help them move towards an alternative narrative.

Exercise therapy for acute non-specific low back pain

Teddy Oosterhuis¹, Helma Ijzelenberg¹, Sidney Rubinstein¹, Jill Hayden², Bart Koes³, Maurits van Tulder¹

¹VU University Amsterdam, ²Department of Community Health & Epidemiology, Dalhousie University, Halifax, ³ErasmusMC

Background: Exercise therapy is a worldwide, extensively practiced intervention for the treatment of low back pain (LBP). We updated a Cochrane review that was last published in 2005.

Aim: To assess the effectiveness of exercise therapy compared to no treatment, and other conservative treatments for the outcomes pain, functional status, perceived recovery, return to work and general health in adults with acute non-specific LBP.

Methods: An updated search was conducted for randomised controlled trials (RCTs) in the Cochrane Central Register of Controlled Trials, MEDLINE, PubMed, Embase, CINAHL, PEDro, PsycINFO, SportDiscus. We included RCTs that examined the effectiveness of exercise therapy for adults with acute non-specific LBP with a mean duration of less than or equal to six weeks. Two authors independently conducted study selection and risk of bias assessments. GRADE was used to assess overall evidence quality.

Results: We included 19 studies that involved a total of 2455 participants in this update. We found low quality evidence indicating no difference for pain and function when exercise therapy was compared with no treatment at short-term or intermediate follow-up. There was moderate quality evidence of no difference at the short-term, at intermediate and long-term follow-up for pain and functional status when exercise therapy was compared with other conservative therapies.

Conclusion: Exercise therapy is no better for short-, intermediate or long-term pain relief or improvement in functional status than no treatment, other conservative therapies or sham treatment. There was no strong evidence that any particular form of exercise therapy was better than another.

Session: Promoting physical activity in communities and workplaces

A cluster randomised controlled trial to investigate the effectiveness of a Structured Health Intervention for Truckers (SHIFT)

Stacy Clemes¹, Veronica Varela-Mato¹, Yu-Ling Chen¹, Fehmidah Munir¹, Mark Hamer¹, Thomas Yates², Charlotte Edwardson², Laura Gray², Gerry Richardson³, Jacqui Troughton⁴, James King¹

¹Loughborough University, ²University of Leicester, ³University of York, ⁴University Hospitals of Leicester NHS Trust

Introduction: Heavy goods vehicle (HGV) drivers' exhibit higher than nationally representative rates of obesity, and obesity-related co-morbidities, and have a reduced life expectancy compared to other occupational groups. Their working environments are not conducive to a healthy lifestyle, yet they are underserved in terms of health promotion efforts. The SHIFT programme is a multicomponent, theory-driven intervention targeting drivers' physical activity (PA), sedentary behaviour and diet. This presentation will describe the SHIFT programme evaluation protocol.

Methods/analyses: 336 HGV drivers will be recruited from our partner company. Following baseline measurements, depots (clusters) will be randomised to either the SHIFT intervention or usual-care control arm (12 clusters/arm). An internal pilot will be conducted on the first 6 clusters, findings will be presented. The 6-month SHIFT intervention includes a group-based interactive 6-hour education session, worksite champion support, and equipment provision (Fitbit and resistance bands/balls to facilitate a 'cab-workout'). Total daily PA (steps/day) will be the primary outcome. Secondary outcomes include: time spent sitting, time in light PA and MVPA, sleep quality, markers of physiological, metabolic and psychosocial health. Outcome measures will be taken at baseline, 6 and 12-months and analysed using an intention-to-treat principle.

Discussion: To our knowledge, this is the first RCT to examine the impact of a multicomponent intervention targeting individual and environmental barriers faced by HGV drivers to lead a healthy lifestyle. If effective, the SHIFT programme could be scalable as a Continued Professional Competence resource for drivers. This could have a long-term impact on professional drivers' health and well-being.

Effectiveness and cost-effectiveness of a Physical Activity Loyalty Scheme to maintain behaviour change: a cluster randomised controlled trial

Ruth Hunter¹, Aisling Gough¹, Jennifer Murray¹, Jianjun Tang¹, Christopher Patterson¹, Mark Tully¹, Alberto Longo¹, George Hutchinson¹, Lindsay Prior¹, David French², Jean Adams³, Emma McIntosh⁴, Frank Kee¹

¹Queen's University Belfast, ²University of Manchester, ³University of Cambridge, ⁴University of Glasgow

Background: The consequences of physical inactivity are estimated to cost the NHS over £1bn annually. As a large proportion of the UK workforce is employed in inactive occupations, workplace interventions have the potential to contribute significantly to the health of the population. The aim of the study was to investigate the effectiveness and cost-effectiveness of a complex intervention incorporating financial incentives to encourage physical activity and maintained behaviour change.

Methods: Desk-based employees were recruited from public sector organisations and randomised to Intervention or Control (waiting-list) groups. Intervention Group participants were encouraged to be active through provision of retailer vouchers during a 6 month intervention. The

primary outcome was mean steps/day (validated Yamax Digi-Walker pedometers). Secondary outcomes included health and wellbeing, and work absenteeism/presenteeism. Data was collected at baseline, 6 and 12 months. Outcomes were compared between groups using ANCOVA adjusting for baseline values, randomisation stratum and season, with standard errors corrected for clustering.

Results: 853 participants (mean age 43.56 (SD 9.60) years; 71% female) were randomised (37 clusters) into two groups. At six months, mean steps/day were 6990 (SD 3078) for the intervention group and 7576 (SD 3345) for the control group ($p = 0.02$). There was a significant difference between groups in favour of the intervention group for mental wellbeing (WEMWBS) and work absenteeism ($p = <0.01$).

Conclusion: Although the study did not show a significant intervention effect for physical activity, it did show significant improvements for mental wellbeing, absenteeism and presenteeism. Such improvements may lead to economic benefits for the employer.

External funding details: Funded via the National Institute for Health Research Public Health Research Programme; Award no: 12/211/82. The funding body had no role in the design of the study or collection, analysis, and interpretation of data or in writing the manuscript. The study team would also like to acknowledge funding from the Public Health Agency and South Eastern Health and Social Care Trust. RH is supported by a NIHR Career Development Fellowship and acknowledges funding support from the HSC Research and Development Division. JM is funded by a PhD studentship from the Department for the Economy Northern Ireland. The work was undertaken under the auspices of the UKCRC Centre of Excellence for Public Health Research Northern Ireland and Centre for Diet and Activity Research (CEDAR), UKCRC Public Health Research Centres of Excellence which are funded by the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, MRC, NIHR, and Wellcome Trust.

Activating employees in Liverpool workplaces

Danny Woodworth¹, Nicky Yates², Gina Perigo³, Jean Stephens⁴

¹Merseyside Sport, ²Liverpool City Council, ³NHS Liverpool Clinical Commissioning Group, ⁴Merseyside Sport Partnership

Liverpool has a very high rate of inactive and fairly active employees (46%), coupled with high levels of sedentary behaviour and an inactive workplace culture.

To combat this, Merseyside Sport Partnership (MSP) was commissioned by Liverpool City Council, in partnership with NHS Liverpool Clinical Commissioning Group (LCCG) and strategic stakeholders, to develop and deliver the Liverpool Active Workplace Programme.

MSP worked collaboratively with LCC, LCCG, stakeholders and the business community to launch a package of support for employers to improve staff physical activity levels, synergising with existing services and public health campaigns. A case for change agenda was promoted, citing research that absenteeism levels could be cut by up to 20% by investing in workplace physical activity. With 82 businesses registering for the programme, a mass participation step challenge was delivered and 21 small grants projects were funded. A legacy for the programme was ensured through development of a Workplace Toolkit, plus building organisational capacity by training and empowering 107 Workplace Champions, who organised activities and motivated their peers with behaviour change principles.

The programme evaluation found that the programme motivated 3,700+ employees to increase their activity levels, achieved a reduction in absenteeism in 45% of participating organisations and generated a £14.64 social return on investment for every £1 spent.

Liverpool Active Workplaces was pioneering in being the first practice-based (i.e. non-policy) workplace initiative to be commissioned in the city, which has helped to kick start a movement in the business community.

A HTA analysis of the Swedish Physical activity on prescription model

Mats Börjesson, Sahlgrenska Akademien

We will present data from the first systematic review, evaluating the Swedish PAP (Physical activity on prescription) model. The effects of various other exercise referral schemes have been evaluated in systematic reviews (Pavey et al. 2011, Campbell et al. 2015), with varying results. Important differences between the models for promoting physical activity is that exercise referral schemes, typically are focused on referring patients to a program performed outside the healthcare system lasting around 10-12 weeks, whereas Swedish PAP focuses on incorporating physical activity into the lifestyle of the patient on a long term and continues to be followed-up within the healthcare setting.

The effect of PAP on level of physical activity was based on data reported from five RCTs and one cohort study (eight papers), using the GRADE-system for review. Study participants represented several of the major patient groups suitable for receiving PAP, which increases the external validity of the results. The systematic review and the fact that our assessment was restricted to the Swedish PAP model further increases the applicability of the results.

The results from this systematic review, regarding the effect of Swedish PAP on the level of physical activity compared to no PAP, in adult individuals who have been deemed to be in need of increased physical activity by healthcare, will be presented. As lifestyle behavioural change is universally recommended for a multitude of diseases, the results may affect the use of PA in routine treatment, in healthcare.

The WELL Building Standard™ (WELL): The intersection of physical activity and the built environment

Vienna McLeod, International WELL Building Institute

Background: Buildings and communities have a profound impact on health. This presents a unique opportunity to utilize the design, construction and operation of built spaces to promote health and address some of today's most pervasive public health challenges, such as insufficient physical activity (PA).

Description: The WELL Building Standard™ (WELL) is a performance-based rating system for measuring, certifying and monitoring features of buildings and communities that impact health and wellbeing. Founded in health, science and design research, the program includes over 100 features across ten concepts (Air, Materials, Water, Nourishment, Light, Fitness, Sound, Thermal Comfort, Mind and Community) that leverage design strategies, performance testing and operational policies to establish conditions that foster health.

Components: At the building scale, WELL promotes active design strategies, including accessible and aesthetically designed staircases, active and ergonomic workstations, dedicated PA spaces, on-site equipment and amenities for active commuters. In addition, WELL includes features that encourage tenants to provide meaningful fitness incentive programs and structured PA opportunities. At the community scale, WELL addresses neighborhood-level factors that aim to improve opportunities for active living, including mixed-use development, pedestrian and cyclist friendly streets, and community PA spaces and programming.

Conclusion: Since the program launched in 2014, over 700 projects spanning 32 countries across a variety of building sectors have committed to the healthy building movement and are in pursuit of WELL

Certification. Of those, 72 have achieved certification. To date, 26 projects are located in the United Kingdom and four of these have achieved WELL Certification.

A longitudinal study of physical activity in different office types

Viktoria Wahlström¹, Frida Bergman², Fredrik Ohberg³, Therese Eskilsson⁴, Tommy Olsson², Lisbeth Slunga Jarvholm²

¹Umeå University, ²Department of Public Health and Clinical Medicine, Umeå University, ³CEDAR, Center for Demographic and Aging Research, Umeå University, ⁴Department of Community Medicine and Rehabilitation, Umeå University

Introduction: Sedentary behavior is a risk factor for lifestyle diseases. Office workers spend many hours at work sitting. We need strategies to reduce sitting time among office workers. Flex offices have no fixed work stations and employees are presumed to move between different working areas. The flex office may provide opportunities for increased physical activity (PA) at work.

Aim: Investigate the effects on PA when moving from a cell to a flex office.

Methods: A longitudinal study was performed on approximately 400 officials in a Swedish municipality, who initially all worked in cell offices. Half of them moved to a new flex office and half to a new cell office. A multicomponent intervention to increase PA was implemented at both offices. A substudy was performed on 84 officials who were recruited to measure sedentary time and PA with ActivPAL from 6 months before up to 18 months after relocation.

Results: Participants in the cell versus flex office group spent at baseline 51 and 53% of the working hours sitting, 40 and 39% standing, and 9 and 8% walking. After relocation the flex office group increased walking time and total steps. Time spent in moderate to vigorous physical activity (MVPA) at work increased in both groups. There were no changes in sitting or standing time or anthropometry between the groups.

Conclusions: The flex office design might increase walking time at work. A multicomponent intervention could increase time in MVPA at work, regardless of office type.

External funding details: Funded by Afa Insurance Foundation, Sweden.

Investing in inclusive built environment for physical activity and health: Design intervention assessment of urban public park in Bangkok, Thailand

Sigit Arifwidodo¹, Orana Chandrasiri²

¹Kasetsart University, ²International Health Policy Programme

Public Park is considered as one of the important settings for physical activity, especially in urban area. Parks support physical activity through their accessibility; their provision to facilitate active pursuits; their capacity to provide opportunities to a wide range of users; and their semi-permanent nature. The paper explores the design intervention assessment of Benchakitti Park, which serves as the pilot project for active park and showcase during the past ISPAH 2016 conference. The objective of the paper is to understand the health and well-being benefits of urban park in increasing PA levels of urban population and promoting healthy and active lifestyle. System for Observing Play and Recreation in Communities (SOPARC) is used to examine the change of activity patterns of users in the park and their level of PA. A survey questionnaire is used to understand how the new design in the park are perceived by users and how it can improve PA levels. It is found that the design changes the composition of users and pattern of PA. There are increasing number of children and elderly visitors (21% and

34%) and 4.1% and 17.6% increase of biking and running in the park. It is also found that park visitation is significantly associated with the increase of 5 minutes of PA per week. The project shows that even small intervention in built environment can change the people's attitude and behavior towards physical activity and healthy lifestyle.

Session: The impact of places and spaces on physical activity

Association between urbanicity and physical activity in Mexican adolescents: The use of a composite urbanicity measure

Maria Hermosillo-Gallardo, Simon J. Sebire, Russ Jago, University of Bristol

Introduction: In Mexico, 39.5% of adolescents do not meet the World Health Organisation's physical activity guidelines. Urbanicity is a potential correlate of physical activity. The aim of this study is to examine the associations between different aspects of urbanicity and adolescents' physical activity.

Methods: Participants were 4,079 Mexican adolescents aged 15-18 from Mexico City and Oaxaca, Mexico. Data was collected between February and June 2016. Multiple imputation of missing data was implemented after confirming values were missing at random. Multivariable regression models examined associations between five domains of self-reported physical activity: 1) moderate-to-vigorous physical activity, 2) sports activities, 3) leisure time activities, 4) Physical Education class at school, 5) active commuting to school; and a composite measure of urbanicity and its six sub-scores: 1) demographic, 2) economic activity, 3) built environment, 4) communication, 5) education, 6) health services. Multivariable regression models were adjusted for parents' education and participants' age.

Results: Urbanicity was positively associated with activity spent in Physical Education class. The association between urbanicity and sport activities depended on state context. Communication-based urbanicity was negatively associated with leisure physical activity and active commuting. Population density was positively associated with active commuting.

Conclusion: Urbanicity is associated with adolescents' physical activity in Mexico. Findings were largely consistent between Mexico City and Oaxaca and highlight the value of examining urbanicity as a multidimensional construct.

Funding source: The first author (MHG) is funded by The National Council of Science and Technology of Mexico (CONACyT).

Capturing the value of walkable neighbourhoods using hedonic pricing models

Lucy Gunn, Billie Giles-Corti, RMIT University

Background: Many features of the built environment are public goods where differences in provision, quality and location, can be estimated using house prices. House prices can therefore provide a way of measuring the value of walkability which can be used to promote healthy neighborhood and urban design.

Methods: Spatially measured built environment data was collated for participants from the 2007-2009 Victorian Integrated Survey of Travel Activity which was linked to house price data in each area derived from the Australian Property Monitors. Spatial hedonic pricing models were used to estimate the value of walkability measured using several built environment variables including street connectivity, density and land use mix among others in metropolitan Melbourne, Australia.

Results: This research will demonstrate an empirical method for estimating the value of walkability for each of the built environment variables examined. Understanding the value of the built environment provides both an economic and financial impetus for good urban design which is often missing from public health research and planning processes. Good urban design is necessary for supporting healthy behaviours and sustainable environments. Results will be presented for this analysis.

Conclusions: Estimating the value of walkability can provide support for designing healthy neighbourhoods. Such estimates can be used to understand the relative value of different features of the built environment, and as a means of estimating value capture, which is becoming an important tool for funding major infrastructure projects.

External funding details: Research supported by the Centre of Research Excellence in Healthy, Liveable, Communities (NHMRC grant #1061404).

Contribution of parks and green space to physical activity across the life course -ParkIndex: A Standardized GIS-based Park Access Tool

Jasper Schipperijn¹, Andrew T. Kaczynski², J. Aaron Hipp³, Ellen W. Stowe², S. Morgan Hughey⁴, Marilyn E. Wende², Elizabeth L. Oliphant³

¹University of Southern Denmark, ²University of South Carolina, ³North Carolina State University, ⁴College of Charleston

Access to parks and green space is associated with numerous psychological, physiological, social, economic, and environmental benefits for individuals and communities. However, not all parks or neighborhoods are created equal and researchers and planners have employed a wide array of measures for assessing park access and environments. To reduce the problems related to the multitude of measures, ParkIndex, a standardized park access measure incorporating park availability, features, and quality was developed. To inform the development of a ParkIndex, key informant interviews were conducted in Fall 2016 with twelve academics, public health, and parks and recreation professionals representing local and national organizations. These in-depth qualitative data were used to inform the next phase in which data were being collected in four cities across the U.S. In each community, 32 census block groups were selected representing high/low park availability and high/low income and recruitment postcards were mailed to 100 randomly-selected households per block group (n=12,800 total). Using a map-based survey platform (www.maptionnaire.com), respondents indicate parks in their neighborhood used in the past 30 days and answer detailed questions about perceptions and use. Concurrently, all parks within the study area were mapped using GIS and audited for their features and quality using the Community Park Audit Tool. The data were analyzed using multi-level spatial regression techniques to develop a park use probability algorithm, the ParkIndex. ParkIndex can be used as a standardized measure of park access by various users: park planners, citizens, researchers and public health professionals.

External funding details: U.S. National Institutes of Health, 1R21CA202693-01A1

Perceived safety from traffic and cycling: Making more sense of the data through video anchoring vignettes?

Klaus Gebel¹, Melanie Crane², Dafna Merom³, Ding (Melody) Ding²

¹Australian Catholic University, ²University of Sydney, ³Western Sydney University

Background: Perceived safety from traffic is the most important factor affecting cycling, however, its measurement might be subject to scale perception bias. To adjust for this, we used anchoring vignettes (AVs-

hypothetical scenarios allowing calibrating responses), a method mostly used in social sciences.

Methods: Staff and students (n=3,550) of an Australian university completed an online survey about commuting, including three short videos with varying levels of safety from traffic as vignettes. Ratings of traffic safety on the way to university, other destinations and for leisure were recorded depending on vignette ratings. Differences in ratings of the videos by sociodemographic attributes and cycling behaviour were examined. Adjusted and unadjusted perceived safety from traffic and differences in associations with cycling outcomes will be examined.

Results: Preliminary analyses found that 10.8% of the participants cycled to university, 23.3% for transport to other destinations and 40% for leisure. 92% of the participants rank ordered the video vignettes correctly as AV1 ≥ AV2 ≥ AV3. Women rated the safety in the vignettes significantly lower than men (p<.001). There were significant differences in scale interpretations by frequency of cycling, and between unadjusted and corrected safety scores. Additional analyses will examine differences in associations between unadjusted and adjusted safety and different cycling outcomes.

Conclusions: Validity and interpersonal comparability of the measurement of environmental perceptions are important for modelling and for evidence-based policy and planning in health, urban design and transportation. Anchoring vignettes might be a powerful tool for improving the validity of a wide range of Likert-scale items in public health research.

Parental perception of the built environment and children's active travel to school by deprivation level

Angela Hands¹, Michael Duncan¹, Stefanie Williams¹, Gemma Pearce¹, Lou Atkinson²

¹Coventry University, ²Aston University

Introduction: Active travel to school (ATS) has the potential to increase children's physical activity. The built environment (BE) can influence ATS. This study examined the association between parental perception of the BE and ATS and whether it is modified by deprivation.

Methods: A cross-sectional study was conducted with 113 parents of children aged 9-11 attending school in different areas of deprivation across Coventry, UK. Parents provided demographic data and completed the 'Assessing Levels of Physical Activity and Fitness' (ALPHA) questionnaire to produce a score indicating perceptions of various BE themes. Deprivation was assessed by the English Index of Multiple Deprivation (IMD). Summary theme scores were associated with active travel using logistic regression stratified by deprivation.

Results: Children of parents with positive perceptions of road safety were statistically significantly less likely to travel actively than those with negative perceptions (odds ratio (OR) for every point increase in theme score)=0.77, 95% confidence interval (CI)=0.64-0.92). Parents from more affluent areas were more likely to perceive traffic safety, crime safety and neighbourhood environment positively, yet their children were less likely to walk or cycle. However, in more deprived areas there was no association between parental perceptions of any BE themes and ATS.

Conclusion: In more affluent areas, parental perception of traffic and crime safety, and neighbourhood environment may be related to children's active travel to school. Children of parents living in more deprived areas were more likely to travel to school actively, but ATS was not associated with parental perception of built environment themes.

Effectiveness and mechanisms of environmental interventions to promote walking and cycling: what works and how?

Jenna Panter¹, Cornelia Guell², David Humphreys³, David Ogilvie¹

¹University of Cambridge, ²University of Exeter, ³University of Oxford

Practitioners often find it difficult to generalise evidence about the effectiveness of interventions from one location to another. To understand the relationships between context and effectiveness, we reviewed environmental interventions to promote walking and cycling, and why these may or may not be effective. We searched for systematic reviews in seven databases, mined these reviews for evaluative studies and searched for related sources including quantitative or qualitative studies, policy documents or reports. We extracted information about how the interventions worked (e.g. contexts, mechanisms, and outcomes) and assessed credibility. 13 studies of interventions were included, most of which were new routes or facilities for walking and cycling, and 49 related sources were used. Most evaluations met 3/5 credibility criteria for effectiveness. Only two provided 'rich' evidence of mechanisms, with the remainder providing 'thin' or 'thick' evidence. The most effective interventions targeted accessibility and safety in both supportive and unsupportive conditions. For example, in physical contexts supportive for cycling such as well-connected streets, cycling might have become even more practical. Equally in car-dominated environments or poor conditions for walking, new infrastructure could encourage people to walk or cycle as it became more convenient to do so. In some situations, unsupportive contexts led to mechanisms not being triggered and no impacts. In others, the same context could trigger different mechanisms. Although evidence was sparse, we were able to understand the role of context in the success of interventions and distil the implications for practitioners through a new approach to evidence synthesis.

External funding details: MRC/NIHR

Modelling personal exposure to poor air quality through transport, and what we can do to mitigate

Andy Cope, Sustrans

Poor air quality is acknowledged as a major health issue. One of the main contributors to poor air quality is transport. Traditional UK approaches to valuing polluting emissions from transport apply a 'cost per unit emission' approach. This disregards issues around degrees of personal exposure, and in particular the extent to which the travel choices of individuals affect levels of exposure. This considerably understates the impact of AQ on public health.

Sustrans has undertaken research that has produced a model that addresses the personal exposure component of AQ. This model uses micro-environment concentration, respiratory rates, relative risk factors, mode choice, and many other factors to assess personal exposure. Focusing particularly on active travel, this helps us to understand how we can adjust delivery to improve the health of individuals, and how this scales up across communities. Different forms of outputs are generated for use with different types of audiences (e.g. economic, QALY, reduced hospital admissions).

The model is used in conjunction with the 'cost per unit emission' approach to present a more comprehensive overview of the likely extent of impact. I will describe the model, illustrate its application, and discuss the ways we have used the insight and the policy implications of the research. This is in the context of Low Emission Zones and Clean Air Plans in the UK, but is internationally transferable. We also consider briefly the AQ implications of 'transport futures' (e.g. fleet electrification, autonomy, traffic demand management, etc).

External funding details: Model development funded by Transport Scotland, Scottish Government

Session: Understanding inequalities in physical activity and health

Urban indicators for monitoring progress towards healthy, active cities

Billie Giles-Corti¹, Melanie Lowe², Jim Sallis³, Deborah Salvo⁴, Jonathan Arundel¹, Ester Cerin³, Mark Stevenson⁵, Marc Adams⁶, Erica Hinckson⁷

¹Healthy Liveable Cities Group - RMIT, ²Australian Catholic University, ³Institute for Health and Ageing - Australian Catholic University, ⁴University of Texas Health Science Center at Houston (UTHealth), ⁵Transport, Health and Urban Design Research Hub - University of Melbourne, ⁶School of Nutrition and Health Promotion - Arizona State University, ⁷AUT University

Introduction: Walking and cycling-friendly cities promote good health, and are vital for achieving the UN Sustainable Development Goals. Policies on transport, employment, urban design, housing, open space, and social infrastructure help to shape city planning, which then determines transport mode choices, and ultimately physical activity levels and health outcomes. To measure progress towards creating healthy, active cities, a recent Lancet series proposed a set of urban policy and built environment indicators.

Methods: This is a progress report on a collaborative process to measure those indicators in a range of cities worldwide. The selected cities are part of the International Physical Activity and Environment Network (IPEN) studies. Using GIS methods, IPEN data is used to quantify and map the distribution of built environment attributes. Policy in each city will be assessed for the extent to which they support creation of healthy cities.

Results: Preliminary work in Australia has found significant inequities within and between cities in delivery of transport and urban design that supports active living. Work is underway to scale-up this research in cities globally. Policy and legislative capacity to create active cities is likely to vary considerably between countries; and the ability to create spatial indicators will be determined by GIS data quality.

Conclusions: To assist in addressing global health challenges, there's a need for evidence-based urban policy targets and consistent city-level built environment data collection. This project is exploring whether common spatial indicators can be used internationally to benchmark cities and address inequities in opportunities for active lifestyles.

The contribution of physical activity to neighbourhood socioeconomic inequalities in the incidence of cardiovascular disease: findings from the HABITAT multilevel longitudinal study in Brisbane, Australia.

Aislinn Healy¹, Jerome Rachele², Lucy Busija¹, Gavin Turrell³

¹Australian Catholic University, ²University of Melbourne, ³Queensland University of Technology

Introduction: Neighbourhood socioeconomic inequalities have been found in the incidence of cardiovascular disease. Understanding the contribution of physical activity will inform strategies to reduce these inequalities. This longitudinal study examines the contribution of physical activity to the incidence of cardiovascular disease by level of neighbourhood socioeconomic disadvantage in Brisbane, Australia.

Methods: Data comes from the HABITAT project, a multilevel longitudinal investigation of health in Brisbane. Data included 11,035 residents in

200 neighbourhoods in 2007, with follow-up completed in 2009, 2011 and 2013. Neighbourhood socioeconomic disadvantage was derived using a Census-based index and divided into quintiles, and cardiovascular disease and physical activity were self-reported. Hazard ratios were estimated using Cox's proportional hazards regression model, adjusting for age, sex, education, occupation, and household income. Analyses were restricted to 10,385 people without cardiovascular disease in 2007.

Results: There were 408 reported incidences of cardiovascular disease over 28,510 person-waves of observation. Residents of more disadvantaged neighbourhoods (Q1: most disadvantaged HR 2.05, 95%CI 1.47-2.88, Q3: 1.89, 1.42-2.52 and Q4: 1.54, 1.14-2.07) reported significantly higher rates of cardiovascular disease over the follow up. Adjusting for physical activity reduced the hazard ratios by between 7-22%, with the greatest reduction observed in Q2.

Conclusion: This study identified physical activity as a meaningful contributor to neighbourhood socioeconomic inequalities in the incidence of cardiovascular disease. Future research should investigate which neighbourhood-level features are likely to influence physical activity, with a focus on how these features differ between advantaged and disadvantaged neighbourhoods. Such investigations would inform strategies to reduce health inequities.

Is there a deprivation and maternal education gradient to child obesity and physical activity in England?

Robert Noonan, Stuart Fairclough, Edge Hill University

Introduction: This study examined associations between individual- and area-level measures of socioeconomic status (SES) and different measures of overweight/obesity in 7-year-old English children. A secondary objective was to examine associations between individual- and area-level measures of SES and moderate to vigorous intensity physical activity (MVPA).

Method: Data is from wave four of the Millennium Cohort Study. Children wore an ActiGraph accelerometer for 7 consecutive days and measures of stature, body mass and waist circumference were taken. Overweight/obesity was defined using the International Obesity Taskforce definition. Waist-height-ratio ≥ 0.5 defined central obesity. Individual-level SES was defined using self-reported maternal education (grouped into four categories) Area-level SES was defined using the 2004 English Indices of Multiple Deprivation (grouped into five categories). Mean daily MVPA and number of children achieving 1 hr daily MVPA was calculated. Associations between maternal education, deprivation and outcome measures were examined by adjusted multinomial logistic and linear regression analyses.

Results: Three-thousand-seventeen children (1890 girls) had complete data. Children from the lowest maternal education group and children living in the most deprived neighbourhoods were at greatest risk of being overweight and centrally obese. MVPA was inversely associated with deprivation, and deprived children were most likely to achieve 1 hr daily MVPA.

Conclusion: Individual- and area-level SES measures were independently related to overweight and central obesity. Higher rates of overweight and central obesity among deprived children are not due to physical inactivity. Further research examining the concurrent effect of dietary intake and MVPA on child weight status by deprivation is warranted.

Exploring the determinants of overweight and obesity in South Asian adolescents in England: A mixed-methods approach using population-level Quantitative data alongside in-depth Qualitative interviews

Gurnam Johal¹, Therese Hesketh², Ruth Bell³

¹Public Health England, ²University College London Institute for Global Health, ³University College London Institute of Health Equity

WHO has stated that childhood obesity is one of the most serious challenges facing public health in the 21st century, with obese children and adolescents facing a plethora of health complications and increased risk of many chronic diseases.

Using a systematic methods literature review, quantitative analysis of the WHO Health Behaviour in School-Aged Children (HBSC) data, and qualitative interviews with South Asian adolescents, this research identifies obesogenic behaviours in South Asian adolescents in England. This evidence has been used to create a set of policy recommendations for the Public Health field to consider.

Pearson's Chi Squared test alongside Multiple Logistic Regression analysis of HBSC data from 2006, 2010 and 2014 (separately and combined) examined variables such as physical activity, dietary behaviours, and mental health indicators in these South Asian ethnic groups.

Qualitative fieldwork was undertaken with a disaggregated population of South Asian Adolescents (Bangladeshi, Indian, Pakistani) of both genders, aged 11-18 years, from the London and Great London area. This involved 26 in-depth face-to-face interviews.

Key findings were that South Asian adolescents have lower physical activity levels compared with their white peers, have worse dietary behaviours, and identified barriers and opportunities to engaging in healthier lifestyles, compared with their white British counterparts.

These negative lifestyle behaviours will need careful consideration of upstream policy and local health service provision and interventions in South Asian adolescents in England. Taking this evidence into action will be crucial in addressing the obesity epidemic and reducing existing health inequalities.

The partnership process in the design, implementation and evaluation the Men on the Move (MOM) gender sensitised community based programme for adult men in Ireland.

Paula Carroll¹, Michael Harrison¹, Noel Richardson², Aisling Keohane¹, Liam Kelly², Alex Donoghue¹, Steve Robertson³

¹WIT, ²IT Carlow, ³Leeds Beckett University

The excess burden of ill-health, mortality and premature death experienced by many men across the developed world has prompted calls for the development of gender sensitised health related services for men. MOM is a community-based physical activity (PA) programme designed to engage inactive men to improve their overall health and well-being. The programme was gender-sensitised in relation to context (e.g. men only groups), content (e.g. information presented in a scientific manner) and style of delivery (e.g. use of humour and banter). It was delivered by practitioner partnerships across 13 diverse communities and among diverse groups of men under 'real world' conditions to assess a) efficacy when compared to matched controls and b) replicability for scaling-up the programme nationally for population wide impact. Establishing appropriate partnerships is critical when implementing PA interventions to ensure research findings translate into practice, are replicable in practice and can be disseminated at a population level. The purpose of this paper is to detail the partnership that underpinned the design, implementation and evaluation of the MoM programme. Specifically, the role of individual partners and the process of maintaining the partnership will be presented in the context of achieving the outcomes of the partnership. Illuminating the partnership process may support others engaged in translational research to ensure their research translates into meaningful outcomes in practice

External funding details: Health Service Executive; Local Sports Partnerships; Men's Development Network; Waterford Institute of Technology.

Integral PA programmes for vulnerable citizens: What works best?

Annemarie Wagemakers¹, Annemarie Wagemakers², Kirsten Verkooijen²

¹Wageningen University & Research, ²Wageningen University

Introduction: Integral physical activity (PA) programmes are deemed effective to stimulate PA and to improve health and societal participation. In these programmes, multiple sectors (e.g. sports, health insurers, municipalities) collaborate to connect primary care and PA. An example is the X-Fitt 2.0 programme for low SES overweight people in the Netherlands. X-Fitt 2.0, funded by the municipality and a health insurer, offers 2 sports sessions per week, lifestyle coaching and dietary advice for 3 months, and 6 meetings with a lifestyle coach during 2 years. The aim of this study was to unravel the 'action elements' explaining the success of X-Fitt 2.0.

Method: Interviews were conducted with 20 professionals and 30 participants of X-Fitt 2.0.

Results: X-Fitt 2.0 resulted into significant health gains: improved perceived health (6.1 – 7.4) after 3 months, and on average 6.7 kg of weight loss after 3 months and 10 kg during the first year. Participants indicated to feel better and more confident, and to participate more actively in society (e.g. play with their (grand)children, start working again). Social support received from other participants and coaches, especially the lifestyle coach, appeared crucial. Furthermore, the weekly weighing with other participants was important for perseverance and social support.

Conclusion: X-Fitt 2.0 contributes both to participant's health and societal participation. Social support and joined weight monitoring are programme elements that contribute to its success. Integral PA programmes may wish to adopt these elements to improve vulnerable citizen's health.

External funding details: Funding by ZonMw (Netherlands Organisations for Health Research and Development) (505311098003).

An evaluation of a physical activity and peer-support intervention for people experiencing homelessness: Street Fit Scotland

Stephen Malden, Ruth Jepson, Yvonne Laird, John McAteer, University of Edinburgh

Background: Homelessness affects an individual's ability to access health-care, opportunities for social interaction and recreational activities such as physical activity. This study aimed to explore the impact of a community-based physical activity and peer support intervention (Street Fit Scotland) on the health and wellbeing of homeless participants in Edinburgh, Scotland.

Methods: We conducted 10 semi-structured interviews with homeless adults attending the intervention. Interviews explored perceived impact of participation on the health and wellbeing of participants, in addition to strengths and weaknesses of the intervention. Interviews were audio recorded, transcribed and a thematic analysis conducted. A logic model was developed from the findings.

Results: Seven major themes were identified. Participants reported improvements in health and wellbeing since attending the intervention. This was attributed to increased self-esteem and social interaction, which in turn positively affected mental wellbeing. Participants reported increases in physical activity, and healthier choices concerning other health behaviours. The content and structure of the peer support component was identified as an area for improvement.

Conclusion: Findings suggested a positive impact of participation on health and wellbeing, particularly self-esteem, social interaction and physical activity. The logic model developed from these findings should be considered when expanding the intervention to other settings, or developing similar programmes. More efforts should be made to evaluate small-scale interventions that are reaching the most vulnerable population groups.

External funding details: This study received no external funding. SCPHRP is funded by the Medical Research Council and Chief Scientist Office of Scotland.

Parallel Oral Sessions: Wednesday 17 October

Wednesday, 10:20–11:20

Session: Innovative Interventions to Promote Physical Activity

Translation of the evidence for the Scottish Football Fans In Training (FFIT) weight loss programme into practice in Swindon and evaluation of its long-term effectiveness

Una Geary, Penny Marno, Fiona Dickens, Swindon Borough Council

Introduction: Following publication by the Lancet (2014) of evidence of effectiveness of the Scottish FFIT weight-loss programme, Swindon Borough Council (SBC) and Swindon Town Football Club launched FFIT, aimed at men aged between 35–65, with a BMI of 28 (kg/m²) or higher, in January 2015. To date, six 12-week courses with 30 participants each have been delivered. As the first place in England to deliver FFIT, Swindon now has the longest-term follow-up data to evaluate whether weight-loss achieved by programme completion is sustained.

Methods: Linear regression analysis was used to investigate the relationship between weight at baseline and post-intervention, adjusting for length of follow-up. Measurements were available at baseline, at the 12 week programme completion point and at follow-up intervals ranging from 6 to 18 months post-baseline.

Results: Average weight-loss between baseline and programme completion was 8.01 kg (95% confidence interval (CI) = 7.33–8.68 kg), which was highly statistically significant ($n = 170$, $t(169) = 23.47$, $p < 0.001$).

Linear regression analysis found that, on average, participants maintained a statistically significant reduction of 14.5% of their baseline weight at long-term follow-up ($n = 125$, mean follow-up = 13.35 months, 95% CI = 0.776–0.933, $p < 0.001$). Average long time weight loss was 8.22 kg.

Conclusion: The FFIT programme was effective in Swindon in supporting men to lose a clinically important amount of weight. Results were sustained long term. Swindon is contributing to the long-term evaluation by Scottish academics, and also piloting courses for female football fans and non-football fans using the same model.

Active Bucks – Using ‘Stealth’ in green spaces to engage inactive residents

Sarah Preston¹, Tom Burton¹, James Cavalier²

¹Buckinghamshire County Council, ²Active In

Active Bucks provides a population-level, evidence-based approach to increasing activity levels of residents, particularly those that are least active. Community engagement was key to understanding what residents wanted, and activities in green spaces were very popular. The programme explored an innovative approach to engaging inactive residents by developing an offer of physical activity by ‘stealth’ in green spaces where physical activity isn’t the primary reason for engaging.

46 six month programmes of stealth activities were commissioned over 18 months, including bushcraft, quidditch, NERF games, wildlife photography and dog agility, engaging 1112 unique participants. A wide range of

ages were engaged from a 6 month old to a 101 year old, with 58% of participants under 16. 51% were male and 12% were from BAME groups.

91% of adults and 94% of children were not achieving CMO guidelines when they started, with 35% of adults and 48% of children being inactive. 58% of the programmes were sustained past the end of the funding period, with an additional 14% of sessions sustained seasonally.

Building a social network through meeting near cafes and creating social media groups were critical to maintaining engagement and sustaining activities. Other wider benefits of engaging residents in these activities have been demonstrated, including improved mental wellbeing, building confidence and developing skills.

Stealth activities that engage residents who would not be interested in traditional activities, and are built on a model with sustainability at its core, are effective at engaging inactive residents in regular activity.

Where to from social sport: A model of participant transi- tion pptions

Kiera Staley¹, Matthew Nicholson¹, Erica Randle¹, Rayoni Nelson², Paul O’Halloran¹, Regina Belski³, Pam Kappelides¹

¹La Trobe University, ²Victorian Health Promotion Foundation (VicHealth), ³Swinburne University of Technology

Introduction: The development or expansion of social sport products has provided the opportunity for sport organisations to engage new non-traditional sport participants, with a focus on those who are inactive or somewhat active (across Victoria, Australia). An ongoing challenge is transitioning participants of social sport programs, which are often a short-term (e.g. 4–6 weeks), into regular PA and/or ongoing sport participation (social or traditional).

Method: The assessment of 105 unique social sport products was undertaken over a two-three year period and consisted of 90 interviews across 35 sport organisations and assessment of their reported instance data (locations, dates, and sessions); 120 interviews with program deliverers; 360 participant interviews; and over 3,600 participant program evaluation surveys.

Results: Participants in short-term social programs were often left thinking ‘what next?’, with deliverers found to be lacking knowledge of options for ongoing PA/sport participation beyond the program. A model was developed based on the five options found to be available to participants:

1. The same social sport product repeated;
2. A different social sport product;
3. The same social sport product but regularly;
4. Traditional sport;
5. Active recreation.

Conclusion: Social sport program design should consider the development of pathways for participants to transition into ongoing participation opportunities as their skills, PA and/or interest increase. This might be achieved by providing information about all five options in the participant model, or by designing a program that actively promotes and connects to one or two of the transition pathways.

External funding details: Victorian Health Promotion Foundation (VicHealth)

The Health Impact Planning Support System. A tool for community engagement in urban renewal decision-making

Claire Boulange¹, Paula Hooper², Sarah Foster¹

¹RMIT, ²University of Western Australia

Increasingly studies show that infill developments especially in larger scale urban renewal projects can recycle many of the features that encourage active and healthy urban living. However, to be successful, these community infill projects must be planned in partnership with the local community. Yet, it is often challenging for community members to envision a redesigned and denser future for their neighbourhoods.

Planning Support Systems (PSSs) are spatial simulation tools designed for simulating impacts arising from urban development. Recent studies have found that PSSs can improve understanding of the relationship between the built environment and health, and foster collaboration between researchers, urban planners and community members in promoting healthy built environments. The Health Impact Planning Support System (HI-PSS) was developed to respond to that need.

The HI-PSS is an interactive computer-based tool that allows residents and urban planners to work together by sketching future urban scenarios on a digital map. With the help of interactive evidence-based health and liveability indicators, they can instantly see the impacts on health and liveability associated with changing the urban layout.

The HI-PSS was trialled in real planning practices in Western Australia in July 2017 and feedback were collected via surveys. Residents who engaged with the redevelopment plans via the HI-PSS indicated that the indicators and interactive tool provided additional benefit in allowing them to visualise and understand the redevelopment plans, how it could benefit the community, people's health and provided them with an alternative avenue through which to provide feedback on the plans.

External funding details: Landcorp

Unlocking physical activity opportunities in vulnerable communities: Key principles for locally-led interventions

Justin Richards¹, Vanessa Hughey², Laura Menzies², Liz Smith³, Neil Snowling²

¹Sport New Zealand, ²Sport NZ, ³Litmus Research

Introduction: Behaviour change research typically involves investigator-led development of structured interventions. This contradicts established practice in community development, which acknowledges local autonomy in intervention design to create meaningful and sustainable change. We explored this disconnect by identifying key principles in a "locally-led" approach to physical activity intervention development.

Methods: In 2016, Sport New Zealand embraced a "locally-led" approach to intervention development through all 14 Regional Sports Trusts (RSTs). One year later, we used appreciative enquiry to identify common themes from key stakeholders within each RST through semi-structured interviews with senior managers and focus groups with program staff. An evidenced-based community-led development framework used in other sectors formed the basis for discussion about key characteristics of successful "locally-led" initiatives.

Results: Key principles identified were: 1) Focus on strengths in the community rather than needs; 2) Develop the initiative iteratively rather than design a definitive intervention at the outset; 3) Enable leadership of local champions by embracing existing initiatives rather than select new leaders to translate interventions across settings; 4) Understand the community and critical physical spaces for target populations rather than entice people into novel intervention settings; 5) Work in cross-sectoral

partnerships recognising the limited relevance of some of their outcomes rather than focus solely on physical activity behaviour.

Conclusion: This represent a genuine shift in intervention design for promoting physical activity. The diversity in initiatives that emerges from applying a "locally-led" approach may require novel approaches to evaluation, which challenges the established evidence hierarchy, when applying best-practice in intervention design.

Study on health benefits spectrum of physical activities in urban parks of Shanghai

Chengzhao Wu, Tongji University

Many studies have shown that the health benefits of activities in the natural environment are better than that of the built environment and indoor environment, but how does the different types of physical activities affect the health of users? Does the specific activity attribute affect health benefit acquisition? How to better promote the health benefits of activities from park design and management? This study take the elders in Pine Crane park and the Huangxing park of Shanghai as a case, the integrated use of GPS, the energy consumption of human movement monitor ActiGraph GT3X + and GIS method, preference for park recreation activities, activity and health benefits of the spatial distribution characteristics are analyzed, and build the park recreation activity sequence of health effects based on three dimensions of the activity type, attribute, characteristic of landscape environment.

The study found that exercise was the best activity in promoting high intensity physical activity and energy expenditure, followed by exercise facilities and group boxing activities. In terms of improving attention level and enhancing positive emotions such as pleasure and vitality, group boxing activities are the best, followed by leisure activities.

The results of correlation analysis of activity attribute showed that activity intensity and duration only had a positive effect on energy consumption and achievement of the park activities.

The impact of the natural environment and the humanistic and social environment on the actual health benefits is complex, and there are overlapping or mutually cancelling effects on the actual health benefits.

A novel community-based approach to increase physical activity in older adults using citizen-science and technology

Anja Frei, Kaba Dalla Lana, Thomas Radtke, Emily Stone, Milo Puhan, University of Zurich

Introduction: Promotion of physical activity (PA) in elderly people remains challenging. The aims of this project were to develop, implement and evaluate a novel community-based PA promotion intervention.

Method: The PA intervention considered of multiple determinants of PA (individual, interpersonal, cultural, environmental factors), used modern devices (smartphone with three apps) and followed a dynamic citizen-science approach. We targeted elderly persons, aged > 60 years, from the community of a typical small Swiss town. The intervention aimed to enable the participants to organise structured walking groups in their neighbourhood. Assessments took place at baseline and after 6 months; subsequently the participants were involved in the transfer of the intervention into a self-sustained state (without further support from the study team).

Results: We developed the intervention with active participation of the target population. In total, 29 elderly adults participated during the intervention phase and 25 conducted 6-months follow-up. The participants had a significant increase in daily moderate-to-vigorous PA ($p=0.046$) but not in daily steps ($p=0.331$). After the official study end (6 months), key participants took over the whole organisation of the intervention, added new walking group offers and are still successfully recruiting new participants.

Conclusion: The novel approach to promote PA was developed with active participation of the participants. After the official study end, it was successfully implemented in the community and is now self-sustained by the older adults, without further support from the study team.

External funding: Foundation Uniscientia and Foundation Walder

Session: Novel Approaches to Assessing Physical Activity Behaviour

The Roanoke Valley Community Healthy Living Index: A grassroots approach to community health surveillance

Elizabeth Ackley, Roanoke College

Community health surveillance (CHS) systems are increasingly relied upon to provide systematic assessments of population-level health outcomes and behaviors. Due to recent mandates imposed on government agencies and health systems, CHS has become commonplace in the USA. In addition to illustrating the magnitude of health inequities, the crux of CHS is generating strategies to improve community health. Given data sensitivity concerns, a common challenge relates to the translation of CHS data to community partners to facilitate health promotion. One possible solution is the development of grassroots systems which prioritize translation and are built to complement mandated CHS.

Objective: To outline the conceptual framework of the Roanoke Valley Community Healthy Living Index (RV-CHLI), a CHS system developed to engender cross-sector strategies to address health inequities in mid-sized communities.

Methods: Conducted annually, the RV-CHLI collates data from citywide FitnessGram assessments with perceptions of access to healthy living resources and health-related beliefs and behaviors. Using spatial technologies, the RV-CHLI informs community partners on the magnitude of health disparities across city neighborhoods in relation to a variety of social and environmental determinants.

Results: Since 2014, the RV-CHLI has led to walkability enhancements; neighborhood revitalization efforts addressing food insecurity; changes in police patrolling to improve neighborhood safety; school garden installations; the inclusion of health as a critical component of the city's comprehensive master plan; and has leveraged >\$650,000 for partner organizations.

Conclusion: The RV-CHLI serves as a model of grassroots CHS with demonstrated success in catalyzing social, environmental, and policy change with potential replicability.

External funding details: Support for this work has been provided by the Robert Wood Johnson Foundation, Virginia Foundation for Healthy Youth, Freedom First Credit Union, and the Brian H. Thornhill endowed professorship.

Harmonising physical activity data using indirect relationships with doubly labelled water method estimates

Matthew Pearce¹, Kate Westgate², Michelle Venables³, Nick Wareham², Soren Brage²

¹Mr, ²MRC Epidemiology Unit, University of Cambridge, ³MRC Elsie Widdowson Laboratory, University of Cambridge

Prediction equations describing direct relationships between estimates from less precise field methods and gold standard approaches are the optimal means to harmonise (calibrate) physical activity data to a common format, a critical step when integrating different sources of information for the same analysis. Such harmonisation efforts are hindered when equations

are unavailable for the method or population of interest. This study examined the validity of an indirect approach to harmonisation.

The linear relationship between estimates of Physical Activity Energy Expenditure (PAEE; kJ/kg/day) from Recent Physical Activity Questionnaire (RPAQ) and doubly labelled water method (DLW) was calculated using indirect relationships, first between RPAQ and combined heart rate and motion sensing (ACCHR) in 2664 participants from the Fenland Study; and second between ACCHR and DLW using published data. Errors in the individual method relationships were propagated to the indirect relationship using bootstrapped standard errors. PAEE was estimated from RPAQ using the indirect equation and validated against DLW in 100 independent participants; this was compared against the directly mapped relationship.

The slope of the indirect equation was attenuated compared with the direct relationship. There was statistically significant mean bias for indirectly predicted versus DLW-based PAEE (7.3 kJ/kg/day [15.0%]; 95%CI: 4.0 to 10.6). Root mean square errors for direct (12.8 kJ/kg/day) and indirect (14.2 kJ/kg/day) predictions versus DLW-based PAEE were smaller than for non-calibrated RPAQ-based PAEE estimates (22.1 kJ/kg/day).

Harmonisation using indirect relationships could potentially reduce error in the absence of direct validation data. Further work should examine validity for different methods and populations.

Development and evaluation of a Park Rx Park Audit Tool and Inventory

Courtney Schultz, Jason Bocarro, Aaron Hipp, Myron Floyd, NC State University

Background: Rapidly accumulating evidence suggests public parks hold promise for increasing physical activity (PA). Medical providers are interested in growing PA counseling into a standardized clinical practice. There is a need for an audit tool that assesses parks' spatial characteristics for PA potential that can help translate open space into dosage-specific PA prescriptions.

Study Purpose: The purpose of this study was to develop a user-friendly tool and integrated inventory of PA behaviors.

Methods and Results: The Park Rx Park Audit Tool (PRxPAT) builds upon existing instruments such as the Community Park Audit Tool and the 2011 Adult Compendium of Physical Activities (ACPA). The PRxPAT contains two sections: Park Information, and Park Activities and Amenities. Inter-rater analysis demonstrated strong reliability for the majority of items in the tool. The ACPA's 764 PA behaviors were refined to generate a list of 128 behaviors suitable for a sustained PA prescription within parks. These adapted PA categories were then linked to each of the PRxPAT audited areas to create an inventory of spatially-specific PA behaviors that can be selected by medical providers based on patient stated preferences to create tailored PA prescriptions.

Conclusion: Evidence suggests the PRxPAT can enable community and clinical partners to quickly and reliably audit parks for potential PA opportunities, and generate community specific data repositories. By connecting these audited park spaces to specific PA behaviors with metabolic equivalency task (MET) values, medical providers can utilize the data to create tailored PA prescriptions for patients that incorporate intensity, duration, and frequency.

Estimating city-level travel patterns using street imagery: a case study of using Google Street View in Britain

Rahul Goel¹, Leandro Garcia², Anna Goodman³, Rob Johnson², Rachel Aldred⁴, Manoranjan Murugesan⁵, Soren Brage⁶, Kavi Bhalla⁵, James Woodcock²

¹University of Cambridge, ²UKCRC Centre for Diet and Activity Research (CEDAR), MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Cambridge, UK, ³London School of Hygiene & Tropical Medicine, London, UK, ⁴Department of Planning and Transport, faculty of Architecture and the Built Environment, Westminster University, London, UK, ⁵Department of Public Health Sciences, University of Chicago, Chicago, USA, ⁶MRC Epidemiology Unit, University of Cambridge, Cambridge, UK

Background: Street imagery is a promising big data source providing current and historical images in more than 100 countries. Previous studies used this data to audit built environment features. Here we explore a novel application, using Google Street View (GSV) to predict travel patterns at the city level.

Methods: We sampled 34 cities in Great Britain. In each city, we accessed GSV images from 1000 random locations from years overlapping with the 2011 Census and the 2011-2013 Active People Survey (APS). We manually annotated images into seven categories of road users. We developed regression models with the counts of images of road users as predictors. Outcomes included Census-reported commute shares of four modes (walking plus public transport, cycling, motorcycle, and car), and APS-reported past-month participation in walking and cycling.

Results: In bivariate analyses, we found high correlations between GSV counts of cyclists ('GSV-cyclists') and cycle commute mode share ($r=0.92$) and past-month cycling ($r=0.90$). Likewise, GSV-pedestrians was moderately correlated with past-month walking for transport ($r=0.46$), GSV-motorcycles was moderately correlated with commute share of motorcycles ($r=0.44$), and GSV-buses was highly correlated with commute share of walking plus public transport ($r=0.81$). GSV-car was not correlated with car commute mode share ($r=-0.12$). However, in multi-variable regression models, all mode shares were predicted well. Cross-validation analyses showed good prediction performance for all the outcomes except past-month walking.

Conclusions: Street imagery is a promising new big data source to predict mobility patterns. Further testing across multiple settings is warranted both for cross-sectional and longitudinal assessments.

External funding details: RG, LG, MM, KB, and JW were supported by TIGTHAT, an MRC Global Challenges Project MR/P024408/1. JW and AG were also supported by METAHIT, an MRC Methodology Panel project (MR/P02663X/1). Contributions from RJ were directly funded by and LG, RG and JW's work was undertaken under the auspices of the Centre for Diet and Activity Research (CEDAR), a UKCRC Public Health Research Centre of Excellence funded by the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research (NIHR) and the Wellcome Trust (MR/K023187/1) and (MR/K023187/1). SB was supported by UK Medical Research Council [MC_UU_12015/3]. This work was completed in part with resources provided by the University of Chicago Research Computing Center.

Validating and shortening a park observation measure

James Sallis¹, Carrie Geremia¹, Kelli Cain¹, Terry Conway¹, Brian Saelens²

¹UC San Diego, ²University of Washington

Background: Assessment of park characteristics that may support physical activity (PA) can guide the design of more activity-supportive parks. Direct-observation measures are seldom used due to time and resource restraints.

Methods: We developed shortened versions of the Environmental Assessment of Public Recreation Spaces (EAPRS) tool and tested their construct validity by comparing scores from 40 parks in San Diego, USA to observed park use and PA using SOPARC. EAPRS Original was up to 688 items, Abbreviated was 113 items, and Mini was 38 items.

Results: PA elements were positively associated with park use and park PA across all versions, with the highest correlations for trails (.45 for use and .51 for PA using EAPRS Original; .57 use and .62 PA using Abbreviated and .38 use and .43 PA using Mini). Presence of amenities, using Abbreviated and Mini versions, was correlated with park use (.71, .64) and PA (.67, .59). The overall park quality score using Abbreviated and Mini had similar correlations (adjusted for park size) with park use (.74, .72) and PA (.72, .70) as the EAPRS Full (.71 use and .73 PA).

Conclusion: In all three versions, EAPRS overall park scores were strongly related to observed park use and PA. Shorter versions of EAPRS make it more feasible to use park observations in research and practice.

External funding details: US National Institutes of Health HL109222

If what gets measured gets done: Ensuring population level measurement remains relevant when policy priorities change

Andrew Spiers, Sport England

Introduction: Sport England's Active People Survey (APS) began collecting data in 2005. Between 2005 and 2016, 10 annual waves of APS data collection were completed before it was replaced by the Active Lives Survey.

During this time, there have been important changes in sport and physical activity policy priorities in England, including:

- London's selection and hosting of the 2012 Olympics and Paralympics
- An initial shift from regional delivery of Sport England investment to increased investment through National Governing Bodies
- Revised Chief Medical Officer physical activity guidelines
- A recent shift from a 'sport for sport's sake' approach to one more explicitly premised on sport's contribution to wider government outcomes

Discussion: This presentation will outline some of the challenges shifting policy priorities present to population measurement, including:

- Survey design
- Stakeholder management
- Performance management / metrics
- Communication and reporting

As well as responses to changing policy priorities, it will outline the role population measurement has played in shaping policy in England by providing empirical evidence to illustrate and deepen understanding of emerging trends and / or persistent inequalities in engagement.

Conclusions: The presentation will conclude with reflections on the successes and challenges of the English experience, including:

- Policy priorities will change over time
- Change cannot be perfectly anticipated but flexible design helps ensure population measurement tools remain relevant
- As well as measuring policy effectiveness, sustained population level measurement can shape future policy development

Emphasis will be given to learning relevant / applicable to attendees with similar objectives operating in different national contexts.

Moving Communities: Active leisure trends

Lizzie Broughton¹, Utku Toprakseven², Rachel Lawson¹, Tim Williams¹

¹ukactive, ²DataHub

Background: Leisure centres represent the front-line of preventative care providers and understanding sector trends can offer insight into approaches to improve population health. This work aimed to determine what the UK public sector leisure landscape looks like and how this is changing over time.

Methods: Aggregated data supplied by DataHub from over 300 leisure centres across the UK over the last three years was supplied, covering over 3 million individuals and 150 million visits to leisure facilities. Key factors, including the demographic breakdown of members and peak days and times to visit were examined. Participation in individual sports were examined to find the most popular activities and identify those that were gaining in popularity. Users were segmented by age and sex to examine differences in behaviour between groups.

Results: Visits to leisure centres have increased over the last three years, with females making up over half of the membership base in 2017 (52%). Further, the 65+ age group appear to be under represented within the membership base, making up just 9% of total members. Whilst swimming remains the most popular activity, representing 35% of all visits, the prevalence of this is declining as the popularity of group workouts has grown over the last three years.

The report will be updated with the latest data in Spring 2018 to present up to date analysis and examine how the face of public sector leisure has changed over the last year.

Session: Physical Activity Epidemiology

Differences in physical activity among rural-to-urban migrant and non-migrant: the Bangladesh sibling-pair comparative study

Shirin Jahan Mumu¹, AKM Fazlur Rahman¹, Liaquat Ali¹, Dafna Merom²

¹Bangladesh University of Health Sciences, ²Western Sydney University

Introduction: The detrimental effects of urbanization in developing countries on people's lifestyles are based on the cross-sectional comparison. This study examined differences in physical activity (PA) between rural-to-urban migrants and their rural siblings in Bangladesh.

Methods: A sib-pair comparative study was designed to compare PA among 164 male migrated from Pirganj rural areas to Dhaka City and their rural siblings (total N = 328). The Global Physical Activity Questionnaire (GPAQ-V2) in the Bengali language was used. We adhered to GPAQ scoring protocol for computation of PA indicators. Generalized linear mixed effect model (GLMM) for the binary outcomes with a pair-specific random effect and SES in the fixed effect was used.

Results: Compared to migrants, rural men had higher mean $\pm$ SD age (31.87 ± 7.54 vs 33.35 ± 9.33 ; $p = 0.02$), lower proportion of university-level education (17.7% vs 14.6%) and higher proportion of manual worker (53% vs 66%). Rural siblings reported significantly higher total MVPA (median MET-minutes/week: 2340 vs 800, $p = 0.04$) than did migrants. The median weekly travel moderate PA (710 vs 380, $p < 0.001$) and leisure time MVPA (260 vs 0, $p < 0.001$) MET-minutes were higher in rural than migrants. Work-related MVPA did not differ significantly. The prevalence of physical inactivity was 21.30% in rural siblings and 42.70% in migrants. The adjusted odds ratios for low physical activity was 3.26 (1.73; 6.16) for migrants compared to the rural siblings.

Conclusion: Siblings who shared similar rural lifestyle but migrated to megacity were at higher risk of physical inactivity. Interventions targeting rural-to-urban migrants may help to reduce NCDs in Bangladesh.

The effect of moving to East Village (the former London 2012 Olympic Games Athletes Village) on physical activity levels

Claire Nightingale¹, Bina Ram¹, Elizabeth Limb¹, Aparna Shankar¹, Duncan Procter², Ashley Cooper², Angie Page², Christelle Clary³, Daniel Lewis³, Steven Cummins³, Anne Ellaway⁴, Billie Giles-Corti⁵, Peter Whincup¹, Alicja Rudnicka¹, Derek Cook¹, Christopher Owen¹

¹St. George's, University of London, ²University of Bristol, ³London School of Hygiene and Tropical Medicine, ⁴University of Glasgow, ⁵RMIT University

Introduction: There has been increasing interest in whether the built environment influences health behaviours, but robust longitudinal evidence is limited. We assessed the effect of moving into East Village, a neighbourhood built on active design principles, on levels of physical activity (PA).

Methods: A cohort of 1278 adults seeking to move into social, intermediate (affordable), and market-rent East Village accommodation were recruited in 2013-2015, and followed up after two years. Objective measures of PA using accelerometry (ActiGraph GT3X) were made. We examined change in levels of PA, adjusting for sex, age group, ethnicity, housing sector and household (random effect), comparing those who moved to East Village (intervention group) with those who lived outside East Village (control group). Effects by housing sector and weekdays versus weekends were examined.

Results: 877 adults (69%) were followed-up, half had moved to East Village. Moving to East Village was associated with a small increase in daily steps (187, 95%CI -195, 569), more so in the intermediate sector (418, 95%CI -198, 1033), but effects were not statistically significant. There were no differences in time spent in moderate-to-vigorous PA (MVPA) or any appreciable weekend effects. There was evidence of less time spent in light PA (-6.8 mins/day, 95%CI -12.5, -1.1), largely in the market-rent group (-13.4 mins/day, 95%CI -25.2, -1.7).

Conclusion: At two-year follow-up, moving to East Village, did not have positive, consistent effects on objectively measured physical activity of public health importance.

External funding details: MRC National Prevention Research Initiative (MR/J000345/1) and National Institute for Health Research (12/211/69).

Relationships between outdoor time, physical activity, sedentary behavior and obesity in children: a 12-country study

Richard Larouche¹, Emily Mire², Kevin Belanger³, Tiago Barreira², Jean-Philippe Chaput³, Mikael Fogelholm⁴, Gang Hu², Estelle Lambert⁵, Carol Maher⁶, José Maia⁷, Tim Olds⁶, Vincent Onywera⁸, Olga Sarmiento⁹, Martyn Standage¹⁰, Catrine Tudor-Locke¹¹, Peter Katzmarzyk², Mark Tremblay¹²

¹University of Lethbridge, ²Pennington Biomedical Research Center, ³Children's Hospital of Eastern Ontario Research Institute, ⁴University of Helsinki, ⁵University of Cape Town, ⁶University of South Australia, ⁷Universidade do Porto, ⁸Kenyatta University, ⁹Universidad de los Andes, ¹⁰University of Bath, ¹¹University of Massachusetts, Amherst, ¹²Children's Hospital of Eastern Ontario

Introduction: Previous studies have shown that children spending more time outdoors accumulate more physical activity (PA), but this body of evidence is limited to high-income countries. The present study investigated the relationship between outdoor time and PA, sedentary time (SED), and BMI Z-scores among children in the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE).

Methods: 6,478 children (54.4% girls) aged 9-11 years from 12 countries (Australia, Brazil, Canada, China, Colombia, Finland, India, Kenya, Portugal, South Africa, United Kingdom, and United States) participated between 2011 and 2013. Outdoor time was self-reported, PA and SED were assessed with ActiGraph GT3X+ accelerometers, and height and weight were measured. Data on parental education, neighbourhood collective efficacy, and accessibility to neighborhood recreation facilities were collected from parent questionnaires. Country latitude and climate statistics were collected through national weather data sources. Gender-stratified multilevel models with parental education, climate, and neighborhood variables as covariates were used to examine the relationship between outdoor time, accelerometry measures, and BMI Z-scores.

Results: Each additional hour/day spent outdoors was associated with higher MVPA (boys: +2.8 min/day; girls: +1.4 min/day), higher light-intensity PA (boys: +2.0 min/day; girls: +2.3 min/day) and lower SED (boys: -6.3 min/day; girls: -5.1 min/day). Outdoor time was not associated with BMI Z-scores.

Conclusion: Outdoor time is associated with higher PA and lower SED independent of climate, parental education and neighborhood variables. Future research examining the correlates of outdoor time should be conducted to inform intervention studies aiming to increase time spent outdoors.

“Ecological predictors of sport and exercise participation among Thai adolescents: A multilevel analysis of a cross-sectional population survey”

Areekul Amornsriwatanakul, University of Western Australia

Background: The purpose of this study was to examine predictors of sport/exercise participation (S/EP) across individual, interpersonal, and environmental levels in a nationally representative sample of Thai adolescents.

Methods: Data from 4,617 Thai adolescents aged 14-17 years old were obtained from recruited schools across Thailand. Data on S/EP were collected from individual adolescents using the Student Questionnaire. School environmental data were collected at the school level using a School Built Environment Audit. Multilevel logistic regression taking into account school clustering effects was applied for data analysis.

Results: At the individual level, biological factors, including sex and age, were independently and strongly correlated with S/EP. Adolescents with high preference toward PA (OR = 1.82, $p < 0.001$) and at least moderate level of self-efficacy (OR = 1.41, $p < 0.001$) were more likely to have high S/EP. At the interpersonal level, adolescents whose parents joined their sports/exercise at least 1-2 times/week (OR = 1.37, $p = 0.002$), received ≥ 3 types of parental support (OR = 1.44, $p = 0.004$), and received sibling (OR = 1.28, $p = 0.005$) and friends support (OR = 1.86, $p < 0.001$) had a greater chance of high S/EP. At the environmental level, adolescents' S/EP were greater when there were at least 3-4 pieces of home sport/exercise equipment (OR = 2.67, $p = 0.004$), school grass areas (OR = 1.53, $p < 0.001$), and at least 1-2 PA facilities in community (OR = 1.38, $p < 0.006$).

Conclusion: Multiple factors at different levels within an ecological framework influencing Thai adolescents' S/EP were generally similar to those found in high income countries. The positive predictors should be considered enhancing as they potentially benefits PA promotional efforts among Thai adolescents

External funding details: Thai Health Promotion Foundation

Differential associations of walking and cycling with obesity markers in a sample of 12,776 French adults (the ACTI-Cités project)

Jean-Michel Oppert¹, Mehdi Menai², Helene Charreire³, Chantal Simon⁴, Julie-Anne Nazare⁴, Camille Perchoux⁵, Christophe Enaux⁶, Serge Hercberg², Leopold Fezeu²

¹Sorbonne university, ²University Paris 13, ³University Paris Est, ⁴Lyon University, ⁵Luxembourg Institute of Socio-Economic Research, ⁶Strasbourg University

Introduction: Active transportation has been associated with excess body weight in some populations but the evidence relies mostly on the use of the body mass index (BMI, weight/height²), a useful but crude indicator. We analysed associations of walking and cycling assessed separately with more specific obesity markers such as waist circumference, a marker of abdominal obesity related to cardio-metabolic risk.

Method: A new tool (Sedentary, Transport and Activity questionnaire) was designed, validated vs. accelerometry and doubly labelled water (Mensah BMC Public Health 2016) and then self-administered to 55,694 participants (70% women) of an on-going web-cohort (NutriNet Santé)(Menai IJBNPA 2015). In 12,776 subjects, obesity measures were taken during a clinical visit including percent body fat (bio-impedance) and waist circumference. Associations between walking, cycling and obesity markers were analysed by multivariate regression models accounting for age, gender, socioeconomic status, urban density and diet.

Results: Walking > 2.5 h/week was associated in women only with lower percent body fat (-1.1%) and waist circumference (-1.7 cm) in addition to lower weight (-1.8 kg)(all $p < 0.001$). Cycling > 1.5 h/week was associated in both men and women with lower percent body fat (-2.5 and -1.9% respectively) and waist circumference (-4.4 and -2.1 cm) in addition to lower weight (-4.3 and -1.4 kg) (all $p < 0.001$). Results were unaltered with further adjustment on household and leisure physical activity.

Conclusion: Walking and cycling were favourably associated with abdominal fatness. Active transportation needs to be part of public health policies focused on prevention of obesity and promotion of metabolic health.

Cycling but not walking to work or study is associated with physical fitness, body composition and cardiovascular risk factors

Jani P Vaara¹, Tommi Vasankari², Mikael Fogelholm³, Harri Koski⁴, Heikki Kyröläinen⁵

¹National Defence University, ²The UKK Institute for Health Promotion Research, ³University of Helsinki, ⁴Training Division, Defence Command, ⁵University of Jyväskylä

Introduction: Active travel may provide one alternative to be physically active. We studied how active travel components, cycling and walking, are related to physical fitness, body composition and cardiovascular risk factors (CVD).

Methods: 776 young (age 26 ± 7 yrs.) adult men participated in the study. Self-reported transportation mode and distance to work or school, and leisure-time and occupational physical activity were assessed. The participants performed standing long jump, maximal leg and bench press, cardiorespiratory fitness, sit-ups and push-ups tests. Body mass index (BMI) and waist circumference (WC) were measured and CVD risk factors (blood pressure, HDL, LDL, triglycerides, glucose and insulin) were analyzed from blood samples. A continuous clustered cardiovascular risk factor score was formed using all CVD risk factors.

Results: 24% engaged to active travel (10% walkers and 14% cyclists). 96% of walkers reported the distance between school or work and home to be less than 5 km and similarly 96% of cyclists to be less than 10 km. After adjustments for age, smoking, leisure-time and occupational physical activities, cycling but not walking was inversely associated with WC, BMI and maximal strength, while a positive association was observed with aerobic fitness ($p < 0.05$). Cycling was inversely associated with the clustered CVD risk factor score ($\beta = -0.11$, $p = 0.044$), while walking was not ($\beta = -0.04$, $p = 0.507$).

Conclusion: Cycling to work or study may provide a sufficient training stimulus in young adult men to improve fitness and body composition and CVD risk factors, whereas walking does not.

Session: Physical activity interventions for youths

Moderators of the effect of a school-based intervention on cardiorespiratory fitness in Brazilian students

Giseli Minatto, Edio Luiz Petroski, Juliane Berria, Kelly Samara Silva, Federal University of Santa Catarina

Introduction: School-based interventions had successfully improved cardiorespiratory fitness (CRF) among adolescents. However, it is unclear in which subgroups the actions have been most effective. This study aimed to investigate possible moderators of a school-based intervention effect on CRF in Brazilian students.

Method: A non-randomized controlled design tested 432 students (intervention group [IG]: $n = 247$), grades 6th to 9th from two public schools in Florianópolis, Brazil in 2015. The “MEXA-SE” intervention lasted 13 weeks and included four components: 1) increase of physical activity (PA) in Physical Education classes; 2) active recess; 3) educational sessions and 4) educational materials. The estimated maximum oxygen consumption (VO_{2max}) obtained by the 20-m shuttle run test, represented the CRF. The moderators analyzed were sex, age group (10-12; 13-14; 15-16), economic level (high and low-middle status), sum of skinfolds triceps and subscapular (low, adequate, and high), and habitual PA (< 420 min/week and ≥ 420 min/week). Comparisons between groups were analyzed by covariance analysis.

Results: The data analysis indicated positive and significant effect of the intervention in VO_{2max} on boys (mean = 1.33; $CI_{95\%} = 0.26; 2.39$; $p = 0.015$), and for students from 13 to 14 years old (mean = 1.53; $CI_{95\%} = 0.11; 2.95$; $p = 0.035$) when compared to their peers in the control group. No difference was found for the other moderating variables explored.

Conclusions: The “MEXA-SE” intervention effect on CRF was moderated by sex and age group. The characteristics of these interventions could be used to understand how different subgroups of individuals may benefit from strategies to have greater success for improving CRF. [<http://www.ClinicalTrials.gov/>: NCT02719704].

Street sports promoting positive youth development: preliminary findings from a peer-to-peer intervention

Julie Hellesøe Christensen¹, Glen Nielsen¹, Charlotte Demant Klinker², Peter Elsborg², Peter Bentsen²

¹University of Copenhagen, ²Steno Diabetes Center Copenhagen

Introduction: This is a qualitative study of a peer-led physical activity intervention with youth in less advantaged neighbourhoods in Denmark. Peer-to-peer strategies seem particularly effective for reaching marginalised groups. Since young people are especially amenable to peer

influences, using peer-to-peer approaches in interventions targeting youth seems particularly relevant. The intervention is organised by GAME; a street sports organization that implements activities led by youth peer leaders (“Playmakers” aged 16-25) with the primary aim of fostering positive youth development and secondary aims to increase physical activity and mental wellbeing.

Methods: The study applies the behaviour change wheel as a theoretical framework to understand intervention mechanisms and functions. Data consist of observations of GAME’s peer leader education and during peer-led street sport practices in four less advantaged neighbourhoods. Further, four focus group interviews with youth peer leaders explore their capabilities, opportunities and motivation in relation to intervention implementation.

Results: Preliminary findings will highlight the mechanisms in GAME’s current intervention and explore intervention delivery and ways in which the education is put into practice by peer leaders. The project will increase theoretical understandings of mechanisms in peer-to-peer physical activity interventions for positive youth development in less advantaged neighbourhoods and will inform the further development of GAME’s peer leader education.

Conclusion: The findings should be of interest to practitioners, researchers and policy makers with an interest in peer-to-peer approaches to physical activity involving youth.

External funding details: The research is funded by the Novo Nordisk Foundation (NNF17SH0026986) and Innovation Fund Denmark (7038-00204B).

Factors influencing the implementation and maintenance of a decade-long school-intervention adding three times more physical education in primary schools

Jonas Vestergaard Nielsen, Thomas Viskum Gjelstrup Bredahl, Thomas Skovgaard, University of Southern Denmark

Introduction: School-based physical activity programmes have the potential to improve students’ physical and mental health as well as their academic achievements. However, school-based programmes often face implementation challenges, and the identification of factors influencing this particular programme phase is considered important in order to secure relevant intervention effects. The aim of this study was to identify factors affecting the implementation of the Svendborgproject (SP) - an effective real-world programme tripling the amount of physical education (PE) in primary schools in the municipality of Svendborg, Denmark.

Method: A mixed method design was used. Data consisted of i) documents on programme description and meeting minutes, ii) PE teacher questionnaires, iii) interviews with main programme managers, school heads and PE teachers.

Results: Results show that SP has been implemented with high levels of fidelity. It is now an established part of the municipality and school identity. Schools and programme managers have established solid partnerships, based on long-term collaboration. The provision of added quality to PE lessons has been implemented through teachers attending a professional development course.

Conclusion: The successful implementation of SP has been enabled through the early involvement of schools to meet individual school needs, combined with simple non-negotiable requirements. Finally, the implementation and maintenance of school-based PE is facilitated when programme managers, school heads and teaching personnel has a joint acknowledgement that the initiative is of high value and manageable within an already full curriculum.

External funding details: The study is funded by a donation from the non-profit foundation TrygFonden.

Providing pupils autonomous use of sit-stand desks; behaviour changes and teacher and pupil opinion following an 8 week intervention

Samantha Fawcner¹, Amanda Pitkethly², Josie Booth¹, John Sproule¹, Danielle Hutson²

¹University of Edinburgh, ²Edinburgh Napier University

Introduction: The aim of this pilot study was to examine the impact of providing pupils autonomous use of sit-stand desks in the classroom on sedentary behaviour and on- and off-task behaviour, and explore pupil and teacher opinion of the change to the learning environment.

Methods: One year 7 classroom was provided with nine sit-stand desks for 8 weeks of a single school term, with pupils given autonomy over when they chose to use the desks. Observations of on- and off-task behaviour and objective measurement of time spent sitting, standing and number of sit-to-stand transitions were undertaken at baseline and at the end of the intervention in 10 boys and 11 girls (141 ± 4 months). Teacher interviews (n=3) and two pupil focus groups (n=8) were conducted.

Results: Compared with baseline, after the intervention the percentage of classroom time spent sitting was marginally less (3.6 ± 13.5%, $g = 0.34$), standing time marginally more (4.2 ± 11.5%, $g = 0.45$) and number of sit-to-stand transitions/hour significantly more (3 ± 2, $g = 2.03$, $P = 0.03$). Pupils tended to spend more time on task and less time off task during the class observations after the intervention (passive on task $P = 0.055$, $g = 0.62$). Both staff and pupils were positive about the intervention, with teachers reporting less disruption, more confidence and autonomy, and pupils indicating an ability to concentrate more.

Conclusion: Providing children autonomous use of sit-stand desks is positively received by teachers and pupils and may help to break up sedentary behaviour and encourage better on- and off-task behaviour.

Effectiveness of a randomized controlled trial to scale up an efficacious school-based intervention to improving children's MVPA.

Rachel Sutherland¹, Nicole Nathan¹, David Lubans¹, Peter Butler², Nicole McCarthy², Clare Desmer², Lynda Davies², Luke Wolfenden²

¹University of Newcastle, ²Hunter New England Population Health

Introduction: Although comprehensive school-based physical activity interventions are efficacious under research conditions, they often require adaptation for implementation at scale. The primary aim of this paper is to report the effectiveness of an adapted efficacious school-based intervention in improving children's MVPA.

Methods: An RCT was conducted in primary schools (25 intervention and 22 control schools) located in NSW, Australia. Follow-up measures were taken at 6-months post randomization. The multi-component intervention was based on an efficacious school physical activity program (SCORES program) which was adapted for scalability by a local health service over a 6-month period. The intervention consisted of four PA strategies and seven implementation support strategies. The primary outcome was students mean daily minutes spent in MVPA, objectively measured using accelerometers. School level outcomes included PE lessons quality and school physical activity practices were assessed.

Results: Participants were Grade 3-6 students at follow-up (May-August 2015). At follow-up there were no significant effects favouring the intervention group for overall daily MVPA (adjusted mean difference in

daily MVPA between groups (1.96 minutes [CI]: (-3.49,7.41, $p = 0.48$). However, adjusted difference in mean minutes of overall VPA (2.19, CI 0.06-4.32, $p = 0.04$), mean minutes of school day MVPA (2.90, CI 0.06-5.85, $p = 0.05$) were significantly different in favour of the intervention group. PE lesson quality also significantly differed between groups.

Conclusion: The modified intervention was not effective in increasing children's overall MVPA, when adapted for at-scale. However, did improve daily minutes of VPA and school day MVPA and PE quality.

External funding details: No external funding was received.

What we build makes a difference: Mapping activating schoolyard facilities after renewal using GIS, GPS and accelerometers

Henriette Bondo Andersen, Lars Christiansen, Charlotte Pawlowski, Jasper Schipperijn. University of Southern Denmark

Schoolyard renewal can increase physical activity (PA) during recess, but it remains unclear which facilities are most suitable for promoting PA for both genders. This paper aims to investigate PA levels in renewed schoolyards focusing on specific areas. Three Danish schools with large asphalt schoolyards lacking permanent facilities were renewed and received innovative facilities with great variation in design.

At baseline (spring 2014) 353 students (grade 4-8) and following renewal (spring 2016) 300 students (grade 4-8) were asked to wear an accelerometer (ActiGraph GT3X) and GPS (Qstarz BT-Q1000XT) during five school days. Total time and proportions of time spent sedentary, light and moderate-to-vigorous physical activity were calculated per area by gender pre and post renewal. Schoolyards were mapped using ArcGIS and 'hot-spot analyses' were used to detect activity-spots.

At two schools, time and PA increased for both genders, but for one school both decreased. The activity was spread out more and new and more activity-spots were identified for both genders, however boys remained more active after renewals. Multi-courts, small soccer-courts, panna-courts, four-square markings and hills generated activity-spots for both genders, whereas a large screen for dancing activities, an undulating multi-court, a spider-web climbing structure and woodland area only generated activity-spots for girls.

Variation in elements and features is important when building activating schoolyards for both genders. Context, design and function of elements plays a central role in promoting PA behavior in schoolyards.

External funding details: This study was funded by The Danish Cancer Society, Realdania, The Danish Foundation for Culture and Sport

The impact of a childcare intervention on early childhood educators' physical activity knowledge and self-efficacy

Molly Driediger¹, Leigh M. Vanderloo², Andrew M. Johnson¹, Shauna M. Burke¹, Jennifer D. Irwin¹, Brian W. Timmons³, Anca Gaston⁴, Patricia Tucker¹

¹University of Western Ontario, ²The Hospital for Sick Children, ³McMaster University, ⁴Brant County Health Unit

Introduction: The training Early Childhood Educators (ECEs) receive may influence children's physical activity (PA) affordances during childcare. This study sought to explore ECEs' knowledge of Canadian PA guidelines for the early years and their self-efficacy to engage preschoolers in PA before and after receiving training, as part of the multi-component *Supporting Physical Activity in the Childcare Environment* (SPACE) intervention.

Method: A randomized controlled trial, 11 childcare centres in London, Canada implemented the 8-week intervention, wherein ECEs (n=49) attended one 4-hour PA workshop. ECEs (n=34) from 11 additional

centres maintained standard care. Educators completed a questionnaire at baseline and post-intervention to assess knowledge of national PA guidelines (1 item) and self-efficacy to engage preschoolers in PA in various circumstances (e.g., when going outside isn't possible; 6 items). Percentages for accurate identification of the guidelines were tallied, while self-efficacy data were analyzed using a mixed MANOVA in SPSS.

Results: Accurate guideline identification for the intervention group was 8% and 31% at baseline and post-intervention, and 20% and 17% for the control group, respectively. Preliminary results suggest that the training significantly improved ECEs' self-efficacy to engage preschoolers in PA. Specifically, in regard to their self-efficacy to engage preschoolers in 1) PA in general, 2) for 30 minutes indoors, and 3) when going outside isn't possible.

Conclusion: This research may provide evidence of the usefulness of PA-related training for ECEs in support of preschoolers' engagement in PA.

External funding details: Funded by the Canadian Institutes of Health Research (grant # 133559).

Session: Physical activity promotion among specific patient groups

Physical activity and physiotherapy: Moving forwards

Anna Lowe, Sheffield Hallam University/Public Health England

Background: A large proportion of the UK population fail to meet physical activity (PA) guidelines, this impacts on the lives of individuals and has substantial social and economic implications. There are over 55,000 physiotherapists in the UK yet little is known about PA promotion in physiotherapy practice. The overarching aim was to explore PA promotion in physiotherapy practice and to understand the factors that underpin patterns of current practice.

Methods: A systematic scoping review was undertaken to assess the state of the existing global evidence. Following this, a mixed methods study was completed. Phase 1 involved a national, cross-sectional survey of UK physiotherapists and Phase 2 involved a qualitative, explanatory follow-up study.

Findings: Thirty-one studies were included in the scoping review, most were observational, non-UK. Findings from Phase 1 of the mixed methods study indicated that respondents (n=514) engage in conversations with patients about PA but lack a systematic, evidence-based approach and knowledge of the PA guidelines was poor. These findings were further explained in Phase 2 which showed that participants (n=12) highlighted a lack of understanding of key concepts and focused on short term restoration of function rather than long term promotion of health.

Conclusion: Physiotherapists have the potential to contribute to tackling inactivity through routine clinical care. However, current approaches appear to be inconsistent and are not systematic. Findings could improve physiotherapy practice such that it reflects current health policy. Furthermore, they could contribute to the bigger goal of orientating health services towards prevention.

Is recreational running associated with earlier delivery and lower birth weight in women who continue to run during pregnancy? An international retrospective cohort study of running habits of 1293 female 'parkrun' runners during pregnancy.

Katy Kuhrt, Mark Harmon, Natasha Hezelgrave, Paul Seed, Andre Shennan, Kings College London

Introduction: Women of reproductive age increasingly participate in recreational running, but its impact on pregnancy outcome is unknown.

This study investigates whether running affects gestational age at delivery and birthweight as indicators of cervical integrity and placental function respectively, as existing studies are underpowered to determine potential effects.

Methods: Information about running habits and first pregnancy outcome was collected from participants. Women were initially categorized according to whether they continued running in pregnancy or stopped, and further, dependent on average weekly km and trimester they ran into.

1293 female participants were recruited from parkrun, which organises weekly runs across the world, including 691 in the UK. Those under 16 or unable to provide outcome data were excluded from the analysis. Primary outcomes were gestational age at delivery and birthweight centile. Other outcomes included assisted vaginal delivery rates and prematurity at different gestations.

Results: There was no significant difference in gestational age at delivery: 39⁺⁶ weeks' in both groups (C.I. 39⁺⁴ to 40; p=0.55) or birthweight centile; 46.9 vs 44.9%, (C.I. 44.5 to 49.4% vs 42.8 to 47.1%; p=0.22) in women who stopped running and those who continued respectively. Assisted vaginal delivery rate was increased in women who ran; 195/714 (27%) vs 128/579 (22%), (O.R 1.32; C.I. 1.02 to 1.71; p=0.03).

Conclusion: Running during pregnancy doesn't influence gestational age at delivery or birthweight centile and appears safe irrespective of intensity. Assisted vaginal delivery rates were higher in women who ran, possibly due to increased pelvic floor muscle tone.

"MOVEdiabetes": A trial to promote physical activity for adults with Type 2 Diabetes in Oman

Thamra Al Ghafri¹, Saud Alharthi¹, Yahya Al-Farsi², Elaine Bannerman³, Angela M Craigie⁴, Annie S Anderson³

¹Ministry of Health, ²Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Oman., ³Centre for Public Health Nutrition Research, University of Dundee, Ninewells Hospital and Medical School., ⁴Centre for Public Health Nutrition Research, University of Dundee, Ninewells Hospital and Medical School

Introduction: This study examined the impact of a multi-component intervention (MOVEdiabetes) on physical activity (PA) in inactive adults with type 2 diabetes (T2D) within primary care (PC) in Oman.

Method: A cluster randomized controlled trial of the "MOVEdiabetes" programme (PA consultations delivered by dietitians trained in behaviour change techniques (BCTs), pedometers and monthly telephone WhatsApp messages) versus usual care in eight health centres in Muscat. Sample size was calculated to demonstrate a 50% between group difference in PA (MET-mins/week) over 12 months. The primary outcome was change in PA measured by the Global Physical Activity Questionnaire. Intention to treat analysis was done via SPSS v21.

Results: Of the 232 participants, 59.1% were female, 79.3% married, 6.5% illiterate, >50% employed, and mean age was 44.2 ± 8.1 years. Seventy-five percent completed the 12 month follow-up. At 12 months, mean PA change was +737.9 ± 2224.8 MET-min/week (95%CI 2.9-7.5) in the intervention group compared with +199.3 ± 613.7 MET-min/week (95% CI 1.0-3.1) in the control group. Using a Mann-whitney test, the between group difference in median MET-min/week was 80 MET-min/week (95% CI 0.010-0.014). Overall, 42.6% of the intervention group (vs 28.2% in usual care) achieved WHO PA recommendations (≥600 MET-mins/week) (OR = 1.25, 95%CI 1.1-1.5).

Multilinear regression analysis found greater changes in MET-mins/week at 12 months in males (95%CI 36.5 -851.9), participants with no

comorbidities (95%CI 243.5-1199.6) and those with less sitting time (95% CI 311.9-618.4).

Conclusions: PA consultations linked to BCTs, delivered by trained dietitians, can be an effective method to increase levels of PA in primary diabetes care.

Who is at risk for a sedentary and inactive lifestyle? Pooled accelerometer data in patients with cancer.

Maïke Sweegers¹, Terry Boyle², Jeff Vallance³, Brigid Lynch⁴, Adrijana D'Silva⁵, Mai Chin A Paw¹, Johannes Brug⁶, Teatske Altenburg¹, Laurien Buffart¹

¹VU University Medical Center, ²University of South Australia, ³Athabasca University, ⁴University of Melbourne, ⁵University of Calgary, ⁶University of Amsterdam

Background: Several reviews and meta-analyses demonstrated beneficial effects of physical activity on physical health and quality of life in patients with cancer. Emerging evidence suggests that sedentary behavior may have detrimental effects on health. Yet little is known about the correlates of these behaviors in patients with cancer. The current study aimed to investigate demographic and clinical correlates of objectively assessed physical activity and sedentary behavior in patients with cancer.

Method: Data from seven studies (n=1150 cancer survivors) from the Netherlands, Australia and Canada were pooled. We performed multilevel linear regression analyses to examine associations between demographic and clinical variables (age, gender, body mass index (BMI), marital status, education level, smoking status, comorbidities, diagnosis, time since diagnosis, type of treatment and fatigue) and accelerometer-assessed moderate-to-vigorous physical activity (MVPA) and sedentary time, adjusting for confounders which were identified using a directed acyclic graph.

Results: On average, participants spent 538 (standard deviation (SD)=99) minutes per day sedentary and 25 (SD=22) minutes per day in MVPA. Older age ($\beta=1.3$, 95% confidence interval (CI)=0.8;1.7), being male ($\beta=35.6$, 95%CI=23.6;47.5), higher BMI ($\beta=1.3$, 95%CI=0.5;2.0) and higher fatigue ($\beta=8.0$, 95%CI=2.8;13.1) were significantly associated with higher sedentary time. Younger age ($\beta=0.3$, 95%CI=0.2;0.4), lower BMI ($\beta=0.3$, 95%CI=0.1;0.5), non-smoking ($\beta=6.9$, 95%CI=2.1;11.2) and lower fatigue ($\beta=2.2$, 95%CI=0.9;3.4) were significantly associated with higher levels of MVPA.

Conclusion: Age, gender, BMI, smoking status and fatigue were significantly associated with sedentary behavior and/or MVPA in patients with cancer. This information helps to identify patients who are at risk for a sedentary and inactive lifestyle.

What influences physical activity engagement post-myocardial infarction? A longitudinal qualitative study

Sarah Birtwistle, Rebbecca Murphy, Ian Jones, Ivan Gee, Paula Watson, Liverpool John Moores University

Introduction: Engagement in physical activity (PA) post-myocardial infarction (MI) can reduce risk of reoccurrence and mortality. Yet uptake of PA through cardiac rehabilitation (CR) is poor, and little is known about the long-term PA behaviour of cardiac patients. We aimed to understand factors influencing PA engagement for post-MI patients during the 9-month period following an MI, from the perspective of both patients and family members.

Methods: Six family-dyads (1 patient, 1 family member) engaged in semi-structured interviews at 1, 4 and 9 months post-MI. Interviews explored PA

experiences, attitudes, beliefs, behaviours, motivation and family support for PA. Interpretative Phenomenological Analysis involved reading transcripts, identifying emerging themes and comparing themes between cases. Emerging themes were organised into profiles representing common experiences.

Results: In the preliminary analysis, one active profile (5 family-dyads) and one sedentary profile (1 family-dyad) emerged. Patients in the active profile were motivated by interest, enjoyment, knowledge of the benefits of PA and confidence to be physically active, coupled with their desire to return 'back to normal'. These active patients also reported positive influences from their family and CR team. The sedentary profile was characterised by a lack of interest and negative associations with PA, with family concerns regarding PA (post-MI) acting as a further deterrent.

Conclusions: Although patients' personal relationship with PA appeared to influence PA engagement, considering the effect of interpersonal interactions on PA engagement may also be worthwhile when designing interventions to enhance PA engagement within a post-MI population.

Effect of a tailored activity pacing intervention on fatigue and physical activity behaviours in adults with multiple sclerosis

Ulric Abonie, Florentina Hettinga, University of Essex

A tailored approach to activity pacing is recommended to manage fatigue and improve physical activity (PA). However, supporting evidence on tailored activity pacing is limited and conflicting, with no evidence available in persons with multiple sclerosis (MS). The aim of this study was to evaluate the effect of a tailored activity pacing intervention on fatigue and PA in adults with MS.

21 adults with MS (age 59 ± 2 yrs.) were randomly allocated to tailored pacing group (n=11) or control group (n=10). Participants wore an accelerometer for 7 days that measured PA behaviours, and self-reported their engagement in pacing and risk of overactivity (Activity Pacing Questionnaire) and fatigue (Fatigue Severity Scale) at baseline and 4-week follow-up. Tailoring involved using data from the accelerometer and questionnaires. PA behaviours were assessed by examining activity level (7-day average activity counts per minute) and activity variability (7-day average highest activity counts each day divided by activity counts on that day). Group differences were examined with one-way ANOVA ($p=.05$).

Compared to the control group, the tailored group had increased activity level (22.79 ± 44.70 vs. -18.11 ± 36.07 ; $p=.03$) and decreased activity variability ($-.10 \pm .53$ vs. $.53 \pm .80$; $p=.04$). No group difference was found for fatigue ($-.10 \pm .75$ vs. $.26 \pm .70$; $p=.27$).

Tailoring activity pacing based on attitudes towards pacing, PA and fatigue was effective in improving PA behaviours, without exacerbating fatigue symptoms. This provides the basis to incorporate activity pacing in MS management.

RECREATE: Intervention development to support stroke survivors to reduce and break up sedentary behaviours

Jennifer Hall¹, Sarah Morton², Claire Fitzsimons², David Clarke³, Anne Forster³

¹Bradford Teaching Hospitals NHS Foundation Trust, ²The University of Edinburgh, ³University of Leeds

Introduction: Stroke survivors can spend up to 80% of their day in prolonged sedentary behaviour(s) (SBs), which is more than healthy age-matched controls. Interventions tailored to the needs of stroke survivors to support reducing/breaking up SBs and improve outcomes are needed. To

develop appropriate interventions it is necessary to understand current behaviour(s) of stroke survivors and existing practices within stroke care.

Methods: (1) Non-participant observations in two UK (England, Scotland) stroke services, each including a stroke unit and linked community service; (2) Semi-structured interviews with staff, stroke survivors and their caregivers to explore capabilities, opportunities and motivations associated with reducing SBs in stroke survivors. Field note data were thematically analysed. Interview data were analysed using a framework approach to facilitate comparison across and within groups of participants.

Findings: Initial findings indicate that the physical and social environment, perceptions of stroke survivors' physical and psychological capability to move, and routinized practices enacted by staff, facilitate an expectation to be sedentary in the inpatient setting, which is often carried over when patients leave hospital. There are opportunities to incorporate a reduction in SB within existing routine activities of stroke survivors and staff.

Conclusions: Efforts to reduce SBs in stroke survivors are considered necessary and potentially beneficial for improving long-term recovery. Findings from this study will inform a co-production approach to develop a complex intervention designed to reduce/break up SBs and improve health outcomes in stroke survivors.

External funding details: The abstract presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (Development and evaluation of strategies to reduce sedentary behaviour in patients after stroke and improve outcomes, Reference number RP-PG-0615-20019). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Session: Understanding and influencing physical activity behaviour

Evaluating the evidence on sitting, smoking, and health: Is sitting really the new smoking?

Jeff Vallance, Athabasca University

Over the last decade sedentary behavior research has attracted widespread media attention. Sitting has frequently been equated with smoking; some sources go so far as to suggest smoking is safer than sitting. The objective of this presentation is to highlight how sitting and smoking are not comparable. These are distinct behaviours with vastly different levels of risk attributed to them. Meta-analyses of sedentary behaviour and health outcomes report hazard ratios of 1.24 (95% CI: 1.09, 1.41) for all-cause mortality. The relative risk of death from all causes among current smokers, compared to those who have never smoked, is 2.80 (95% CI: 2.72, 2.88) for men and 2.76 for women (95% CI: 2.69, 2.84). The risk is substantially higher for heavy smokers (>40 cigarettes per day, RR = 41.7 [95% CI: 33.18, 52.46] for men, 59.5 [95% CI: 43.62, 81.05] for women). Even light smoking (1-4 cigarettes per day) exceeds the risks associated with very high volumes of sitting. It is not just the magnitude of health risks associated with sitting and smoking that are dissimilar. Other elements of smoking, such as its addictive properties and harm to bystanders, are not comparable to sitting. Conflicting or distorted information about health risks related to behavioural choices and environmental exposures can lead to confusion, and public doubt, with respect to health recommendations. As a scientific community, our public health messages need to be driven by our data and the current body of evidence; there is no room for alternative facts.

Patterns of health behaviour associated with active travel: a compositional data analysis

Louise Foley¹, Dorothea Dumuid², Andrew Atkin³, Timothy Olds², David Ogilvie⁴

¹University of Cambridge, ²School of Health Sciences, University of South Australia, ³School of Health Sciences, Faculty of Medicine and Health Sciences, University of East Anglia, ⁴MRC Epidemiology Unit & UKCRC Centre for Diet and Activity Research (CEDAR), University of Cambridge

Introduction: We explored differences in how people doing active travel (walking or cycling for transport) used their time compared to those doing no active travel, incorporating physical activity, sedentary behaviour and sleep.

Methods: We analysed time-use diaries from the cross-sectional 2014/15 United Kingdom Harmonised European Time Use Survey. In participants aged 16+ years, diary activities were categorised into six domains, accounting for a full 24 hours: (1) sleep; (2) leisure moderate to vigorous physical activity (MVPA); (3) leisure sedentary screen time; (4) non-discretionary time (work, study and chores); (5) travel and (6) other. This mixture of activities was defined as a time-use composition. A binary variable was created indicating whether participants reported any active travel on their diary day. Using compositional data analysis, we ran adjusted regression models to test whether time-use composition differed between individuals reporting some active travel and those reporting no active travel.

Results: 6,143 participants (mean age 48 years; 53% female) were included in analysis. There was a statistically significant difference in time-use composition between those reporting some active travel and those reporting no active travel. Compared to those not undertaking active travel, those who did active travel reported 11 minutes more in leisure MVPA and 18 minutes less in screen time per day, and reported lower sleep.

Conclusion: Overall, active travel was associated with a broadly health-promoting composition of time across multiple behavioural domains. From a health perspective, higher MVPA and lower screen time is favourable, but lower sleep could have positive or negative implications.

External funding details: The Centre for Diet and Activity Research (CEDAR) is a UKCRC Public Health Research Centre of Excellence. Funding from the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust, under the auspices of the UK Clinical Research Collaboration, is gratefully acknowledged.

Overview of different physical activity models for the general public in various countries, with pro's and con's.

Ragnar Van Acker, Luc Lipkens, Flemish Institute for Healthy Living

Introduction: The objective was to review existing national physical activity (PA) and sedentary behaviour (SB) models, their main features and whether these models are expert-based and tested in the general public.

Methods: (1) A pubmed and google search strategy was conducted using a search strategy with key words in English, Dutch, French and German. (2) For Europe, this was complemented by a search of country-specific models based on an existing systematic overview of national PA recommendations in the European Region of the World Health Organization. Only models or infographs recognized by national agencies or governments were included.

Results: 18 unique PA models or infographs from 12 different countries worldwide were found. Most countries adopted pyramid or triangle shaped

models to visualize health recommendations ($n=8$), followed by infographics ($n=6$) and circle or disc shaped models ($n=6$). Most models were reported as expert-based (72%). However, none (0%) were actually tested in the general public during the development phase. The only reported evaluation in the general public was a formative or post-development evaluation (22%). Most models integrated PA and fitness guidelines, but few provided SB guidelines (33%).

Conclusion: No PA or SB models provided reports of evaluation in the general public during their development. There is an urgent need to develop and test models in participation with the general public, in order to communicate feasible public health messages effectively.

External funding details: Funded by the Flemish Government.

A person based approach to developing the 'Breaks from Sitting' module within a digital intervention for reducing and preventing cognitive decline in adults aged 60-80.

Rosie Essery¹, Cheryl Hunter², Kirsten Smith¹, Alex Milton³, Fiona Mowbray¹, Stephanie Easton¹, Max Western¹, Sebastien Pollet¹, Anne Ferrey⁴, Bernard Gudgin⁵, Nanette Mutrie⁶, Paul Little¹, Lucy Yardley¹

¹University of Southampton, ²University of East London, ³University of Bristol, ⁴University of Oxford, ⁵PPI Representative, ⁶University of Edinburgh

Background: There is good evidence that optimising older adults' physical activity behaviours can help to slow or prevent cognitive decline. An important aspect of this includes addressing high levels of sedentary behaviour, more common amongst older adults and an independent risk factor for cardiovascular and cardiometabolic conditions. Such conditions are risk factors for age-related cognitive decline. Breaking up sedentary time with light-intensity activity may also be a manageable first step towards increasing activity - particularly for those with limited mobility, strength or balance issues. In developing the multi-component 'Active Brains' digital intervention, we incorporated a module to support individuals to reduce sedentary behaviours.

Methods: In addition to drawing on theoretical and empirical understandings of relevant behaviours, we employed a Person-Based Approach to tailor intervention content and functionality to the needs and preferences of intended users. This involved developing 'guiding principles' and conducting over 60 think-aloud and semi-structured qualitative interviews with adults aged 60-80, some with existing cognitive decline. Feedback was systematically coded to determine necessary amendments and to gain a deeper understanding of older adults' experiences of engaging with the 'Breaks from Sitting' intervention module.

Results and Conclusions: We will report on older adults' experiences of engaging with the 'Breaks from Sitting' module and outline changes made to this intervention content, structure and functionality in response to participants' feedback. Our findings will provide insight into the acceptability and accessibility of a digital intervention to reduce sedentary behaviour amongst older adults with and without cognitive deficits.

External funding details: PGfAR NIHR Programme Grant: RP-PG-0615-20014

Nudging baseball fans to be active: a large-scale, smartphone-based, quasi-experimental study

Masamitsu Kamada¹, Hana Hayashi², Koichiro Shiba³, Masataka Taguri⁴, Naoki Kondo⁵, I-Min Lee⁶, Ichiro Kawachi³

¹The University of Tokyo, ²McCann Global Health, ³Harvard T.H. Chan School of Public Health, ⁴Yokohama City University, ⁵University of Tokyo, ⁶Brigham and Women's Hospital, Harvard Medical School

Introduction: Sport fandom has the potential to be a powerful draw for habit formation. We investigated the effect of a smartphone application, Pa-League Walk, developed by the Japanese Professional Baseball League (Pacific League), on the daily step counts of fans who used the application.

Method: Quasi-experimental study conducted throughout Japan. Pa-League Walk became freely downloadable on iPhones and Android phones on March 2016. The daily step counter included some gamification features including ranking of friends according to daily step count, and competition between opposing teams' fans based on daily total steps on game days (e.g., [Eagles fans = 200 M steps] vs [Hawks fans = 300 M steps]). A voluntary survey of 499 users showed that 53% were male and 57% were 30-49 years old. We analyzed the preliminary data of 15,228 iPhone users who downloaded the app in 2016. De-identified data was provided by the Pacific League.

Results: After excluding data with <500 steps/day, we had 606,630 days of data. Fans walked more on "home-game" days (average 7565 steps/day), compared with "visiting-game" (7279, $P < 0.001$) and "no-game" days (7134, $P < 0.001$) during the regular season (Apr-Sep). After the introduction of "players photo collection" feature (a reward for 10,000 steps/day achieved) on October 2016, the proportion of days achieving 10,000 steps increased from 24.4% during Apr-Sep to 27.5% during Nov-Dec ($P < 0.001$), despite the latter being the winter off-season.

Conclusion: This preliminary analysis suggests that the fandom-based app may promote physical activity among baseball fans.

External funding details: Japan Society for the Promotion of Science.

Integrating Fitbit data with the electronic health record (EHR) to promote physical activity in cancer survivors

Lisa Cadmus-Bertram, Amye Tervaarwerk, Mary Sesto, Brittany Van Remortel, Preshita Date, Ronald Gangnon, University of Wisconsin - Madison

Introduction: Breast and colon cancer are highly prevalent, with a combined population of 4 million survivors in the US. Although an active lifestyle provides physical and psychological benefits to cancer survivors, most remain insufficiently active. Although effective interventions have been developed, these have not been integrated with oncology care. The purpose of this pilot trial was to test the feasibility of a technology-based physical activity intervention that imports Fitbit data to the EHR and provides email-based coaching.

Method: Participants were 50 stage I-III breast ($N=45$) and colon ($N=5$) cancer survivors, each of whom was enrolled alongside a co-survivor (friend/relative/spouse) for peer support. Dyads were randomized to intervention or usual care. Those dyads in the intervention group received Fitbit trackers, with the survivor's data uploaded to the electronic health record (EHR), and email-based coaching. The primary outcome was physical activity measured at baseline and 12-weeks by the ActiGraph accelerometer.

Results: As of January 2018, 47 dyads have completed the study, two were lost to follow-up, and one is ongoing. Fitbit data were successfully integrated with the EHR for all 26 cancer survivors randomized to the intervention group. Physical activity outcomes are forthcoming.

Conclusion: High retention was observed in a study that combined Fitbit data with the EHR and provided peer support and email coaching. Future studies should examine additional strategies for providing clinical support for physical activity adoption and maintenance.

External funding details: Funding was provided by the University of Wisconsin's Institute for Clinical and Translational Research (ICTR) and the Carbone Comprehensive Cancer Center.

A reduction in sedentary behaviour in obese women reduces neonatal adiposity: The DALI randomised controlled trial

Mireille van Poppel¹, David Simmons², Gernot Desoye³

¹University of Graz, ²Western Sydney University, ³Medical university Graz

Background: Maternal obesity and gestational weight gain are implicated in the development of childhood obesity, tracking from neonatal adiposity. Lifestyle intervention in pregnancy might reduce adverse effects of maternal obesity on neonatal adiposity.

Methods: In the Vitamin D And Lifestyle Intervention (DALI) Lifestyle Trial (ISRCTN70595832), 436 women with a body mass index ≥ 29 kg/m² were randomly assigned to counseling on Healthy Eating (HE), Physical Activity (PA), HE&PA, or to usual care (UC). Neonatal outcomes were head, abdominal, arm and leg circumference, skin folds, estimated fat mass, fat percentage, fat free mass, and cord blood leptin. Intervention effects on outcomes were assessed in multilevel analyses. Mediation of intervention effects by lifestyle and gestational weight gain was assessed.

Results: Outcomes were available from 334 neonates. A reduction in sum of skin folds (-1.8 mm; 95% CI, -3.5 to -0.2; $p = 0.03$), fat mass (-63 g; 95% CI, -124 to -2; $p = 0.04$), fat percentage (-1.2%; 95% CI -2.4 to -0.04; $p = 0.04$), and cord blood leptin (-3.80 μ g/l; 95% CI -7.15 to -0.45; $p = 0.03$) was found in the HE&PA group, and reduced leptin in female neonates in the PA group (-5.79 μ g/l; 95% CI, -11.43 to -0.14; $p = 0.05$) compared to UC. Reduced sedentary behavior, but not gestational weight gain, mediated intervention effects on leptin in the HE&PA and PA group.

Conclusion: The HE&PA intervention resulted in reduced adiposity in neonates. Reduced sedentary behavior drove the intervention effect on cord blood leptin. Implications for future adiposity of the offspring need to be elucidated.

External funding details: EU FP7

Wednesday, 13:20- 14:20

Session: Cross Sectoral Approaches to Physical Activity Promotion

Prospective associations between alternatives to the car and cardiovascular disease, cancer and all-cause mortality: Evidence from UK Biobank

Jenna Panter¹, Oliver Mytton¹, Stephen Sharp¹, Séren Brage¹, Steven Cummins², Anthony Laverty³, Katrien Wijndaele¹, David Ogilvie¹

¹University of Cambridge, ²London School of Hygiene and Tropical Medicine, ³Imperial College

Car use may affect health in various ways, including through reduced physical activity. We investigated the associations between using alternatives to the car which are more active and morbidity and mortality. We conducted a prospective study using 358799 adults aged 37-73 from UK Biobank. Commute and non-commute travel were assessed at baseline (2006-2010). We classified participants according to whether they relied exclusively on the car, or used alternative modes of transport at least some of the time. Main outcome measures were incident CVD and cancer, and CVD, cancer and all-cause mortality (up to February 2016). We excluded events in the first two years and conducted analyses separately for those who regularly commuted and those who did not. In maximally-adjusted models, regular commuters with more active patterns of travel on the commute had a lower risk of incident (HR 0.89, 95% CI 0.79 to 1.00) and fatal CVD (HR 0.70, 95% CI 0.51 to 0.95). Those who also had more active patterns of non-commute travel had an even lower risk of fatal CVD (HR 0.57, 95% CI 0.39 to 0.85). Among those who were not regular

commuters, more active patterns of travel were associated with a lower risk of all-cause mortality (HR 0.92, 95% CI 0.86 to 0.99). More active patterns of travel were associated with a reduced risk of incident and fatal CVD and all-cause mortality. This is important for individuals choosing how to travel, and for employers and policymakers whose actions influence travel patterns.

External funding details: MRC, BHF and NIHR

Changes of commuting mode to school and fatness measurements in Spanish children and adolescents: Findings from the UP&DOWN longitudinal study

Daniel Camiletti-Moirón¹, Palma Chillón², Alejandro Sánchez-Bey³, Verónica Cabanas-Sánchez⁴, Oscar L. Veiga⁴, Anna Timperio⁵, José Castro-Piñero³

¹University of Cádiz, ²Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain, ³Department of Physical Education, School of Education Sciences, University of Cádiz, ⁴Department of Physical Education, Sports, and Human Movement, Autonomous University of Madrid, ⁵Deakin University, Geelong, Australia, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences

Introduction: Longitudinal cohort studies show that change in transport mode is linked to reduced body mass index (BMI) in adults. We aimed to examine associations between change in mode of commuting and fatness measurements in children and adolescents over two years.

Methods: This longitudinal study comprised 1226 Spanish children and adolescent (49.6%, girls) aged 8-18 years at baseline, recruited from schools in Cádiz and Madrid, respectively. Mode of commuting to school was self-reported at baseline and 2-year follow-up. Height, weight, waist circumference, triceps and subscapular skinfold thickness were measured. Body Mass Index (BMI, kg/m²) was calculated. Multilevel mixed regression analyses were performed.

Results: Persistent active transport was common (58.7%) and 28.2% were persistent passive commuters. Only 7.0% changed from a passive to active, and 6.1% from an active to passive, mode. There were no sex differences in consistency of travel mode over the two years, but a greater proportion of children were persistent active commuters compared to adolescents (66.8% vs 53.8%, $p < 0.001$). Among children, girls who changed from a passive to an active mode had lower BMI at follow-up than those who persistently used an active mode ($B = -0.7$, 95%CI: -1.2, -0.1). No other associations were found.

Conclusions: Travel mode to school remained relatively constant over the 2-year period. The association between the change of travel mode and BMI in younger girls suggest a call to health authorities to promote active transport as a way of incorporating physical activity into everyday life.

External funding details: This study was supported by the DEP 2010-21662-C04-00.

Developing a score to assess the policy environment for cycling and walking promotion in cities: Results of a feasibility study

Sonja Kahlmeier¹, Esther Anaya Boig², Emilia Smeds², Audrey de Nazelle²

¹University of Zurich, ²Imperial College London, Faculty of Natural Sciences, Centre for Environmental Policy

Background: While several scores exist to quantitatively assess cycling and walking environments, hardly any focus on the qualitative aspects of the policy and social environment.

Methods: Information on the social, policy and planning contexts was collected in 7 cities through standardized workshops and semi-structured interviews with stakeholders from health/transport sectors. A purposive scientific and grey literature search revealed the Copenhagenize Index as most suitable guidance.

Results: A subset of the Copenhagenize Index was used to analyse the qualitative information on the social (bicycle/walking culture, social acceptance) and the policy environment (advocacy, politics, urban planning), respectively. Data from a quantitative survey was used to assess perception of safety. Feasibility to derive valid scores was tested using data from 2 cities. A refined approach was applied to the data from the other 5 project cities. 2 experts independently derived a score from 0-4 for walking/cycling for each of the categories, using sequential text interpretation of pre-determined sections from the interview and workshop reports. Explanations on why a particular score was given were recorded. Validation was also explored.

Conclusions: The approach was found to be feasible to derive scores to capture the policy and social context for walking/cycling, respectively, which can be included into quantitative analysis of active transport data. Validity was higher for cycling than for walking, which might be related to more detailed information having been available on the former.

External funding details: EU 7th Framework Programme for research, grant agreement no 602624-2 - PASTA study (Physical Activity through Sustainable Transport Approaches)

Walking towards a brighter future: A participatory research process to advocate for improved walk to school corridors

Anna Greer¹, Alison Martínez Carrasco², Drew Goldsman³, Ann-Uriel Knausenberger¹

¹Sacred Heart University, ²Make the Road Connecticut, ³The Nature Conservancy

Introduction: Bridgeport is the most populous, and one of the poorest, cities in Connecticut. Due to budget limitations, the Bridgeport Board of Education voted to increase the minimum distance requirement for high school busing service from 1 to 2 miles without any improvements to the walk-to-school infrastructure.

Methods: We conducted participatory research to support fifteen youth leaders as they advocate for improvements to their walk-to-school environment. We visited twenty-one classrooms in Bridgeport's three high schools and used an interactive mapping process with students to identify the most often used walk-to-school routes (3 routes/school). The youth leaders then examined the quality of these routes using the Microscale Audit of Pedestrian Streetscapes. Youth also collected questionnaires from 187 peers about their school travel experiences. Percentage scores (i.e., percent of total points earned) were calculated for each segment and crossing along the routes assessed. We used chi square tests to examine associations between students' travel model and negative-travel-related experiences.

Results: Almost all segments (82%) and crossings (91%) examined received a failing grade (<64%). In addition, a greater proportion of students who walk/cycle/skate to school rather than ride in a motor vehicle report feeling unsafe ($p = .001$), missing first period ($p = .006$), and lower grades ($p = .001$) due to travel-related challenges.

Conclusions: School districts must create safe walk-to-school environments to ensure all students' right to travel to school in a safe and timely manner. Other municipalities might benefit from replicating the youth-led, participatory approach used in this study.

External funding details: This project was funded by The Nature Conservancy (#P116393).

Estimated reduction in physical inactivity among inner city adults associated with a rail/trail conversion and park construction: Smart and healthy transportation planning

Gregory Heath¹, Eric Asboe², Mina Sartipi¹

¹University of Tennessee at Chattanooga, ²Chattanooga Department of Transportation

Introduction: Recent studies suggest that urban design at the street-scale level contributes to enhanced transport options for increased physical activity (PA) among residents. Such changes have been linked to the prevention of premature morbidity and mortality from key non-communicable diseases (NCDs). Due to the cost of bike and pedestrian infrastructure planners need to estimate the return on investment of such strategies for increasing PA and decreasing levels of physical inactivity (PI) among persons exposed to such infrastructure.

Methods: Infrastructure costs were accessed by working with a local transportation partner for a rail/trail conversion linking a major transport and recreational corridor with a newly constructed park located within a low-income urban area. Current prevalence of PI and select NCDs among adults 18+ years were available at the census tract level using the Behavioral Risk Factor Surveillance System.

Results: Current PI estimates for the affected census tract was 52.7%. Using a median effect size of 48.2% for street scale interventions targeting increased bicycle and pedestrian activity, derived from the U.S. Community Guide reviews, projected a decrease in physical inactivity of 27.2%. Costs of the infrastructure was set at \$2.8M(USD). The potential estimated cost savings over the ensuing four years for NCD's among this population due to a reduction in PI was \$476,000(USD).

Conclusions: Accessing existing data on PI and NCD prevalence, as well as projected costs of specific active transport infrastructure can be an important approach for transportation, urban, and public health planners in prioritizing healthy transportation infrastructure projects in communities.

Evidence and active urban environment: A qualitative study of how stakeholders in three English local authority areas use evidence in decision making for 'active living' infrastructure

Anna Le Gouais¹, Cornelia Guell², Louise Foley¹, David Ogilvie¹

¹University of Cambridge, ²University of Exeter

Introduction: Urban design has the potential to influence population levels of physical activity and subsequent health impacts. This qualitative study investigates how decisions are made for 'active living' infrastructure (walking and cycling infrastructure and open space), and particularly how evidence is used by different stakeholders.

Method: The research involves three purposively selected local authority areas in England. Qualitative data is collected predominantly through semi-structure interviews, and to a lesser extent ethnographic observations. Participants were chosen using snowball sampling with key stakeholders such as planners, public health, new communities, developers and councillors. 6-10 participants are included for each case study area. Interviews are audio-recorded with consent and transcribed verbatim. Data analysis is supported using qualitative data analysis software NVivo 10.

Results: Decision making may be influenced via multiple 'windows of opportunity'. Funding opportunities, elected members' personal opinions, the persuasiveness of pressure groups, willingness to take risks, organisational culture, developers' attitudes and personal relationships all influence design outcomes. Different types of evidence are used by different stakeholders, ranging from systematic reviews and bespoke research, to population data, transport monitoring and national standards. Economic

arguments for 'active living' infrastructure receive mixed support from stakeholders – its potential for better design must contend with scepticism and limited mechanisms to influence planning negotiations.

Conclusion: Stakeholders vary in the types of data and evidence used for decision making. Better understanding of decision making processes between stakeholders, as well as clearer health-related evidence and cost effectiveness data could help to enable healthier neighbourhoods.

External funding details: MRC Epidemiology Unit and CEDAR.

Building local capacity for sustainable health-enhancing physical activity promotion: City-wide action on physical activity: how mapping activity using causal loop diagrams can help plan interventions and evaluation

Nick Cavill, Cavill Associates Ltd

Introduction: Local governments are uniquely placed to drive and coordinate cross-sectoral collaboration to plan and implement physical activity programmes across an area. However, the majority of the evidence for the effectiveness of interventions to promote physical activity is focused on single, small, short-term linear interventions and does not tend to take account of the complex dynamic systems that exist within communities.

We set out to develop causal loop diagrams (CLDs) that described the physical activity system in partnership with stakeholders involved in a city-wide physical activity programme in the North of England. We aimed to see if this could help the stakeholders move closer to a 'whole systems approach' in both their programme planning and evaluation.

Activities undertaken: We reviewed the activities being planned or implemented in the city-wide approach. At a one-day stakeholder meeting we developed a detailed CLD that described a generic physical activity system, based on the physical activity correlates literature. We discussed the draft CLDs with the stakeholders and refined them, mapping their activities and their evaluation data.

Results: In this case study city, this exercise showed that the current plans were far from being a systems approach, and showed some clear gaps in both activities and data collection that could inform the future planning process.

Conclusion: Mapping the physical activity system using CLDs can be a very effective tool to help stakeholder consultation, and to move intervention planning closer to being a whole systems approach.

Session: Physical Activity and Older Adults

Additive effects of acute exercise and breaking up prolonged uninterrupted sitting on fatigue in older adults

Michael Wheeler¹, Daniel Green¹, Kathryn Ellis², Ester Cerin³, Paddy Dempsey⁴, David Dunstan⁵

¹The University of Western Australia, ²The University of Melbourne, ³Australian Catholic University, ⁴Swinburne University, ⁵Baker Heart and Diabetes Institute

Background: While interrupting prolonged sitting time and an acute moderate-intensity exercise bout can improve fatigue, it is unclear whether combining these approaches amplifies these improvements. We examined the combined effects of acute exercise and breaks in sitting on subjective fatigue in older adults.

Methods: In a randomised crossover trial, inactive adults (n = 38; aged 55-80 years), completed 3 conditions (6 day washout): 1) SIT: uninterrupted sitting (8 hrs, control); 2) EX: sitting (1hr), moderate-intensity walking (30 mins) followed by uninterrupted sitting (6.5 hrs); 3) EX+BR: sitting

(1 hr), moderate-intensity walking (30 mins) followed by sitting (6.5 hrs) interrupted every 30 minutes with 3 minutes of light-intensity walking. The Lee Fatigue Scale (consisting of 18 visual analogue scale items scored from 0-100 mm) was administered at five timepoints (every 2 hours) during each condition, with higher scores denoting increased fatigue. Mean fatigue scores [95% CI] were calculated at each timepoint, then averaged over 8 hours, excluding the first (baseline) timepoint.

Results: Compared to SIT, there was a 10% reduction in average fatigue for the EX+BR condition (EX+BR 37 [33-40] vs. SIT 41 [37- 44] p = 0.012), but no significant difference for the EX condition (39 [35-43]).

Conclusion: In the context of prolonged uninterrupted sitting, an acute exercise bout followed by regular brief activity breaks may be a more effective fatigue countermeasure than exercise alone in older adults.

External funding details: This work was supported by funding from the National Health and Medical Research Council of Australia (NHMRC) Grant (1062338) and by the Victorian Government's Operational Infrastructure Support Program.

'Mobile Me': An evaluation of a sport intervention in sheltered housing and care homes

Amanda Burke¹, Ryan Hughes², Andy Jones¹, Shelley Ames²

¹University of East Anglia, ²Active Norfolk

Introduction: Levels of physical activity amongst older adults are low, and this group is at risk of social isolation. 'Mobile Me' has bought sports, such as bowling, to older people of all abilities in sheltered housing and care homes. After 10 weeks, the sport coaches leave equipment on site so that the residents can continue playing. Between 2015 and 2018 Mobile Me has reached 52 settings in the county of Norfolk, England.

Methods: Mobile Me is being delivered by 'Active Norfolk', the county sports partnership, and evaluated by University of East Anglia. The evaluation compares residents on the programme to those waiting to start; participants are followed-up for one year. Outcomes measurements include the assessment of functional fitness, balance, wellbeing, and sedentary behaviour. A process evaluation will identify best practice and lead to the production of a tool-kit.

Findings: Of the 39 settings receiving Mobile Me to April 2017, 70% are continuing the sport; sessions are mostly being run by residents. One care provider has rolled Mobile Me out to its 35 homes in Norfolk, purchasing equipment and training staff. Interim results suggest a reduction in self-reported sedentary behaviour, along with an improvement in self-reported health scores when using the EQ-5D health questionnaire. Feedback from participants and other stakeholders indicate that Mobile Me is valued for its social aspects, and because it is highly inclusive in a group that experiences high levels of ill-health, frailty and disability.

External funding details: Funded through Sport England

Effect of a combined physical activity and fall prevention intervention on older adults' physical activity levels and mobility-related goals: randomised controlled trial

Juliana Oliveira, Catherine Sherrington, Serene S Paul, Elizabeth Ramsay, Kirkham Catherine, Kathryn Chamberlain, Sandra O'Rourke, Leanne Hasset, Tiedemann Anne, University of Sydney

Introduction: We investigated the impact of a combined physical activity and fall prevention intervention on physical activity and mobility-related goal attainment among people 60+.

Methods: 131 community-dwellers aged 60+ years were randomly assigned to control (n = 67; advice brochure) or intervention groups (n = 64;

one physiotherapist visit, 6 months of phone coaching, pedometer, tailored falls prevention advice, brochure). Primary outcomes were objectively measured physical activity (PA) and mobility-related goal attainment at six and 12 months. Secondary outcomes were other PA measures, falls, quality of life, fear of falling, mood, and mobility.

Results: We found no significant between-group difference in physical activity counts at 6 months (mean difference = 12.8 counts per minute (CPM), 95%CI -98.3 to 123.9, $p=0.82$) or 12 months (55.6 CPM, 95%CI -13.8 to 125.0, $p=0.12$). A greater proportion of people in the intervention compared to control who were not meeting PA guidelines (150 mins/week moderate to vigorous PA) at baseline met guidelines at 6 months (OR 4.0, 95% CI 0.78 to 20.2, $p=0.09$) and there was a trend towards greater number of steps/day in intervention group at 6 months (468 steps/day, 95%CI -330 to 1265, $p=0.25$); but not at 12 months. The intervention group achieved better mobility goal attainment at 6 months compared to controls (OR 1.97, 95% CI 1.06 to 3.68, $p=0.03$). We found no significant between-group differences in the secondary outcomes at six or 12 months.

Conclusion: Our combined physical activity and fall prevention intervention was associated with higher goal attainment and greater physical activity guideline adherence.

Increasing participation in organised physical activity by socially disadvantaged older people

Tracy Nau¹, Genevieve Nolan², Ben J Smith¹

¹School of Public Health & Preventive Medicine, Monash University,

²MOVE Muscle, Bone & Joint Health, Victoria

Introduction: Organised physical activity (PA) conducted in groups and at community facilities provides participation opportunities for older people, and offers social connection as well as disease prevention and functional benefits. Despite this, participation in organised PA is low among older adults in Australia and other nations, especially among those who are socioeconomically disadvantaged, have a disability, or come from culturally and linguistically diverse backgrounds. This study aimed to identify methods of promoting, designing and implementing organised PA programs to improve engagement by socially disadvantaged and under-represented older people.

Methods: Semi-structured interviews were conducted with 30 community service and PA program providers, and 5 focus groups with 42 older participants in existing PA groups, in Melbourne, Australia. Data were analysed thematically and the PRECEDE-PROCEED framework was used to categorise findings.

Results: Helpful strategies for addressing predisposing factors such as social anxiety and lack of confidence, included user-centred program design and sensitive, informative messaging and promotion. Key enabling strategies were transport assistance and minimising fees. Facilitating gentle entry to groups and fostering inclusion and safety were identified as valuable reinforcing strategies. Providers regarded organisational networks as beneficial for facilitating referral and addressing resource constraints.

Conclusion: A multifactorial approach addressing a range of predisposing, reinforcing and enabling factors is likely to be necessary to enhance engagement in organised PA by socially disadvantaged and under-represented older people. Key factors relate to creating a positive sociocultural environment, identifying activities of interest, and enhancing ease of access.

External funding details: Victorian Government Department of Health and Human Services

Exercise against dementia: Development, implementation and evaluation of a physical activity intervention for people with dementia

Doris Gebhard, Christina Schmid, Carinthia University of Applied Sciences

Exercise is a promising tool to counteract the progression of dementia. Nevertheless there are research gaps concerning the ideal design of physical activity interventions for people with dementia, especially in regards to long-term care facilities. Therefore the aim of this study was to develop, realize and evaluate a feasible and health enhancing physical activity intervention for people with dementia living in care homes.

The exercise program was developed on the basis of a method triangulation of three elements: systematic review, interviews with people with dementia and participation workshops with care personnel. The developed multi-component exercise program takes place one hour twice a week with the overall duration of 12 weeks and was piloted in five care homes. In course of a randomized and controlled study design the target parameters mobility, assessed by the Short Physical Performance Battery (SPPB) and the Timed Up and Go Test (TUG), activities of daily living, assessed by Bayer ADL-Scale (B-ADL) and quality of life, assessed by QUALIDEM, were investigated.

In all, 63 individuals with a mean age of 86.21 years participated on the trial. The drop-out rate was 18.87% and the attendance rate was 80.46%. The intervention group shows significant improvements at SPPB ($t_0:3.15$ vs. $t_1:4.50$; $p=.002$), TUG (sec) ($t_0:34.12$ vs. $t_1:31.96$; $p=.040$) and B-ADL ($t_0:6.37$ vs. $t_1:5.02$; $p=.012$). The between groups and time comparison shows significant improvements at SPPB ($p=.006$).

The participatory approach facilitates the development of an evidence based, feasible and sustainable exercise program that shows health enhancing effects.

External funding details: Fonds Gesundes Österreich

Physical activity levels in adults and older adults 3-4 years after pedometer-based walking interventions:- long-term follow-up of participants from two randomised controlled trials in UK primary care

Tess Harris¹, Sally Kerry², Elizabeth Limb¹, Cheryl Furness¹, Charlotte Wahlich¹, Christina Victor³, Steve Iliffe⁴, Peter Whincup¹, Michael Ussher¹, Ulf Ekelund⁵, Julia Fox-Rushby⁶, Judith Ibbison¹, Stephen De-Wilde¹, Cathy McKay¹, Derek Cook¹

¹St George's University of London, ²Queen Mary's University of London, ³Brunel, University of London, ⁴University College, London, ⁵Norwegian School of Sports Sciences, ⁶Kings College, University of London

Background: Interventions can increase short-term physical activity (PA), but health benefits require maintenance. Few interventions have evaluated long-term PA objectively. We followed up two pedometer interventions with positive 12-month effects, to examine objective PA levels at 3-4 years.

Methods: Long-term follow-up of 2 trials: PACE-UP (45-75 years) 3-arm (postal, nurse-support, control) at 3 years; PACE-Lift (60-75 years) 2-arm (nurse-support, control) at 4 years post-baseline. Randomly selected patients from 10 UK primary care practices were recruited. Interventions were 12-week walking programmes (pedometer, handbooks, PA diaries) postally (PACE-UP) or with nurse-support (PACE-UP, PACE-Lift). Main outcomes were changes in 7-day accelerometer average daily step-counts and weekly time in moderate-to-vigorous PA (MVPA) in ≥ 10 minute bouts in intervention versus control groups, between baseline and 3 years (PACE-UP) and 4 years (PACE-Lift).

Results: PACE-UP 3-year follow up was 67% (681/1023), PACE-Lift 4-year was 76% (225/298). PACE-UP 3-year intervention versus control comparisons were: additional steps/day postal +627 (95% CI 198-1056) $p = 0.004$, nurse +670 (95% CI 237-1102) $p = 0.002$; total weekly MVPA in bouts (minutes/week) postal +28 (95% CI 7-49) $p = 0.009$, nurse +24 (95% CI 3-45) $p = 0.03$. PACE-Lift 4-year comparisons were: +407 (95% CI -177 to 992) $p = 0.17$ steps/day; and +32 (95% CI 5-60) $p = 0.02$ minutes/week MVPA in bouts. Results were robust to missing data sensitivity analyses.

Conclusion: Previously reported 12-month trial effects on PA levels persisted at 3-4 years. Pedometer interventions, delivered by post or with nurse support, can help address the public health physical inactivity challenge.

External funding details: NIHR(PACE-UP trial HTA Programme, CLAHRC SL, PACE-Lift trial RfPB programme).

Implementing strength and balance exercise programmes for the prevention of falls in older people: Instructors' experiences of delivering evidence-based exercise.

Helen Hawley-Hague¹, Dawn Skelton², Chris Todd¹

¹University of Manchester, ²Glasgow Caledonian University

Introduction: Encouraging older adults who have experienced a fall to maintain exercise after rehabilitation is difficult. Health authorities claim to provide FaME (evidence-based strength and balance programme), but modification of the programme is common and patients do not receive interventions following the evidence-base in terms of content/length of programme. Exploring instructors' experiences of delivery gives important information for designing effective exercise programmes.

Methods: 40 instructors were purposively sampled from 247 instructors who responded to a questionnaire on FaME delivery. Semi-structured telephone interviews with 23 instructors.

Results: When asked about delivery of the FaME programme, instructors said that they tried to deliver the programme as trained. They suggested that where the protocol is not adhered to it is due to Trust protocols, lack of adequate staffing or insufficient time/space. Instructors argued that delivering the evidence base gave them confidence, they felt that this then gave participants confidence, improved outcomes and improved adherence rates. Well-developed referral systems were perceived as important to success/maintenance of exercise and communication and good working relationships were essential to this. Opportunity to stay with the same instructor, in the same group was important to adherence because of increased participant confidence and established social bonds.

Conclusions: There are a variety of different models of delivery across the UK, but communication and good relationships are essential to long-term adherence to exercise.

External funding details: Funded through MRC Centenary Award, Faculty of Biology, Medicine and Health, University of Manchester.

Session: Physical Activity Interventions for Adults

'Touchpoints' in engaging the less active in a sport program

Erica Randle, Matthew Nicholson, Emma Seal, Kiera Staley, La Trobe University

Introduction: The decline of traditional sport participation in Australia has prompted sport organisations to expand their sport offerings to include

modified programs or entry-level opportunities targeted at the less active and/or individuals who are disengaged from sport. This study sought to identify the key 'touchpoints' where a less active and/or sport disengaged participant engages or disengages from a program or sport offering. This information could be used to improve program design and deliverer training on how to best engage and retain the less active/disengaged cohort.

Method: Semi-structured interviews (306) were conducted with program facilitators and less active and/or sport disengaged participants across various settings (schools; community sport clubs; modified social offerings; and free public programs) and targeted cohorts (youth; parents; female only; participants retired from sport; and social modified sport participants). Additional focus groups (N = 60) were conducted with 566 secondary schools students who were disengaged from sport.

Results: Touchpoints included 'marketing messages'; 'registration'; 'welcome'; realising others in the group are 'just like me'; the 'first mistake'; 'modifying activities'; the 'first achievement', and the 'invitation back'. The 'deliverer' was found to be the key component to engaging the less active and/or sport disengaged into sport and/or physical activity. They were influential in creating the social cohesion of the cohort and the outcome of the key touchpoints identified.

Conclusion: Sport programs and opportunities targeting the less active and/or sport disengaged cohort should consider these touchpoints in their program design and deliverer recruitment and training.

External funding details: VicHealth, Hockey Victoria and the Australian Sports Commission

Gamification and physical activity: What's the 'active' ingredient?

Marc Harris, Intelligent Health

Introduction: In recent years, population level approaches which incorporate gamification components to increase physical activity have grown in popularity. However, little is known about the precise mechanisms essential for successful and unsuccessful implementation, engagement and behaviour change. This study aimed to investigate the motivations to participation in a community-wide gamification-based physical activity intervention called 'Beat the Street'.

Methods: Beat the Street turns a city into a game where residents register their walking and cycling journeys by tapping a smartcard on RFID readers called 'Beat Boxes' placed on lampposts at half-mile intervals throughout the local area. Players compete to see which schools, community groups and individuals can tap the most boxes, or achieve the most points throughout the 6-week game phase. Following Beat the Street in Wolverhampton 2017 which engaged N = 25,790 people, 4 focus groups were conducted with N = 26 players who became active, or more active following the intervention.

Results: Contrary to expectations, the findings of the study indicated that extrinsic motivations (points and prizes) were not a prominent motivation for participation. Key motives for engagement were: purpose seeking, which involved having a break from modern stressors and technology; social influence, taking part in an activity with shared common goals with family, friends and/or colleagues; and exploration, which involved discovering the local area, finding new routes and greenspaces and orienteering to 'collect' 'Beat Boxes'

Conclusion: The findings of the study provide useful insight into the motives which engage typically hard-to-reach individuals into physical activity interventions.

Effectiveness of a text message intervention to improve whole-of-day activity in cancer survivors participating in clinical exercise rehabilitation: a randomised controlled trial

Sjaan Gomersall¹, Tina Skinner², Elisabeth Winkler³, Genevieve Healy³, Elizabeth Eakin³, Brianna Fjeldsoe³

¹The University of Queensland, ²School of Human Movement and Nutrition Sciences, The University of Queensland, ³School of Public Health, The University of Queensland

Introduction: While physical activity intervention is often delivered to cancer survivors via supervised clinical rehabilitation, motivating and maintaining activity changes outside of the clinic setting remains challenging. This study investigated the effect of an individually tailored text-messaging intervention that focused on increasing whole-of-day activity both during and beyond a 4-week, supervised exercise clinic for cancer survivors.

Methods: Participants (n = 36; mean $\pm$ SD age 64.8 $\pm$ 9.6 years; 44.1 $\pm$ 30.8 months since treatment) were randomized 1:1 to receive the standard 'clinic' or enhanced 'clinic+'. Time (min/16-h awake day) spent sitting, standing, and stepping at a light- and moderate-vigorous intensity were assessed using activPAL3. Time use domains were assessed using the Multimedia Activity Recall for Children and Adults (min/day). Clinic days were excluded. Changes and intervention effects were evaluated using linear mixed models, adjusting for baseline values and potential confounders.

Results: Over the first four weeks, no significant ($p < 0.05$) intervention effects were seen though 'Physical Activity' ('clinic+') increased and 'Social Activity' decreased ('clinic') significantly within-groups. By 12 weeks, relative to 'clinic' patients, 'clinic+' patients sat less (-48 min [95% CI: -90, -6]), did more light-intensity stepping (+7 min [+0, +14]), tended to stand more (+42 min [-4, +88]) and did similar moderate-vigorous stepping (-2 min [-14, 9]). Only Quiet Time (-63 min [-111, -16]) and Screen Time (-62 min [-110, -14]) differed significantly between groups.

Conclusion: Out-of-clinic activity was largely maintained during the supervised clinic period. Afterwards, tailored text messaging resulted in the replacement of sitting with light stepping, predominantly via reducing Quiet Time and Screen Time.

Changes in workplace car parking and commute mode: a natural experimental study

Oliver Mytton, Jenna Panter, David Ogilvie, University of Cambridge

Car use places a considerable burden on public health, increasing physical inactivity and contributing to air pollution and injuries. We used a quasi-experimental design to assess whether changes in workplace car parking policies were associated with changes in travel behaviour. We used cohort data from the Commuting and Health in Cambridge study (2009-2012; n = 910 participants; n = 1,773 transition periods). Commute mode and workplace parking policy at each time point were self-reported. Using generalised estimating equations we examined the associations between changes in parking policy and the proportion of commuting trips that were exclusively made by car, involved any walking or cycling, and involved any public transport. 247% of trips were made exclusively by car, 535% involved any walking or cycling and 114% involved public transport. Shifts to less restrictive workplace parking policies were associated with a decrease in active commuting. Those participants who reported changes from no parking at work to free or paid parking reported higher proportions of trips exclusively by motor vehicle (11.4%, 95% CI: 6.4, 16.3) and lower proportions involving walking or cycling (-13.3%, 95% CI: -20.2, -6.4) and public transport (-5.8%, 95% CI: -10.6, -0.9), compared to those who

had no workplace car parking. More restrictive workplace parking policies were associated with small increases in active commuting that were not significant. Parking policies that incentivise car use may exacerbate existing public health problems. Though modest, differences in travel patterns following changes in parking policy, may have a sizeable impact at the population-level.

External funding details: MRC & Wellcome Trust

The new Purple Line light rail within the Washington, D.C. metropolitan area: A protocol for a natural experiment study examining changes in transit behaviors and perception

Jennifer Roberts¹, Ming Hu², Brit Saksvig¹, Micah Brachman³, Casey Durand⁴

¹University of Maryland, School of Public Health, ²University of Maryland, School of Architecture, Planning & Preservation, ³University of Maryland, Center for Geospatial Information Science, ⁴University of Texas Health Sciences Center, School of Public Health

Introduction: Utilizing an expansion of the Washington D.C. area transportation system with a new light rail line, the Purple Line Outcomes on Transportation (PLOT) Study will exam pre- and post-Purple Line public transportation (PT) use, active transportation (AT) behaviors and attitudes and physical activity (PA) among Prince George's County adults and youth. The PLOT Study will also examine how contextual effects (e.g., neighborhood built environment; sense of community) impact PT, AT and PA.

Methods: PLOT, a quasi-experimental longitudinal pre-post study, will use an exploratory sequential mixed-methodology design. Qualitative phase I focus groups, as well as quantitative phase II questionnaire, accelerometry, and travel diary data will be collected to evaluate PT use, AT behaviors and attitudes and PA from Prince George's County adults and youth (12-17 years) residing in the forthcoming Purple Line environment. Through focus groups, participants will share their perspectives on the forthcoming Purple Line; their current neighborhood built environment; and their "sense of community". Overall, the PLOT Study will involve four cycles of data collection (1) pre-Purple Line baseline; (2) 12 months post-Purple Line; (3) 24 months post-Purple Line; (4) 36 months post-Purple Line).

Discussion: A unique quality of PLOT is the diversity of the Prince George's County Study population. The study will take advantage of this natural experiment in an area enduring significant racial/ethnic and gender based overweight or obesity and physical inactivity disparities to measure the impact of a transportation infrastructure change on PT use, AT behaviors and attitudes and PA among adults and youth.

To Bergen on a Bike: Using big sport events as a platform for improving public health

Hanne Beate Sundftr, Aslak Fyhri, Institute of Transport Economics

Introduction: Increasing cycling as a mode of transport is a political goal in Norway, as in many countries, due to the potential for increased overall physical activity and reduced sedentarism. In 2017, Bergen were host city for The UCI Road World Championships. An important aim for the local organizers were to use the event to inspire the general population for increased activity. A gamification-based activity app was developed. The present study assesses the effect of the app on physical activity.

Methods: Through a quasi-experimental design data is collected about the group that downloaded (and used) the app (N = 209) before and after the intervention and compared with data collected from another group

(control) in the same period (N = 203). We explore the potential change in amount of physical activity and everyday transport.

Results: The survey results indicate a higher increase in cycling kilometers in the app user group (frequently used), compared to those who downloaded the app, but didn't use it. However, the change is not significantly different from the control group. Results from the app data will be presented at the conference, exploring the number of active users and distance generated in the app.

Conclusion: The results indicate an increase in cycling activity among the app users, but due to a low number of participants there is not enough data to state that the difference was a result of the intervention. Based on the results we provide suggestions for improvement of the program.

External funding details: The study is funded by Bergen 2017 AS.

Systematic review of the methods used in economic evaluations of individual-level physical activity and sedentary behaviour interventions

Madeleine Cochrane¹, Lee Graves¹, Paula Watson¹, Hannah Timpson¹, Alan Haycox², Brendan Collins², Lisa Jones¹, Antony Martin³

¹Liverpool John Moores University, ²University of Liverpool, ³HCD Economics; University of Liverpool

Introduction: There is an absence of economic evidence in the field of public health to inform decisions in allocating scarce resources.

Methods: A systematic review was conducted to review the methods used in economic evaluations of individual-level physical activity and/or sedentary behaviour interventions.

Results: Ten trial-based and five model-based economic evaluations met the inclusion criteria. All studies assessed the cost-effectiveness of interventions aiming to increase moderate-intensity physical activity; no studies assessed the cost-effectiveness of changing sitting or standing time, or light-intensity physical activity. Overall the quality of the studies was good. Strengths of the studies included the finding that most studies derived their effectiveness estimate from a randomised-controlled trial or meta-analysis, and that all five model studies took a lifetime horizon. Nevertheless, a third of studies did not relate costs and consequences to an appropriate study perspective. Techniques were limited to cost-utility and/or cost-effectiveness analyses; and no studies conducted a cost-benefit analysis. Two model studies conducted a cost-consequence analysis alongside their full economic evaluation. Equity was explored explicitly in one study, while for the remaining studies it was ignored or incorporated implicitly through subgroup analyses.

Conclusions: The findings highlight a lack of development in the methods for incorporating broader costs and consequences, and equity is rarely considered in economic evaluations of individual-level physical activity interventions. Furthermore, the review identified a lack of economic evaluations extrapolating their findings beyond the trial period, and a lack of studies assessing the cost-effectiveness of individual-level sedentary behaviour interventions.

Session: Physical Activity Measurement Among Children

Is after-school sport participation essential for meeting physical activity recommendations in children?

Kerli Mooses, Merike Kull, University of Tartu

The low levels of physical activity (PA) of children is a concern in most developed countries. Participation in organised sport (OS) has been

identified as one factor helping the children to meet the PA recommendations – 60 minutes of moderate-to-vigorous physical activity (MVPA) every day.

The PA of children aged 6-13 years was measured with Actigraph GT3x for one week. The inclusion criteria were a minimum of 10 hours of PA data per day with a minimum of five days. The details about sport participation was collected with diary. Evenson cut-point were used to calculate time spent in MVPA.

Out of 492 children measured, 28.0% of all students met the PA recommendations at least on 5 days, while 27.6% met the recommendation on one or none of the days. 52.4% of students participated in OS at least once a week and 33.3% of students not meeting the PA recommendations on any of the day, participated in OS at least once a week. Participation in OS increased 1.65 times ($p=0.019$) the odds of meeting the PA recommendations at least on five days when controlled for gender and school stage. Each additional day with sport participation increased the amount of weekly average MVPA by 4.1 minutes ($p<0.000$). On average, 23.34 ± 15.3 minutes of MVPA was acquired during trainings, which is 30.3% of training time and $38.9 \pm 25.4\%$ of daily recommendation.

Although participation in OS increases the odds of meeting the PA recommendations, PA should be supported also in other day segments.

Lessons from the establishment of routine, low cost and high participatory childhood obesity and risk factor (physical inactivity, sedentary behaviour, poor diet quality, sleep insufficiency) monitoring in regional Victoria, Australia

Claudia Strugnelli¹, Nic Crooks¹, Colin Bell¹, Janette Lowe², Craig Chadwick³, Steven Allender⁴

¹Deakin University, ²Southern Grampians Glenelg Primary Care Partnership, ³Goulburn Valley Primary Care Partnership, ⁴Deakin University

Introduction: Collecting routine health data from school children is imperative for examining population trends, identifying at-risk populations, optimizing resource allocation, evaluating interventions and providing evidence for policy. However, few countries have successfully implemented such systems. We present lessons (implementation and ethical considerations, cost of delivery, and results dissemination) from the establishment of two childhood obesity and risk factor monitoring systems in the Great South Coast (GSC) and Goulburn Valley (GV) regions of Victoria, Australia.

Methods: All primary schools in designated local government areas (LGAs) were invited to participate (6 LGAs GSC, 3 LGAs GV) and in each school, Year 2, 4 and 6 students were invited using opt-out (passive) consent. Since 2015, we have collected height and weight data from 6,422 children in 142 Victorian primary schools. Older children also completed self-report behavioural questionnaires and a sub-sample wore accelerometers for 7-days.

Results: We learned quality data can be collected efficiently using a mix of paid researcher time and in-kind capacity from health promotion and council workers. Student response rates were $\geq 79\%$ and school response rates were $\geq 60\%$ and no complaints regarding the study were raised with the researchers' or Ethics Committee allaying concerns about opt-out consent. Cost was low but depended on rurality of schools and level of in-kind capacity (\$ estimates to be presented). Electronic data collection enabled dissemination of results to schools and community partners within 12-weeks post data-collection.

Conclusion: A low cost childhood obesity monitoring system achieved high participation rates and rapid dissemination.

Boys and more active children are more active during preschool hours than out-of-care, compared to girls and less active children

Ada Kristine Ofri Nilsen¹, Einar Ylvisaaker¹, Kjersti Johannessen¹, Sigmund Alfred Anderssen², Eivind Aadland¹

¹Western Norway University of Applied Sciences, ²Norwegian School of Sport Sciences

Background: Some studies suggest children accumulate less physical activity (PA) during preschool hours compared to time out-of-care. However, this difference may depend on context and culture, which might also influence how specific groups accrue their PA levels. Therefore, the aim of this study is to investigate in-care and out-of-care PA in a large sample of Norwegian preschool children, and explore differences in PA by sex and PA levels.

Method: In this cross sectional study, 1308 Norwegian preschool children (52% boys) aged 2-6 yrs wore an accelerometer (ActiGraph, GT3X+) for 14 consecutive days during 2015-2016. 1050 children had valid PA across settings (in-care and out-of-care), and were included in the analysis. Levels of MVPA (Evenson cut points: >2296 cpm) were compared between preschool hours and time out-of-care using a linear mixed model including the interactions sex*setting and MVPA quartiles*setting.

Results: Children accumulated 43 and 35 min/day of MVPA during preschool hours and out-of-care, respectively. Both boys and girls accumulated more MVPA during preschool hours compared to time out-of-care ($p < 0.001$), and boys had higher levels of MVPA compared to girls in both settings ($p < 0.001$). Girls had relatively less MVPA during preschool hours compared to boys (-3.3 min, $p < 0.001$), and the less active children had relatively less MVPA during preschool hours than more active children (Q1 vs. Q4: -5.6 min, $p < 0.001$).

Conclusion: Norwegian preschoolers accumulate more MVPA during preschool hours compared to time out-of-care, but the preschool seem to restrict girls and less active children's activity levels.

External funding details: Sogn og Fjordane County Council

Do EMG and acceleration responses differ from heart rate responses to standing, ball games, exergames, agility activities and jumping activities in 7-12 year old children?

Arto Pesola¹, Martti Melin², Anssi Vanhala², Ying Gao², Taija Finni²

¹South-Eastern Finland University of Applied Sciences, ²University of Jyväskylä

Introduction: In addition to increasing energy expenditure, physical activity induces also neuromuscular responses, which are not necessarily reflected by measuring energy expenditure. This study compared metabolic and neuromuscular responses to various physical activities in SuperPark activity park.

Methods: The subjects were 16 children who were sitting, standing, walking, jogging, shooting ice hockey, hitting and catching & throwing baseball, playing floorball, playing a football and parkour exergame, performing an agility track, scooting, jumping on a bouncy mattress and a trampoline in a randomized order for 3 min with 2 min breaks. Heart rate above sitting (HR), acceleration counts (ACC; waist-worn sensor) and EMG amplitude (EMG; EMG shorts) were analyzed as the last minute average and normalized to walking. Using HR as a reference method, a distance (d; least squares fit) of ACC (HR-ACC) and EMG (HR-EMG) from a perfect correlation ($r = 1$, $d = 0$) were calculated for each individual and activity and compared to those of jogging with paired samples t-test. Direction (+/-) of d from $r = 1$ was checked visually.

Results: Average d of jogging HR-ACC and jogging HR-EMG from $r = 1$ were $+76.7 \pm 89.5$ and -65.4 ± 42.7 , respectively. Trampoline HR-ACC ($+200.7 \pm 172.3$) differed from jogging HR-ACC ($P < 0.01$). Standing (-24.2 ± 18.9 ; $P < 0.01$) and trampoline (-100.3 ± 72.7 ; $P < 0.05$) HR-EMG differed from jogging HR-EMG.

Conclusion: As compared to jogging, ACC responds more to trampoline jumping than HR and EMG responds more to standing and less to trampoline jumping than HR. Different methods can reveal different metabolic and neuromuscular responses to physical activity types.

External funding details: AJP received funding for activity measurements from SuperPark Inc.

Meeting Australian 24-Hour Movement Guidelines for the Early Years: associations with adiposity, fundamental movement skills and health-related quality of life

Katherine Downing, Jill Hnatiuk, Lisa Barnett, David Crawford, Jo Salmon, Kylie Hesketh, Deakin University

Purpose: This study assessed associations between meeting 24-Hour Movement Guidelines at ages 3 mo, 9 mo, 18 mo, 3.5 y and 5 y and adiposity, fundamental movement skills (FMS) and health-related quality of life (HRQoL) at age 5 y.

Methods: Data were from the Melbourne InFANT Program. Physical activity (PA) guideline compliance was determined using parent-reported tummy time at 3 mo and accelerometry at 18 mo, 3.5 y, and 5 y. Sedentary behaviour (SB) and sleep guideline compliance were determined using parent-reported screen time and sleep. At 5 y, body mass index z-scores (zBMI) and FMS (object control and locomotor; Test of Gross Motor Development-2) were assessed; physical and psychosocial HRQoL were parent-reported (Pediatric Quality of Life Inventory). Linear regression models adjusted for clustering, intervention effect, child sex and age.

Results: Compliance with the PA guideline at 3 mo and 5 y was associated with higher physical HRQoL ($\beta = 32.7$ [$p = 0.013$] and $\beta = 56.5$ [$p = 0.05$], respectively). Meeting the SB guideline at 9 mo predicted higher physical HRQoL ($\beta = 29.8$ [$p = 0.033$]) and at 18 mo, 3.5 y and 5 y was associated with lower object control skills ($\beta = -2.3$ [$p = 0.004$], $\beta = -1.7$ [$p = 0.026$], and $\beta = -2.5$ [$p = 0.006$], respectively). Compliance at 3 mo with the sleep guideline predicted higher zBMI ($\beta = 0.3$ [$p = 0.007$]), at 18 mo predicted lower physical and total HRQoL ($\beta = -33.1$ [$p = 0.005$] and $\beta = -72.9$ [$p = 0.018$], respectively), and at 5 y was associated with lower zBMI ($\beta = -0.3$ [$p = 0.045$]).

Conclusion: PA and SB may be important for physical HRQoL; however, FMS appear to need targeted opportunities. Further prospective studies are required to elucidate health outcomes of guideline compliance.

External funding details: Australian National Health and Medical Research Council (425801 & 1008879).

Physical activity data on Australian kids: What's out there? What's not?

Verity Booth¹, Natasha Schranz¹, Grant Tomkinson², David Lubans³

¹University of South Australia, ²University of North Dakota, ³University of Newcastle

Introduction: Thousands of studies have collected data on Australian children's physical activity (PA). However, many of these studies are now left dormant and underutilised. Difficulties also arise when attempting to make comparisons between different groups, geographical areas and time due to the methodological inconsistencies.

Methods: An audit of Australian PA research was conducted on youth aged 0-18 years focusing on overall PA participation, along with the specific domains of active transport, sport, school-based PA, and play, as well as sedentary behaviours. Online databases and grey literature were searched and a set of metadata was developed to assist with data extraction.

Results: The systematic search yielded 22,283 records, of which 1002 articles were screened at full-text. Along with a grey literature search, over 150 datasets were identified consisting of data from over 200,000 children. The coverage of these datasets spans 1971 till today, with the majority collected from 1998 onwards. Twelve was the most common age covered, with a noticeable gap for children aged five and under. A range of objective and subjective methodologies were employed, including hundreds of different questions.

Conclusion: Data on PA participation in Australian children are extensive but disproportionate, and suffer from inconsistencies due to the widely varying survey methods, questions and sampling frames. The ideal question would be comparable with a large volume of historical data, have established reliability and validity, and allow us to assess compliance with guidelines.

Has children's physical activity declined over the last three decades? Well, that depends

Verity Booth¹, Alex Rowlands², James Dollman¹

¹University of South Australia, ²University of Leicester

Introduction: Only one fifth of Australian children meet the recommended guidelines for daily physical activity (PA), however it is unclear how participation has changed over time and in what PA contexts. This study investigated secular trends in children's PA over 28 years (1985-2013), separately for active transport (AT), club and school sport, physical education (PE) and school break times.

Method: South Australians aged 10-15 years self-reported PA participation at three cross-sectional time points: 1985 (n=408), 2004 (n=446), and 2013 (n=394). Consistent methodology, based on the 1985 ACHPER Schools Health and Fitness Survey, was used for self-reports of participation within discrete PA contexts. Linear mixed modelling was controlled for socioeconomic status and stratified by sex and age (10-12 y and 13-15 y).

Results: Among younger boys there was a decline in walking to school and lunchtime play, while among older boys declines in cycling for AT, school sport and lunchtime play were observed. Declines in both recess and lunchtime play were observed among younger girls, with no trends in other PA contexts. Among older girls there were declines in every PA context, except for walking to school which increased. Among both boys and girls, older and younger, most observed changes occurred between 2004 and 2013.

Conclusions: There was evidence of relatively recent declines in PA in particular contexts, differentiated by age and sex. Older girls were the subgroup of most concern, with declines in PA participation in almost all contexts.

Session: Research Progress and Future Directions

Road blocks to progress in physical activity research in the last decade

Adrian Bauman¹, Adrian Bauman¹, Wendy Brown², Lars Bo Anderson³

¹Sydney University, ²University of Queensland, ³University of Western Norway

This presentation will consider roadblocks and lack of progress in physical activity in the last decade, focussing on several domains of physical

activity. The presentation will begin by demonstrating trends in population levels of physical activity from countries around the world that have used consistent measures over time. These trends appear to indicate limited progress in physical activity behaviour change. Despite increased interest, advocacy efforts and a multitude of research publications, even active travel behaviours have not improved in many countries. The second part of this presentation will critically consider how an over-emphasis on 'efficacy' trials and systematic reviews has (1) failed to increase the proportion of interventions that are scaled up to the population level, and (2) resulted in limited policy-relevant information for decision makers on how to increase physical activity in populations.

Occupational physical activity: The evidence

Harold W. Kohl¹, Willem van Mechelen², Wendy Brown³

¹University of Texas Health Science Center at Houston, ²VU Medical Center, ³University of Queensland

The aim of this presentation is to identify large scale shifts in occupational physical activity in recent years and to highlight the challenges of researching this domain of physical activity. The presenter will show that there has been little progress in understanding and demonstrating the health effects of occupational physical activity, and the physiological mechanisms underlying these, probably because there are now so few jobs that require physical work. The potential of occupational physical activity interventions to achieve health benefits has also been limited, as research, practitioner and policy efforts have focussed on the emerging area of sedentary behaviour research, which has become a highly contested area of behavioural epidemiology. As a result, the health effects of different contemporary patterns of occupational physical activity, including part-time flexible work practices and shift work, remain poorly understood.

External funding details: Partially supported by the US National Institutes of Health

Understanding and changing determinants to get people moving more

Wendy J Brown¹, Lars Bo Andersen²

¹University of Queensland, ²Western Norway University of Applied Sciences

The aim of this presentation is to critically examine progress in our understanding of the determinants of physical activity behaviour change, and how we have used this understanding to inform intervention studies in adults. Selected examples of interventions in the health care and community settings will be used to illustrate how commonly used behaviour change models, frameworks and constructs have (or have not) provided insights into critical components of behaviour change. Some of our research with adults suggests that 'strong' determinants (such as self-efficacy) actually decline during interventions, while perceived barriers increase once people try to increase their activity levels. Recent research with adults suggests that outcome expectations, social support and access are critical, especially at life stages when competing family commitments appear to override other individual and physical environmental factors, which are often assumed to play a significant role in changing physical activity behaviour. Large scale interventions that positively impact on determinants as well as behaviour are required if we are to counter the trend of declining physical activity in young adults.

Worksite interventions to promote physical activity

Willem van Mechelen, VU University Medical Center

The worksite is a place where we are dealing with a captive audience, potentially providing an ideal venue for physical activity promotion. The aim of this presentation is to briefly outline some of workplace physical activity interventions we have designed, implemented and evaluated (using best practice intervention mapping and behaviour change theory) in the last 20 years. These include interventions with blue- and white-collar employees, as well as managers in various types of companies in the building, service, health care, banking and business sectors. The aim is to show how far we have progressed along the road to health through physical activity, using the workplace as a setting for interventions. Important progress in understanding the cost-effectiveness of worksite health interventions will be illustrated, taking into account the differential role of contextual socio-economic systems on cost-effectiveness outcomes.

The studies that will be presented have received funding from various sources, including Body@Work TNO/VUmc, Delta Lloyd, ZonMW, Dutch Heart Foundation and Stichting Arbowe.

Active travel: moving populations along the road to health

Lars Bo Andersen, Western Norway University of Applied Sciences

The aim of this presentation is to outline progress made in the field of transport-related physical activity in Denmark, using examples of whole community inter-sectoral strategies which have resulted in more active transport. There has been significant progress in research into the behavioural epidemiology of cycling, with studies indicating positive trends in active transport in cities which have invested in improvement in infrastructure for cycling and safety. Recent analyses will be used to show how data can counter common arguments against active transport, with substantially lower mortality rates and lower rates of type 2 diabetes, cancers and cardiovascular disease in cyclists (and to some extent walkers) than in passive travellers. Although many people (including politicians and traffic researchers) perceive cycling to be dangerous, a significant breakthrough in this field is that increased cycling is not followed by increased cycle-related injuries, resulting in a net gain in population health from increased active transport. In Denmark, cycling prevented more than 6000 deaths in 2015, while 26 cyclists were killed in the traffic that year.

Session: Understanding Inequalities in Physical Activity and Health

Building activity-promoting environments that support health across the lifecourse through global citizen science research

Abby King¹, Ann Banchoff¹, Sandra Winter¹, Jenna Hua¹, Olga Lucia Sarmiento Dueñas², Ayelet Dagan³, Nicolas Aguilar-Farias⁴, Afrodit Stathi⁵

¹Stanford University School of Medicine, ²Universidad de Los Andes, ³JDC Israel Eshel, ⁴University de La Frontera, ⁵University of Birmingham

Introduction: Residents represent an under-utilized change agent for promoting activity-friendly local environments, particularly in under-resourced communities and among older populations. We describe both the active aging activities and process evaluation of a global research network, called Our Voice, which systematically engages residents as citizen scientists in enacting local healthy environment changes.

Method: Researchers from 14 countries (6 continents) contributed to the empirically-driven citizen science approach where residents, regardless of circumstances, learn to use a simple, geo-tagged mobile app to identify barriers to physical activity (PA), build consensus around priority issues, and galvanize pragmatic changes with local decision-makers.

Results: Network-based aging adult target areas include converting underutilized public spaces for recreation among low-income seniors (Taiwan); promoting multi-aged resident engagement in evaluations of open streets and park use (Colombia); developing safe walking routes for older adults (Israel); and examining the role of the built environment in facilitating or impeding older adults' PA (Chile and UK). While, overall, Network member ratings were generally strong for research team readiness for and local stakeholder and resident receptivity to citizen science engagement (means = 9.4, 7.2, and 8.1 out of 10, respectively), Network member self-efficacy (SE) ratings for completing a 1-yr citizen science project were more variable (mean = 5.7 out of 10, range = 1-10). Successful sites were able to identify the reasonably small amount of resources typically needed to support a part-time community-engaged coordinator.

Conclusion: The results support the acceptability and utility of citizen science activities that include aging adults from diverse cultures.

External funding details: Robert Wood Johnson Foundation grant#73344

Spatial patterns of park use by children in low-income and ethnically diverse communities

Claudia Alberico, Oriol Marquet, Elizabeth Mazak, Jing Huang, J. Aaron Hipp, Myron F. Floyd, North Carolina State University

Childhood obesity is a health challenge and those in low-income communities of color are at greatest risk. Physical activity promotion is an effective prevention strategy and parks are key settings for prevention. We aim to determine how children in low-income, ethnically diverse communities are moving within parks and how spaces contribute to MVPA during park visits.

Target population was children (5-10 year olds) in two US cities (Raleigh, NC and New York, NY). Three parks were selected per city according to population density by race/ethnicity (African American, Latino, and Asian). Children were fitted with accelerometer and GPS while in the park (1s epochs), for a minimum of 15 minutes, in spring and summer. Parents were surveyed about their decision to go to the park and facility preferences. Data collection was conducted in New York in 2017 (n = 260) and will be finalized in Raleigh by July 2018 (expected n = 300).

Over 15 hours of monitoring were registered (mean = 25 min/participant). Mean age for children was 7 years old (SD = 1.7), mostly female (49%) and Latino (41%). Over 68% of children made the decision to go to the park (n = 198). Spatial analyses will associate location of participants by type of target area (e.g., courts, playgrounds, water features,) and MVPA.

Spatial patterns in park use and MVPA may be associated with park features as well as individual characteristics of children (e.g., gender). Additionally, a child's decision to visit a park versus a parent's decision may also associate with MVPA.

External funding details: Funded by the Robert Wood Johnson Foundation

Barriers and facilitators of physical activity among Black and Minority Ethnic (BME) adults and older adults in the United Kingdom: A meta-ethnographic study

Janet Ige, Paul Pilkington, Selena Gray, Jane Powell, University of the West of England

Introduction: Older adults from BME groups experience a relatively higher burden of physical inactivity and other risk-factors. Despite the increasing number of qualitative studies investigating the barriers and

facilitators of physical activity among older adults from BME backgrounds in the UK, there is very limited review level evidence. This review aims to undertake a synthesis using a meta-ethnographic approach, of existing studies that have explored the barriers and opportunities for physical activity among BME adults and older adults in the UK.

Method: Studies conducted between January 2007 and July 2017 were eligible if they met the following criteria: employed any qualitative method; Included participants identified as being BME, aged 50 and above, living within any UK community. In total, 1036 studies were identified from a structured search of six electronic databases combined with hand searching of reference bibliography from identified studies for grey literature. Of these, 10 studies met the inclusion criteria.

Result: Six key themes emerged from the data: awareness of the links between physical activity and health, interaction and engagement with health professionals, cultural expectations and social responsibilities, appropriate environment, religious fatalism and practical challenges. Findings also showed that the barriers and facilitators of physical activity exists at the individual, community and socio-economic, cultural and environmental level. There was a substantial gap in research among Black African groups.

Conclusion: Identifying the barriers and facilitators of physical activity among BME groups and acknowledging and addressing cultural issues is crucial if low levels of physical activity are to be addressed.

Inequalities in participation in community physical activity events: The case of the five Sheffield parkrun

Elizabeth Goyder¹, Daniel Lawrence², Alice Bullas², Callam Edmonds¹, Alec Sabey¹, Matthew Taylor¹, Sarah Potter¹

¹University of Sheffield, ²Sheffield Hallam University

Introduction: Community-based 5k running/walking events run by volunteers ("parkruns") are a rapidly growing phenomenon with over 1200 people participating each week in Sheffield, over 100 000 across the UK. Individuals living in less affluent areas are known to be less likely to participate, suggesting that better understanding is needed of what makes events accessible to those from poorer neighbourhoods if there is to be a positive impact on inequalities in physical activity and associated wellbeing. This study explored differences in participation and factors that affect participation across the five Sheffield parkrun events.

Methods: We collected information from routine data sources, from the event websites and from social media and conducted structured observations at five events at different locations across the city. The findings were combined to identify similarities and differences between the different events which might explain significant differences in numbers and characteristics of participants across events.

Results: Index of multiple deprivation was a major predictor of attendance, with attendance varying from 584 (most affluent location) to 63 (most deprived location). Men outnumbered women (57% versus 43%) and ethnic diversity was low across all events. Significant differences in participant experience were observed between the larger and smaller events in terms of the competitive ethos, degree of anonymity, sense of community and social engagement.

Conclusion: Current efforts to increase access to opportunities for physical activity in deprived communities need to address ways to attract more participants whilst preserving the perceived benefits of smaller events that promote community ownership and engagement.

Insufficient physical activity and ageing: a longitudinal multilevel study of the influence of neighbourhood disadvantage, individual-level socioeconomic position, and health

Gavin Turrell¹, Nicola Burton², Billie Giles-Corti³, Jerome Rachele⁴, Nancy Pachana⁵, Wendy Brown⁵

¹Deakin University, ²Griffith University, ³RMIT University, ⁴The University of Melbourne, ⁵The University of Queensland

Introduction: Insufficient physical activity (IPA) is a threat to healthy ageing. Cross-sectional studies show that residents of disadvantaged neighbourhoods and individuals from low socioeconomic groups are more likely to be insufficiently active. At present, little is known about change in IPA as people age, or whether any changes are socioeconomically patterned, or moderated by health status: this study investigates these issues.

Methods: Data were collected from 11,035 participants in the HABITAT cohort (Brisbane, Australia) in 2007 (age 40-65), 2009, 2011, and 2013 (age 45-70). IPA was self-reported and defined as <150 minutes/week. Neighbourhood disadvantage was measured using a census-derived index, individual-level socioeconomic position was measured using education, occupation, and household income, and health was self-rated. Data were analysed using mixed-effects logistic regression.

Results: At baseline, 42% of respondents were classified as doing IPA; the probability increased significantly with age, most notably for older persons (60+ in 2007). The odds of IPA were significantly higher for those: with low education; in blue collar work; in low income households; and in disadvantaged neighbourhoods. Rates of age-related increases in IPA were highest for residents of disadvantaged neighbourhoods and those from low income households. Health status explained between 5% and 36% of the socioeconomic differences in the odds of doing IPA.

Conclusions: During mid- and older-age, the likelihood of doing IPA is greatest for low socioeconomic groups, in part due to their poorer health. Policies and interventions that prevent age-related increases in physical inactivity, especially among the socioeconomically disadvantaged, should be a priority.

Mugiment-gipuzkoa: Analysing equity policies in the field of sport at the local level.

Iñaki Iturrioz¹, Unai Asurmendi², Juan Aldaz³, Joseba Zalacain⁴, Arantza Mendieta⁴, Ibai Saavedra

¹Gipuzkoa's Provincial Sport Council, ²Gipuzkoa's Provincial Sport Council, ³University of Basque Country, ⁴SIIS Documentation and Studies Center, ⁵Pasaia's Town Council

Introduction: Participation in physical activities is linked to socioeconomic factors such as income and educational level, employment, age, gender or belonging to minorities. One of the goals of the Mugiment-Gipuzkoa program is to challenge the equity policies that are being applied in the area of sports by local entities.

Method: A state of the art review has been carried out related to "groups in situation of socioeconomic exclusion" following the definition of WHO, in the field of sports.

A baseline framework has been extracted and served as the basis for a fieldwork through which, by means of a structured interview to the professionals in charge of the sports area of Gipuzkoa town councils of more than 2,000 inhabitants, a total of 44. The municipalities with fewer than 2,000 inhabitants have been recruited zonally in 4 discussion groups.

Results: The local sports sector has been provided with a framework to deal with main problems of inequity. A descriptive diagnosis has been made concerning equity policies that are being applied by municipalities on school sports, access to services and facilities, physical activity programs and regulations. As a result of collaboration between sectors, physical activity variables have been introduced in the Poverty and Social Inequalities Survey.

Conclusion: The development of a conceptual framework and a diagnosis of the situation on equity policies in the local sports sector helps to highlight inequity and places it on the agendas of policy makers.

The role of KidSport funding in supporting children's participation in sport and physical activity in Nova Scotia, Canada

John C. Spence¹, Christa Costas-Bradstreet², Nick Holt¹

¹University of Alberta, ²CCB Consulting

Introduction: KidSport is a national not-for-profit organization that provides financial assistance (approx. \$350 CDN) for registration fees and equipment to Canadian children aged 18 years and under living in low income so that they can participate in sport. However, little information is available on the effects of this program. The purpose of this study was to

evaluate parents' perspectives on the barriers and opportunities associated with receiving funding from KidSport.

Methods: Using a purposeful sampling strategy, 14 parents of families that had received KidSport funding were recruited in Nova Scotia, Canada. After providing consent, the parents participated in a 60-minute face-to-face semi-structured interview about barriers to participation, their children's experiences in sport, and their thoughts on KidSport. The interviews were transcribed and subjected to a thematic analysis.

Results: The dominant theme around barriers was related to costs (e.g., programs, transportation). Thus, in the absence of KidSport funding, parents stated their children would not be able to engage in sport. Provision of funding also contributed to a sense of independence and well-being for both the children and parents. Finally, regardless of their own financial situation, parents did not want to receive additional funding if that meant other families would go without.

Discussion: KidSport funding appears to play a critical role in supporting sport participation for children living in low income in Nova Scotia. Furthermore, such funding contributes to family well-being and therefore should be considered as a feature of policies to promote public health more broadly.

External funding details: Funding provided by KidSport Canada

Oral ePosters

Theme: Behaviour Change

Monday 15 October

Bella Mossa: BetterPoints' use of incentives to encourage active travel and reduce single-occupancy car use in Bologna, Italy

Hannah Bowden, BetterPoints Ltd

Introduction: BetterPoints is an evidence-led health, sustainability and social behaviour change technology company. With local mobility authority SRM we ran a six-month EMPOWER-funded programme in Bologna. Bella Mossa aimed to reduce congestion, improve air quality and encourage healthy activity & wellbeing using a smartphone app and incentives. Bella Mossa was 'health by stealth', a transport activity, with the desired outcome of lower car use, bringing significant health benefits.

Method: Participants tracked public transport, cycling, walking and car-sharing journeys using the BetterPoints app, earning BetterPoints for active/sustainable travel. BetterPoints can be converted vouchers or donated to charity. Non-monetary incentives (medals, team challenges and prize-draws) added interest and competition.

Journeys were verified by sophisticated algorithms and OpenStreetMap data. In-app baseline/end of programme surveys allowed comparison of self-reported activity levels and travel habits and demographic data.

Travel behaviour change was assessed in three ways:

- Quantitative – tracked journey data
- Qualitative – self-reported via baseline and end of programme survey
- In-context self-report – responses to in-app question 'did this journey replace a car journey?'

Results:

- 24,428 users tracked 816,139 active/sustainable trips, potentially saving 700+ tonnes CO₂
- 89% of self-identifying 'everyday' car users demonstrated behaviour change with 81% of their active/sustainable journeys replacing car journeys.

Conclusion: We'll consider conclusions and questions arising around the potential for incentivising travel and health behaviour change using gamification and rewards. We'll also discuss the health benefits inferred from the results of the programme and look at how gamification features can be further applied to achieve positive behavioural change for specific health outcomes.

Effects of a tailored print communication and SMS text-messaging intervention on physical activity and health Risk: The South African National Educator Wellness Study (SA-NEWS)

Lester Joseph¹, Vicki Lambert², Tracy Kolbe-Alexander³, Catherine Draper², Faith Kumalo⁴, Kirsty Bobrow²

¹Discovery Vitality, ²University of Cape Town, ³University of Southern Queensland, ⁴Department of Basic Education

Introduction: South African educators are at greater risk for non-communicable diseases than the general South African population. Studies

show the effectiveness of SMS text message-based interventions for weight loss, physical activity (PA), glycaemic control and hypertension management.

Aim: To compare effectiveness of a single tailored print communication and SMS-text messaging intervention vs standard feedback following a wellness day health risk assessment in South African educators.

Methods: Schools (N=27) were randomised into intervention (INT, N=13) or control (N=14, CTL) conditions, with 571 educators presenting for baseline assessment. The INT group (n=156) received a single printed tailored letter focused on lifestyle goals and barriers, and 8 tailored, bi-directional SMS messages over 5 months. After 5 months, 59% of educators were re-tested (N=349). The "as-per-protocol" results are reported.

Results: INT resulted in a significantly greater decrease in BMI and in the proportion educators who were overweight or obese compared to CTL (8.9% vs. 1.1%, P<0.001). PA increased in both groups, with significantly more educators meeting PA guidelines in the INT group compared to CTL (112.8% vs 58.9%, P<0.001). The prevalence of hypertension was significantly reduced in INT vs CTL groups (P<0.001).

Conclusion: A potentially scalable, tailored print communication and SMS text messaging intervention may be more effective for changing physical activity health risk behaviours, than standard feedback following health risk assessment in an "at risk" group such as South African educators.

External funding details: Discovery Vitality Pty (Ltd), National Research Foundation of South Africa, South Africa Department of Basic Education for funding and support

How a nature integration approach involving refugees, migrants and indigenous people in Sweden contributes employment skills but also to physical activity and broader wellbeing

Anna Maria Pálsdóttir¹, Azadeh Shahrad², Liz O'Brien³

¹Swedish University of Agricultural Sciences, ²Shahrad, ³Centre for Ecosystems, Society and Biosecurity Forest Research

The integration of migrants into different societies has become an important topic in recent years, particularly due to the influx of refugees and asylum seekers into Europe from Syria and Africa. A partnership between the Swedish Public Employment and Swedish Forestry Agency is using a nature integration approach to bring together refugees and migrants as well as long term Swedish unemployed to participate in a year-long vocational trainee programme. The programme provides training in and nature conservation skills for all the participants and lessons in the Swedish language for the migrants. An evaluation of the programme is exploring whether it has brought about changes in general health, physical activity, self-efficacy and nature connectedness through a survey based approach at baseline and two follow up points in the programme. In-depth case study interviews are exploring the impacts of the programme on wellbeing, changes in behaviour, participant's attachment to place, and to what extent there has been integration between the Swedes and migrants via their nature conservation activities. Final results from the evaluation will be presented, preliminary results suggest that the Swedes are gaining an understanding of other cultures and the migrants are learning the Swedish language as they work alongside the Swedish unemployed.

External funding details: The study funded by Swedish Public Employment Service and Swedish Forestry Agency.

Improving the synthesis and reporting of behaviour change interventions: The Human Behaviour-Change Project

Emma Norris¹, Marta M. Marques¹, Ailbhe N. Finnerty¹, Alison Wright¹, Marie

Johnston², Robert West¹, James Thomas¹, Michael P. Kelly³, Susan Michie¹

¹University College London, ²University of Aberdeen, ³University of Cambridge

Purpose: Behaviour change interventions are complex, covering a large variety of techniques, delivery, exposures, contexts, behaviours and mechanisms of action. Reporting of such interventions varies greatly in quality. There is a need to synthesise this complex body of evidence to enable large-scale impact on behaviour change.

Aims: The Human Behaviour-Change Project (HBCP) is bringing together behavioural scientists, computer scientists and system architects to synthesise the evidence on behaviour change, including physical activity interventions. This project aims to advance our understanding of what works in behaviour change. Physical activity and tobacco use are the first behaviour types being addressed.

Method: 1) Develop an 'ontology' of behaviour change interventions: a structure of organised knowledge using a set of unified terms for entities and the relationships between them. We are using extensive literature reviews, annotations of published papers and expert consensus to generate this. 2) Use this ontology to build an Artificial Intelligence system to scan relevant literature, extract key information and synthesise it. 3) Develop an online, open-access user interface to interrogate this knowledge base.

Results: We have developed the top level of the Behaviour Change Intervention Ontology, containing 21 entities and 24 relationships. We are currently developing all sub-level entities of the Ontology. Tools for annotating, scanning and extracting published literature related to behaviour change are also being developed.

Conclusions: This work will allow researchers, policy-makers and practitioners to answer specific questions about physical activity behaviour change, aiming to inform international intervention and strategy development.

External funding details: Wellcome Trust Collaborative Award (201,524/Z/16/Z).

Learning from cross-sector approaches to increasing walking among adults in the London Borough of Hackney

Damani Goldstein¹, Dominique Humbert¹, Darren English¹, Kristoffer Backer-Rowley¹, Daniel Ward²

¹London Borough of Hackney, ²Public Health England

Hackney Public Health and Transport teams identified walking as a priority; to reduce physical inactivity among adults, and shift short journeys from by car to on foot. A cross council team developed social marketing interventions, complemented by personalised travel planning (PTP).

Walking potential analysis identified areas and groups with the largest numbers of 'switchable trips'. The campaign promoted brisk walking; encouraging active travel, download of the Active 10 walking app, and participation in walking groups. Campaign promotion was implemented through locally developed out of home posters; a revamp of the Council walking webpage; and digital advertising targeted to mobile devices. These interventions were complemented by PTP advisors engaging with households in target areas.

Results included:

- Campaign posters on billboards around Hackney
- Posters in libraries, job centres, local hospital, GP practices, and pharmacies
- Hackney walking campaign adverts displayed on almost 200,000 mobiles, generating 1,317 clicks to Hackney walking page
- From March-July 2017, unique page views on the Hackney walking webpage more than trebled, compared to previous year
- PTP advisors engaged with 485 households, with 4% increase in walking mode share, and 9% increase in active travel trips to targeted destination
- 652 people in Hackney used the PHE Active 10 app during the campaign period, spending 15,703 hours walking, including 3,842 hours brisk walking
- No change in signups to walking groups

Cross sector working between Public Health and Transport enriches approaches to increase physical activity. National campaigns can be tailored and amplified at local level. Further focused work with inactive groups planned.

Qualitative analysis of real-time motivations, facilitators, barriers and strategies for physical activity behaviour during pregnancy

Judith Jelsma, Mireille van Poppel, Frank Snoek, VU University Medical Center

Introduction: Adopting physical activity during pregnancy among overweight women is both a window-of-opportunity but may also be particularly demanding. We aimed to acquire insight into real-time motives, barriers, facilitators and strategies.

Methods: In the European DALI-study pregnant women (BMI ≥ 29 kg/m²) received a behavioural lifestyle intervention addressing healthy eating and/or physical activity. It consisted of five face-to-face sessions with a personal lifestyle coach trained in motivational interviewing. Face-to-face sessions of 26 Dutch participants were audiorecorded and transcribed verbatim (n = 73 sessions). The data was analysed with AtlasTi7 and examined using the Social Ecological Model.

Results: Women were motivated because of benefits for their baby (related to both healthy pregnancy and normal delivery), and to feel good, healthy, fit and energized themselves. Facilitators comprised social support/companionship; fun; available equipment (e.g. pedometer created awareness); work. However, women expressed many pregnancy-related barriers, especially fatigue, physical complaints (e.g. lower back pain, pelvic pain), and anxiousness about risks and dangers for their child. In addition, their growing belly prevented them to be physically active. Lack of time, prioritising other activities above physical activity, weather situation and lack of social support/companionship were mentioned as well. Strategies comprised incorporation of more physical activity in daily life activities (e.g. walking to work, taking the stairs), and alteration to more pregnancy suitable activities (e.g. swimming, walking).

Discussion: Compared to recall interviews this research method comprises a more accurate representation of the actual struggles and solutions women made. The results could stimulate making behavioural changes and inform future health interventions.

External funding details: EU-FP7

Smoking and objectively assessed physical activity among young adults

Melissa Napolitano¹, Meghan Mavredes¹, Samuel Simmens¹, Jessica A Whiteley², Laura L Hayman², Loretta DiPietro¹

¹The George Washington University, ²University of Massachusetts-Boston

Introduction: Tobacco use and physical inactivity are lifestyle behaviors associated with chronic disease. Assessment and intervention for health risk behaviors among young adults (18-35yo) have received comparatively less attention than other life stages.

Method: Young adults at two urban universities (N=460; %female = 78.5%; %Caucasian = 55.9%; Mage = 23.3 + 4.4; MBMI = 31.3 + 4.4) enrolled in a healthy body weight randomized clinical trial completed baseline assessments including objective physical activity monitoring (ActiGraph) and smoking status. Smoking categories were created: never smoked, experiment, regular (> 5 lifetime packs). Analyses of covariance were conducted to examine the relationship between smoking and two outcomes (MVPA, %time spent in different intensities of activity), controlling for BMI.

Results: The sample averaged 38.3 + 24.7 minutes of MVPA daily; 60% were never smokers, 30.9% were experimenters and 8.10% were regular smokers. The interaction between smoking and sex ($p < .001$) showed male experimenters being most active (54.0 + 28.2 min) and regular smokers being least active (35.5 + 33.0 min), with no differences for females. However, compared with their male counterparts, female experimenters were significantly less active (38.6 + 24.8 min). Significant effects were found for %time spent in moderate ($p < .001$) and vigorous activity ($p < .01$) with experimenters having more time compared with never smokers.

Conclusion: The intersection of smoking experimentation and physical activity behavior is of high public health importance. Given the sex differences in substance use and activity, additional surveillance is critical. Future interventions, including public health messaging and social marketing to educate young adults, are warranted.

External funding details: Supported by: US NIH Grant R01DK100916 (Napolitano-PI)

Using nudges to reduce sedentary behaviour: A pilot intervention

Nicola Eccles, Kiara Lewis, The University of Huddersfield

Traditional interventions which focus on educating or 'motivating' individuals to increase activity levels have been largely ineffective. The concept of altering the space in which we live, to enhance health behaviour, has been the focus of recent inactivity research. Point of decision prompts or nudges are a simple, cost effective, immediate aspect of altering the environment. However, we know very little about how or why they work, and how to create effective prompts.

The 'Environmental Nudges' project, designed to increase movement and understand more around how individuals interact with prompts, was implemented in three sites across the North of England. The nudges took a two-phased approach, the first classed as 'subliminal' and the second as 'call-to-action'. Pre and post intervention focus group data (N.18) and questionnaires (N.101) underlined the immense pressure respondents perceive they are under. The daily struggle endured by many meant physical activity was considered as stressful and requiring intense motivation, therefore rejected as a leisure activity. Individuals knew they should be active indicating that education is not the issue. The 'Environmental Nudges' intervention was considered effective by participants as the prompts allowed autonomy. Individual choice, responsibility and possibility were successful features of the prompts. Further work could refine a two-phased nudge approach as some participants were uncertain about the 'subliminal' element. Individuals demonstrated very sedentary daily patterns underlining the pressing need for employers to utilise the working day to increase activity.

This pilot intervention was supported by: Heart Research UK; Kirklees Public Health; The University of Huddersfield.

VAMOS program: Technological innovation for behaviour change in the Brazilian unified health system

Tânia Bertoldo Benedetti¹, Cezar Grontowski Ribeiro², Camila Tomicki², Paula Sandreschi², Sofia Manta², Paulo Souza², Lisandra Konrad²

¹Federal University of Santa Catarina, ²Federal University of Santa Catarina - PPGEF

The use of technologies in health contributes to the expansion of public policies opportunities for an active and healthy lifestyle. The aims to present the new version of the "Vida Ativa Melhorando a Saúde" (VAMOS - Active Life Improving Health) program for establishment in the Brazilian Unified Health System. VAMOS is a program which motivates people to have a healthier lifestyle in regards to physical activity and nutrition. It was developed in 2012 and consists of 12 sections performed over a period of three months. The method of evaluation used focus groups and interviews with participants, multipliers and health managers. In 2017 the structure of the program was re-elaborated and a few changes regarding definition of themes and objectives, development of contents and activities and design and validation by a group of experts were carried out. The new version is available in both presentational and online versions with 18 sections to be completed in nine months. The contents are: concepts, benefits, types, obstacles, time management, activity monitoring, social support, obesity, stress, health risks, diseases, good practices, relapses, opportunities, motivation and healthier lifestyle maintenance. Each section includes front page, title, welcoming, summary of the previous section, review of the task, content and activities, tips, summary of the current section and goal setting. The new design is based on the original visual identity of the program. VAMOS is an innovative technology with potential to be used in the Brazilian Health System as a strategy to behavior change to physical activity and nutrition.

Weighing the evidence linking sedentary behaviour to poor health

Katrien Wijndaele¹, Charles Matthews²

¹MRC Epidemiology Unit; University of Cambridge, ²Metabolic Epidemiology Branch; Division of Cancer Epidemiology and Genetics; National Cancer Institute

Research investigating the adverse effects of sedentary behaviour on health in adulthood has accumulated rapidly in the last decade, particularly in relation to mortality outcomes, cardio-metabolic diseases, and more recently cancer. This evidence has come from observational epidemiology, human intervention trials, and studies focused on the biological/molecular mechanisms responsible for these adverse effects. The totality of this diverse set of information forms an evidence-base with the potential to support (or not) broader public health and health policy initiatives designed to reduce sitting time in favour of more physically active pursuits. This presentation will describe common approaches to weighing the evidence and describe selected disease outcomes that have a lot, or only a little, evidence for an adverse effect of prolonged sitting time on health. For example, while much is known about the relationship between sedentary time and mortality, less is known about the range of lower intensity activities that may offset the adverse effects of too much sitting. Furthermore, available evidence linking sedentary behaviour to of less studied health outcomes, such as increased risk of functional limitations or poor quality of life, is more limited. The overarching goal of this presentation is to outline common approaches to weighing the evidence in hopes that future research can be directed to high value targets in the growing evidence-base that may facilitate translation of the research findings into future public health efforts to reduce sitting time, increase physical activity and improve health.

Tuesday 16 October

Are physical activity trajectories from childhood to midlife related to smoking trajectories? The Young Finns Study

Kasper Salin¹, Mirja Hirvensalo¹, Anna Kankaanpää², Irinja Lounasalo¹, Xiaolin Yang², Costan Magnussen³, Nina Hutri-Kähönen⁴, Olli Raitakari⁵, Tuija Tammelin²

¹University of Jyväskylä, ²LIKES Research Centre for Physical Activity and Health, ³University of Tasmania, ⁴University of Tampere, ⁵University of Turku

Despite substantial interest in the development of health behaviors, there is limited research that has examined the longitudinal relationship between physical activity (PA) and smoking trajectories from youth to adulthood. This study aimed to identify trajectories of smoking and PA for males and females, and study the relationship between these trajectories from youth to adulthood.

Latent profile analysis was used to identify trajectories of smoking and PA separately for males and females among 3,355 Finnish adults (52.1% females). Participants' smoking and PA were assessed five to eight times over a 31-year period (3-18 years old at the baseline, 34-49 years at last follow-up). Latent transition analysis was fitted to the data to study relationship between the trajectories of smoking and PA.

Five smoking trajectories and four PA trajectories were identified for males and females. Of the PA trajectory groups, the persistently active group were least likely to follow the trajectories of regular smoking and the inactive and low active groups were least likely to follow the rare or non-smoking trajectory group. Likewise, inactive (women only) and low active groups were less likely to belong to rare or non-smokers group.

Study suggests that increasing and maintaining PA from youth to adulthood may be in association in preventing and reducing the harmful use of both persistent and increasing smoking.

External funding details: This work was supported by Finnish Cultural Foundation and Ministry of Education and Culture (Major, grant number: 83/626/2014). CGM is supported by a National Heart Foundation of Australia Future Leader Fellowship (100849).

Are spectators at mass participation events inspired to increase their physical activity?

Roshan Gunasekera¹, Elton Chawatama¹, Ted Caplan², Courtney Kipps³

¹University College London, ²Bristol University, ³Institute of Sports Exercise and Health, University College London

Introduction: It has been suggested that Mass Participation Events (MPEs) may inspire individuals to increase their Physical Activity (PA). This study aims to establish whether spectators who are inspired by attending a MPE increase their PA.

Methods: Adult spectators at 7 Half Marathons (HMs) during 2016 were invited to participate in the study. Self-reported PA levels in three domains (work; travel and recreational PA), inspiration and behaviour change, according to the Transtheoretical Model (TTM), were collected using a validated questionnaire. Follow-up questionnaires were emailed to participants at 2 and 12 months.

Results: 190 spectators completed the initial questionnaire. The follow-up rate was 42% and 28% at 2 and 12 months respectively. 63% of participating spectators reported being inspired during the event, however there were no significant changes in PA levels at either follow-up point and there were no significant differences in PA between inspired and uninspired participants. No significant change was seen from individuals

evolving out of pre-contemplation stage in the TTM. The most commonly cited barrier to PA was lack of time (N=82), and correspondingly participants valued more free time as the most common potential motivator to increasing PA (N=40).

Conclusion: Participants in this study reported being inspired by spectating at a MPE however their overall PA levels did not change at 2 and 12 months follow-up. The application of the TTM to the study revealed that attitudes to PA evolved but the follow-up numbers were insufficient to reveal a significant result.

Building smartphone “apps” for lifestyle behavior change in clinical populations

Kristina Hasanaj¹, Nicole Hoffman¹, Meynard L. Toledo¹, Sarah L. Mullane¹, Miranda L. Larouche¹, Kevin Hollingshead¹, Carl Stepnowsky², Dana R. Epstein¹, Peter Reaven³, Lois E. Krahn⁴, Megan E. Petrov¹, Matthew P. Buman¹

¹Arizona State University, ²University of California, San Diego, ³Phoenix Veterans Affairs Health Care System, ⁴Mayo Clinic School of Medicine

Introduction: Lifestyle-based behavior change approaches are difficult to deliver given high cost and complexity in overburdened clinical environments. mHealth approaches may address some challenges by extending care beyond the clinical setting and providing real-time, objective self-monitoring strategies. Our team developed two clinically focused, lifestyle smartphone applications (“apps”). BeWell24, focuses on lifestyle behavior change in at-risk adults. SleepWell24, focuses on increasing positive airway pressure (PAP) therapy adherence through self-management. Both apps incorporated lifestyle change strategies across the 24 hours (i.e., sleep, sedentary time, physical activity, diet).

Methods: The smartphone app development was based on evidence-based strategies, expert opinion, and stakeholder feedback. A community-embedded iterative design framework was used to collect stakeholder feedback from clinical providers (n=22) and target users (n=10). This feedback was incorporated during all development phases and incorporated think aloud activities, focus groups, individual interviews, and short-term use studies.

Results: Feedback from providers and target users yielded apps tailored to clinical environments including objective feedback, features to enhance patient-provider communication, and a platform conducive for integration into the electronic medical record. Cloud-based linkages were established with wearable technologies to enhance self-monitoring (e.g., activity monitors, PAP machine). Components were designed to provide knowledge and tools to understand and effectively incorporate healthier habits.

Conclusion: Stakeholder feedback is a necessary component to the development of evidence-based smartphone interventions and should employ iterative design methods to ensure integration into the clinical setting.

External funding details: National Institute of Health: R18DK109516, R21NR016046; Virginia G. Piper Charitable Trust.

Common perceived barriers and facilitators for reducing sedentary behaviour among office-workers

Carla Nooijen¹, Lena Kallings¹, Victoria Blom¹, Örjan Ekblom¹, Yvonne Forsell², Maria Ekblom¹

¹Swedish School of Sport and Health Sciences, ²Karolinska Institutet

Background: Qualitative studies identified barriers and facilitators associated with office work-related sedentary behaviour. The objective of our study was to determine the most common barriers and facilitators among

office-workers, to assess subgroup differences and describe time spend sedentary in- and outside the workplace.

Methods: Cross-sectional study among 547 Swedish office-workers (median age: 41 years (IQR = 35-48), 65% women, 66% highly educated). Perceived barriers and facilitators were evaluated using questionnaires, and subgroup differences in age, gender, education and sedentary behaviour assessed with ²-tests. Sedentary behaviour was measured for 7 days using inclinometers (n = 311).

Results: The most frequently reported barrier was: sitting is a habit (67%), which was reported more by women than men ($\chi^2 = 5.14$, $p = 0.03$) and by highly sedentary office-workers ($\chi^2 = 14.63$, $p < 0.01$). The two other most reported barriers were that standing is uncomfortable (29%) and tiring (24%). Facilitators with most support were introduction of either standing- or walking meetings (respectively 33% and 29%) and more possibilities or reminders for breaks (31%). The proportion spent sedentary was 64% at the workplace, 61% on working days and 57% on non-working days. The proportion overall standing was 28%

Conclusions: This study provides a detailed understanding of sedentary office-worker's ideas about sitting and means to reduce sitting. The identified subgroup differences in perceived barriers and facilitators stress the importance of tailored interventions and individualized support in order to reduce sedentary behaviour more effectively. Based on these results we developed an intervention of which we are currently studying the effectiveness in a large longitudinal randomized controlled trial.

Does a confident physical activity facilitator need to be 'sporty'? A survey of Slimming World behaviour change facilitators

Laura Holloway, Jacqui Lavin, Sarah Bennett, Slimming World

Background: Slimming World (SW) offers a multi-component approach to weight management, encouraging healthy eating and gradual increases in physical activity, alongside support from group behaviour change facilitators (Consultants). All Consultants have experienced being overweight and losing weight themselves, without necessarily increasing physical activity. This research explored whether Consultants' own interests and abilities in physical activity/sports impacted attitudes and confidence towards supporting SW members in becoming more active.

Methods: SW Consultants were invited to complete a survey investigating attitudes towards physical activity/sports, and supporting members in increasing physical activity.

Results: Presently, 498 Consultants have completed the survey.

Preliminary findings indicate that 77% consider themselves physically active, but 48% of these (58% overall) don't consider themselves 'sporty'. 96% feel activity is important for health, 93% feel it improves mood and 64% have made activity habitual.

Of the 58% who aren't 'sporty', most still feel knowledgeable (82%), confident (80%), motivated (75%), proud (75%) and determined (71%) in supporting members with their activity goals. Despite not being 'sporty', most aren't embarrassed (80%) nor worried (72%) about supporting/encouraging physical activity.

15% report being inactive themselves, yet 83% are still confident in offering support.

Conclusion: Findings indicate that many SW Consultants consider themselves physically active, but not sporty, yet are still able to confidently support others in becoming more active. Even those not very active themselves are generally confident in supporting others. A non-sporty approach may be a feasible method of facilitating physical activity increases, particularly for those who find the prospect of physical activity daunting.

Effectiveness of the VAMOS strategy for physical activity and nutrition: a randomized controlled community trial

Tânia Bertoldo Benedetti¹, Simone Meurer², Aline Lopes³, Giovana Mazo⁴, Fabio Almeida⁵

¹Federal University of Santa Catarina, ²Federal Institute of Minas Gerais, ³Federal University of Minas Gerais, ⁴State University of Santa Catarina, ⁵University of Nebraska Medical Center

Introduction: The VAMOS strategy, an educational intervention addressed in the present study, was found to be promising in promoting PA and mental health among elderly Primary Health Care (PHC) users in Florianopolis, Santa Catarina, Brazil.

Purpose: This study aimed to evaluate the effectiveness of the VAMOS strategy (Health-Improving Active Life) in improving physical activity (PA), dietary habits, and anthropometric variables of Primary Health Care (PHC) users in Brazil.

Methods: A randomized controlled community trial was conducted at two units of the Health Academy Program (HAP, a service provided by PHC), which were randomly assigned to the control group (CG) and to the intervention group (IG). The participants in the two groups (CG = 156 and IG = 135) underwent physical exercises provided at the HAP facilities and those in IG also participated in the VAMOS strategy for 12 weeks. Physical activity was measured with accelerometers and nutritional status was assessed using dietary habits questionnaires and anthropometric measurements.

Results: Intention-to-treat analysis revealed that participants in IG increased the daily time of moderate-vigorous PA and the frequency of raw vegetable intake, while the intake of ultra-processed foods was reduced. However, no changes in anthropometric variables were observed.

Conclusions: The VAMOS strategy was effective in increasing PA and healthy dietary habits among PHC users. Therefore, VAMOS is suggested as a complement to PHC activities in order to strengthen the autonomy of users regarding their health.

External funding details: PPSUS/FAPESC/2014/TR/2263 and CNPq.14/2012 A. N. 475075/2012-9

Meta-analysis of broad-reach physical activity interventions for cancer survivors (2013-2017): We still haven't found what we're looking for

Jeff Vallance¹, van Harten Wim², Wim Groen²

¹Athabasca University, ²The Netherlands Cancer Institute

Introduction: Physically active cancer survivors have a reduced risk of cancer recurrence and mortality. There is a need to develop and evaluate effective physical activity interventions that employ distance-based, broad-reaching (i.e., non face-to-face) approaches. The primary objective of this study was to conduct a meta-analysis of broad-reach physical activity behavior change interventions (from 2013 to 2017) for cancer survivors.

Methods: PubMed and Embase databases were searched from May 2013 up to October 2017. Studies met the following criteria if: 1) they included post diagnosis adult cancer survivors, 2) the intervention was distance-based with no more than one face-to-face visit or contact, and 3) physical activity was measured pre and post intervention. Review Manager 5 (RevMan 5) software was used to conduct a meta-analysis on all RCTs that presented self-reported moderate-to-vigorous intensity physical activity (MVPA) pre and post intervention means and standard deviations.

Results: Data from 13 RCTs (16 comparisons) were included. Overall, studies were found to be of moderate quality. Excluded studies did not

provide MVPA data. The analysis was based on 3,350 patients (1,675 for both intervention and control). These interventions resulted in a small overall effect (standardized mean difference) of 0.19 (95% CI 0.07, 0.30), which was significant ($Z=3.26$, $p=0.001$). There was significant ($p=0.002$) and moderate heterogeneity ($I^2=58\%$) across the included trials.

Conclusions: As changes in physical activity are generally small, relying on the present content of broad-reach programs aiming to facilitate physical activity in cancer survivors may not be prudent.

Systematic review registration: PROSPERO CRD42017080252

Nature-based programmes for health and wellbeing in vulnerable groups: findings from evaluative research

Jo Barton¹, Mike Rogerson¹, Valerie Gladwell¹, Jules Pretty¹, Dominic Higgins²

¹University of Essex, ²Wildlife Trusts

Introduction/Background: We present findings from a number of nature-based health and wellbeing programmes for vulnerable groups, such as individuals experiencing low mental wellbeing (Wildlife Trusts), youth at risk (Wilderness Foundation UK), and older gentlemen experiencing dementia (Future Roots).

Method: Primary focus will be on findings from a study on the participation of 139 individuals in Wildlife Trust projects between February 2016 and February 2017. This study assessed changes in participants' attitudes, behaviour and mental wellbeing over the course of 12-weeks as a result of taking part in nature conservation volunteering programmes run by five Wildlife Trusts across the North, Midlands and South West of England.

Results: The principle finding was that participants' mental wellbeing improved to a statistically significant extent over the 12-week period, and that improvements were greatest for individuals who were new to the projects. Proportion of participants reporting low wellbeing (compared to UK norms) fell from 39% at baseline to 19% at 12-weeks. Participants also reported enhanced levels of positivity, health, nature relatedness, pro-environmental behaviour, levels of physical activity, and increased contact with greenspace.

Conclusion: Attending Wildlife Trust volunteering programmes facilitates health and wellbeing improvements particularly for people with low levels of wellbeing. This has important implications for reducing the current NHS burden, by offering complimentary non-medical services to promote health and wellbeing. Evaluative methodological issues are addressed and findings from nature-based health and wellbeing programmes for vulnerable groups are discussed in relation to theory.

Shaping an environment, shapes our minds: The Care About Physical Activity (CAPA) programme, a qualitative piece on promoting movement change in care services for older people

Alex Lucas¹, Matthew Wade¹, Steven Mann², James Steele¹

¹ukactive, ²Places for People Leisure

Background: In 2016 the Care Inspectorate was commissioned by the Scottish Government to deliver the CAPA improvement programme, which aims to promote and increase the movement levels of those in care. This study looks to understand factors that link environmental culture change of care services with the movement behaviour change of older people in care.

Methods: Focus groups were/will be conducted at two time points in October 2017 and April 2018, with a minimum of 11 social care professionals and 15 care residents, across Scotland. Data was combined with

anecdotal evidence and was collectively analysed through thematic content analysis.

Results & Discussion: Preliminary results suggest the environmental culture of the care home influences the extent to which movement is prioritised and embedded within the service and how often older people engage in movement. Two overarching themes were found to influence the culture change of care environments; staff/management 'buy in' (e.g. staff/management attitudes and perceptions) and environmental economics (e.g. routine and space changes in the care home). Theming indicated that a top-down approach to integrating movement into a care environment is most successful. This involves the active buy in of staff/management to integrate movement into their everyday tasks, priorities and the physical care home environment. Collectively, these cultural changes can influence the extent to which older people change their movement behaviour.

Notes: As an ongoing project results and discussions are likely to develop due to the continuous collection of anecdotal evidence and future planned focus groups.

External funding details: Funded by the Care Inspectorate

The importance and status of global sedentary behaviour surveillance

Katrien Wijndaele¹, Andrew J Atkin²

¹MRC Epidemiology Unit; University of Cambridge, ²School of Health Sciences, University of East Anglia

Driven by significant and sustained growth in research activity over the last twenty years, sedentary behaviour has risen in prominence as a potential risk factor for chronic disease morbidity and mortality, capturing the attention of policy-makers and mainstream media. Surveillance of sedentary behaviour is required to establish the scale of the burden on public health, to inform priority-setting and public policy, and monitor changes in prevalence over time. In partnership with the Global Observatory for Physical Activity (GoPA), the Sedentary Behaviour Council (SBC) is undertaking a project to collate global data on prevalence, surveillance, research and policy activity as it relates to sedentary behaviour. The GoPA-SBC Sedentary Behaviour Global Monitoring Initiative will be delivered over a number of phases and build upon the GoPA Country Card project methodology. In this presentation, the methods and preliminary results of phase 2 will be presented, which focussed on the collation of sedentary behaviour prevalence/descriptive metrics (Total sitting time, TV viewing) and documentation of surveillance activities across the 6 World Health Organisation regions (Africa, Americas, South-East Asia, Europe, Eastern Mediterranean, Western Pacific). Data will be identified through internet and PubMed keyword searches and by communication with GoPA Country Card contacts in each available country. The protocol for this phase of the project is currently in development, with data collation scheduled to begin in January 2018 and completion due by Autumn 2018. Challenges in data collation and synthesis will be discussed.

Theme: Cross-sector Working

Monday 15 October

A whole systems approach to tackling inactivity across Derby: the contribution of Derby a city on the move

Debra Richardson¹, Mark Faghy¹, Harry Rutter², Nick Cavill³, Chris Bussell¹

¹University of Derby, ²London School of Hygiene and Tropical Medicine, ³Cavill Associates

Introduction: Derby a City on the Move (DaCotM) aims to tackle physical inactivity across Derby, UK and provided impetus and focus to utilising a whole systems approach to tackling inactivity. A consortium of partners work together on the project aiming to develop understanding of the way 'systems thinking' can be translated into action, and to inform future planning across Derby City.

Methods: A baseline review focused on the consultation with partners to establish programmes, policies and datasets in place across Derby City. This was translated into a visual image of the current scenario through the use of causal loop diagrams (CLD). A progress review will be conducted later in 2018 with the CLD being revised to reflect changes and adaptations across the system.

Results: The baseline review showed that DaCotM contributes to aspects of a whole systems approach, primarily through inter-personal interventions designed to support behaviour change. It acknowledges the need to look beyond current activity recognising the significance of the built and natural environment in providing opportunities to be active and also recognising the need for further insight into social norms.

Conclusions: Recommendations for the creation of a whole systems approach have been provided specifically in relation to DaCotM and also beyond the life of the project. Derby City Physical Activity and Sport Strategy provides an opportunity to act on these recommendations and work towards a whole systems approach to tackling inactivity across Derby City.

External funding details: This work was funded through Sport England's 'Get Healthy, Get Active' funding stream 2015-2018.

Active school transportation contributes to be physically active during the journey to school

Damian Chandia, Nicolas Aguilar-Farias, Universidad de La Frontera

Introduction: Active School Transportation (AST) constitutes an opportunity for children to increase their daily physical activity (PA). However, little is known about how much AST contributes to PA during specific periods within a school day. The aim of this study was to evaluate the association between AST and PA during three sections of children's school day.

Methods: School children wore an accelerometer ActiGraph wGT3X-BT during 7 consecutive days. Children completed a question about school transportation habits (active and passive travelers), and weight and height were measured. Multilevel linear regressions were performed to assess the association between AST and total moderate-to-vigorous PA (MVPA) during the journey to school, school-hours and out-school time adjusting for gender, age, nutritional status and accelerometer wear time.

Results: 179 children (47.4% male; aged 10.2 ± 0.9 years; 64.5% overweight/obese) provided valid data. After controlling by covariates, active travelers to school during the journey to school were significantly more physically active than children who travel by car or bus (2.11 ± 0.5 MVPA min/day 95% CI 1.13-3.09; $p < 0.001$). No differences were found in school-hours (2.80 ± 1.9 MVPA min/day 95% CI -1.08-6.68; $p = 0.158$) and out-school periods between active and passive travelers (1.27 ± 2.7 MVPA/day 95% CI -4.12- 6.66; $p = 0.644$).

Conclusions: Although evidence show a substantial association between AST and overall daily PA, in this sample of Chilean children, AST was associated only with higher PA levels of the journey to school period. AST has a positive (but statically negligible) effect during daily PA during school-days and out-school time.

External funding details: Funding: FONDECYT 11160720 – UNETE 14-0008

An examination of the capacity of community bicycle coalitions

Melissa Bopp¹, Dangaia Sims², Emily Hentz-Leister¹, Nicole Vairo¹

¹Pennsylvania State University, ²PSU

Background: Bicycle coalitions serve communities in different ways, including: advocating for physical infrastructure, providing encouragement for biking, safety education and assisting with policy development, though little is known about their functioning, therefore, the purpose of this study was to examine the capacity of these organizations.

Methods: Bicycle coalitions were recruited to participate in an online survey. The survey addressed: information about the coalition, leadership, communication, priorities, and partners. Basic descriptives and frequencies examined trends.

Results: Coalitions ($n = 61$) from 4 countries completed the survey. The majority of respondents represented a city or county ($n = 26$, 46.5%), were from larger cities ($n = 30$, 53.5%) and were located in the USA ($n = 51$, 91.1%). Coalitions primarily operated as a non-profit ($n = 44$, 95.7%), 45% ($n = 21$) had paid staff as leaders; 37% ($n = 17$) had volunteer leaders. Common leadership skills were fundraising ($n = 31$, 53.4%) and event planning ($n = 31$, 53.4%). Education ($n = 21$, 46.7%), advocacy (48.9%, $n = 22$) and encouragement ($n = 17$, 37.8%) were viewed as top priorities. Safety of bicyclists ($n = 21$, 46.7%) and advocacy for infrastructure/policy ($n = 22$, 48.9%) the focus of most activities, reflected in participation in Safe Routes to School ($n = 31$, 53.4%), bike to work events ($n = 42$, 72.4%) and open streets events ($n = 21$, 36.2%). All coalitions reported using social media for communication, though most perceived that their communication strategies were not that effective. Common partners were: parks/recreation departments ($n = 37$, 63.8%), local media ($n = 34$, 58.6%) and transit organizations ($n = 28$, 48.3%).

Conclusion: Bike coalitions represent a critical partner in creating activity-friendly environments and understanding their capacity allows for creating skill/capacity building programs and toolkits.

Assessing implementation of HEPA policy at the local level for effective physical activity promotion: Report of local area policy audit tool (L-PAT) study in Japan

Noriko Takeda¹, Yukio Oida², Shigeru Inoue³, Motohiko Miyachi⁴, Fiona Bull⁵

¹Kogakuin University, ²Chukyo University, ³Tokyo Medical University, ⁴National Institute of Health and Nutrition, ⁵The University of Western Australia

Introduction: Increasing levels of health-enhancing physical activity (HEPA) will require a comprehensive policy framework from national to local levels. We tried to assess the policy for physical activity in Japan using the HEPA policy audit tool (PAT). However, we were not able to clarify the actions concerning the implementation of the local policies. Assessing whether national policy is being implemented requires a monitoring system at the local level.

Method: We developed and tested Local PAT (L-PAT) in 47 Prefectures in Japan. It comprises 11 items based on HEPA PAT covering key policy actions including presence of local action plan; implementation of the action plan; cooperation between sectors and evaluation on implementation. L-PAT was sent to local government representatives in key sectors (e.g. health, sports, urban planning and transport) in all 47 prefectures.

Results: The results indicate that the health and sports sectors are the most active sectors in promoting national HEPA policy. There is a national policy for these sectors. We need to monitor and evaluate the progress of these active plans at local level. Although the actions taken by urban

planning and transport sectors aren't covered by the national policy on physical activity, some prefectures reported local actions by those sectors which improved HEPA. Identifying and sharing good practices between local governments is important.

Conclusion: Assessing the progress, capacity and challenges of policy implementation at the local level will provide valuable feedback to the national planning process for the promotion of physical activity.

Developing a national physical activity plan of action in Oman

Huda Alsiyabi¹, Amal Alsiyabi¹, Muhssen Kanaan¹, Ruth Mabry²

¹Ministry of Health, Oman, ²Independent Public Health Researcher

Overview: Oman has experienced widespread societal changes, including rapid urbanization and a decline in physical activity (PA), which has contributed to a high prevalence of overweight and obesity and increasing prevalence of non-communicable diseases (NCDs). Health authorities' interest in promoting PA was the driving force for developing a multisectoral national plan of action (POA) to promote physical activity. The authors describe the development process and share the lessons learned.

Development Process: A series of steps took place between 2015-2017 to develop the POA. First, a situation analysis of the prevalence of physical inactivity in Oman was conducted. Second, sectoral actions promoting PA were mapped. Third, advocacy visits to key ministries were conducted to obtain commitment and identify experts for a multi-sectoral executive team. Fourth, this team drafted the POA following the guidance of the "seven best investments" to promote PA. Fifth, the draft POA was then reviewed by an international expert. Sixth, a multisectoral taskforce was then formed by the National Committee for NCDs to finalize the POA and oversee the planned activities.

Lessons Learnt: Several lessons have emerged from the Omani experience in developing the POA including: (1) a highly represented national committee creates political commitment and facilitates multisectoral collaboration, (2) sufficient knowledge about the current actions at each sector, cultural characteristics and barriers to PA in the community is critical, (3) available evidence-based approaches and best buys helps guide the planning process and (4) being patient and diplomatic when dealing with partners.

How engaged are health and sport-focused workforces in supporting physical activity promotion for individuals who are overweight or obese?

Emily Oliver, Adam Graver, Molly Owens, Durham University

Introduction and Method: Given its benefits for physical and psychological health, and contribution to weight reduction, physical activity promotion is a core strand of lifestyle-focused interventions for those who are overweight or obese. As policy increasingly seeks to engage both health and sports sectors in targeting obesity, this research examined attitudes and practices of two professional populations involved: 'Gatekeepers' (General Practitioners (GPs): n=87; 80 surgeries) and 'Deliverers' (Sport Development Officers (SDOs): n=6). The former completed questionnaires, and the latter in-depth interviews, examining attitudes towards and professional practices concerning the engagement and delivery of physical activity for obese individuals.

Results: 'Gatekeepers' predominantly agreed that activity promotion was part of their job (83%) with more engagement in activity promotion than prescription. GPs desired more relevant training (42%) and would prescribe physical activity more often if financial incentives were present (21%). Conversely, 'Deliverers' reported that obesity reduction was not a specific target, but did recognise their remit was changing. They identified

a need to improve public health sector links and to better understand new types of client. More positive attitudes and fewer anti-fat stereotypes were reported by those involved with strategy and management as opposed to those coordinating direct delivery.

Conclusion: Collectively, findings suggest both medical and sport-focused professionals are engaged in the physical activity promotion agenda for individuals who are overweight or obese, but that policy and investment is needed in training, facilitating cross-sector links, and developing relevant structures and systems for encouraging, monitoring, and reward-performance.

How to assess parental barriers towards active commuting to school in children and adolescents: A validity and reliability study of the PABACS questionnaire

Francisco Javier Huertas Delgado¹, Javier Molina-García², Delfien Van Dyck³, Palma Chillón⁴

¹PA-Help "Physical Activity for Health Promotion" research group. Teaching Centre La Inmaculada, University of Granada, Granada, Spain, ²Department of Teaching Music, Visual and Corporal Expression, University of Valencia, Valencia, Spain., ³Ghent University, Faculty of Medicine and Health Sciences, Department of Movement and Sports Sciences. Research Foundation Flanders, Brussels, Belgium, ⁴PROFITH "Promoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain

Introduction: Active commuting to school is a daily behaviour related to several health benefits in young people. Parental-perceived barriers are important to determine active commuting to school in children and adolescents. The purpose of this work was to test the validity and the reliability of a questionnaire focusing on parental barriers towards active commuting to school.

Methods: The PARENTAL BARRIERS towards Active Commuting to School (PABACS) questionnaire is comprised of 23 likert-scale items categorised into 3 scales (general barriers, walking barriers, and cycling barriers). The questionnaire was developed using the Delphi method. Internal consistency, test-retest reliability, and predictive validity of the questionnaire (scales and overall questionnaire) were examined using Cronbach's alpha, intra-class correlations, and Spearman's rho correlations. In total, 201 parents of Spanish children and adolescents completed the PABACS on two occasions with a two-week interval.

Results: Good internal consistency and a moderate test-retest reliability was found for the overall questionnaire and for the three scales. The validity to predict active modes of commuting to school was moderate for the overall questionnaire and for the general and walking scales but low for the scale assessing cycling barriers.

Conclusions: This study provides a reliable tool to assess parental barriers towards active commuting to school. The PABACS will be useful for researchers and administrations to identify the most important barriers on which institutions have to focus to increase children's active commuting to school.

External funding details: This study was supported by a grant from the Spanish Ministry of Education, Culture and Sport [CAST17/00072], and Project PACO was supported by the Spanish Ministry of Economy, Industry and Competitiveness (DEP2016-75598-R, MINECO/FEDER, UE).

Investigating the potential of e-bikes as a means of active transport

Ben Jane, Saul Bloxham, Plymouth Marjon University

Introduction: E-bikes (more specifically, the “pedelec” which only functions if the rider pedals) have been shown to elicit exercise intensities equal to those recommended in health related physical activity guidelines (Bertsen et al, 2017; Peterman et al, 2016) and have been suggested as a means of increasing physical activity in the general population (de Geus and Hendriksen, 2016). While 12% of people currently cycle for any purpose at least once a week (UK Gov, 2018), for many the perceived difficulties of cycling over hilly terrain may be a significant barrier to further increases in cycle commuting rates. E-bikes may present an opportunity to address this perception. This study set out to investigate the barriers and facilitators to e-bike usage in the SouthWest of England by engaging with a variety of potential users and identifying which aspects of behaviour change theories might best inform the future uptake of e-bikes; e.g. theory of planned behaviour, transtheoretical model, or diffusion of innovations.

Method: A combination of online questionnaires and face-to-face focus groups were conducted with the support of a number of local employers.

Results: A range of barriers and facilitators were identified with barriers including technological, social and environmental issues and facilitators being social, environmental, trialability and cost reduction.

Conclusion: E-bikes have been shown to appeal to both existing cycle users and to those who are predominantly car users. This study provides an insight into the barriers and facilitators to increased uptake of e-bikes as a means of transport.

The legally binding roles and responsibilities of Romanian local governments in HEPA promotion

Petru Sandu, Romanian Association for HEPA Promotion – HEPARO

Introduction: The importance of local governments’ involvement in HEPA promotion has been acknowledged and emphasized at European and international level. However, there is little scientific knowledge in regard to this issue. The aim of this study is to explore the legally binding roles and responsibilities of local governments in HEPA (policy) promotion in the Cluj-Napoca municipality.

Methods: Thematic document analysis followed up by stakeholders’ interviews were used. Types of documents explored were legislative acts, statutes and operating rules of the local government, organizational charts, strategic documents, legal decisions, any other supporting documents, with legal value (e.g. local government meetings’ minutes).

Results: The local government has a supporting role in HEPA promotion at local level, most of the times allocating financial resources for private organizations involved in health (and HEPA) promotion, or by facilitating the access to publicly owned physical activity infrastructure.

Conclusion: A better understanding of the roles of local governments in HEPA promotion can lead to an increase in debate regarding their actual roles in relation to the international recommendations, and consequently, to an increase in accountability and a change in the legally binding roles assumed by these institutions.

Transport cycling in Chilean adults: Results from 2014 and 2015 national surveys

Kristiann C Heesch¹, Nicolas Aguilar-Farias², Nicolas Salom², Damian Chandia², Andrea Cortinez-O’Ryan³

¹Queensland University of Technology, ²Universidad de la Frontera, ³Universidad de la Frontera & Pontificia Universidad Católica de Chile

Introduction: Active travel surveillance in Latin American is scarce. Surveillance of transport cycling in Chile is critical to document, to serve

as a baseline from which to measure future planned strategies to increase transport cycling in Chile. This study aimed to document the prevalence of transport cycling in urban-dwelling Chilean adults and to examine factors associated with transport cycling in this population.

Method: Data were collected from two cross-sectional National Environmental Surveys. The surveys were administered through a computer-assisted telephone interview system to representative samples of adult residents of the 15 regional capital cities in 2014 (n = 5067) and 2015 (n = 5664). Multivariable multi-level logistic regression modeling was used to assess associations between socio-demographic and environmental factors and bicycling as the main transport mode (yes, no).

Results: Cycling for transport was reported by 6.7% of participants in 2014 and 6.6% of participants in 2015. The highest prevalence estimates were found in males (2014: 10%; 2015: 9%), participants aged 18-24 years (both surveys: 12%), participants of low socioeconomic status (both years: 7%), and participants living in cities with warm summers/mild winters (2014: 9%; 2015: 8%). Factors associated with a reduced likelihood of transport cycling were female gender, older age, high socioeconomic status, and living in a city with cool summer temperatures (p < 0.01).

Conclusion: Transport cycling is more prevalent in Chile than in some other Latin American countries and high-income countries (e.g. US, Australia) but low compared to Northern European countries. Correlates of cycling in Chile are similar to those in other low-cycling countries.

Theme: Disability

Tuesday 16 October

Changes over time in levels of fatness and physical fitness of adolescents with Down syndrome. The UP&DOWN longitudinal study

Borja Suarez-Villadar¹, Rocío Izquierdo-Gómez², Oscar Veiga³, Hernan Ariel Villagra³

¹Autonomous University of Madrid, Madrid, Spain, ²Physical Education, Faculty of Education Sciences, University of Cádiz, Puerto Real, Spain, ³Physical Education, Sport and Human Movement, Autonomous University of Madrid, Madrid, Spain

Background: Nowadays, overweight and childhood obesity represent a significant health problem, since it has been associated with suffering cardiovascular disease in adulthood. People with intellectual disabilities, especially Down syndrome (DS), have been associated with high rates of obesity and low levels of physical fitness compared with their peers without DS. The aim of the present study is to examine 2-year longitudinal changes in several markers of fatness and levels of physical fitness in adolescents with DS.

Methods: The study is composed of a sample of 111 adolescents with DS (UP & DOWN longitudinal study). The ALPHA battery was used to assess fatness and physical fitness levels of adolescents at baseline and over 2-years follow-up. Paired sample statistical t-tests segmented for sex and age group were used to analyse the differences between baseline and follow-up fatness and physical fitness data.

Results: The present study shows changes in fatness and physical fitness of adolescents with by sex and age group. All groups increased in all fatness variables, excepted males and older group significantly decrease in percentage of body fat (all P < 0.05). No differences were observed in females and younger group at 2-year change in percentage of body fat. Males and older adolescents improved their levels of handgrip strength and cardiorespiratory fitness, while females improve levels in handgrip strength and motor fitness at 2-year change (P < 0.05).

Conclusions: Adolescents with DS tend to increase levels of fatness and barely change their level of physical fitness by sex and age groups at 2-year follow-ups.

Examining the impact of the Richmond Group's approach to increasing physical activity

Michelle Roberts, Cherry Russell, Age UK

Introduction: The projects and activities undertaken individually by charities and as part of the collaborative Movement for All programme have helped us to tailor our physical activity 'offer' to better meet the specific needs of people who are inactive with long term conditions and disabilities.

Method: The Richmond Group have created a programme of work which encompasses insight projects, delivery of evidence-based physical activity interventions and collaborative development projects. The programme focusses on an holistic, whole system approach to increasing physical activity by working with individuals, their families and support networks and through working with the myriad of different professionals who come into contact with people with long term conditions and disabilities, all of whom have an important role to play in facilitating behaviour change.

Results: As well as increasing physical activity levels of people participating in targeted interventions, the Richmond Group are addressing broader system change to ensure this achievement continues and is sustainable. This has centred on development and dissemination of tailored resources, support, training, and knowledge with the view to improve leisure facilities and physical activity opportunities; improve health care professional signposting and improve the general understanding of physical activity in management of long term conditions.

Conclusion: Working in collaboration to undertake insight, deliver activity and share learning has allowed the Richmond Group and its partners to optimise its offer, ensuring consistency in message, minimising duplication, streamlining approaches and filling gaps in knowledge. The continued cycle of learning ensures ongoing refinement of our approach.

External funding details: Sport England

Inclusive activity: The perceptions of disabled people and their influencers

Elliott Johnson

Activity Alliance (formerly English Federation of Disability Sport)

Introduction: EFDS has undertaken studies into the perceptions of four groups that influence physical activity among disabled people: their supporters, non-disabled peers, activity deliverers and disabled people themselves. We are now able to present a 360° perspective, particularly with reference to inclusive sport (disabled and non-disabled people participating together).

Method: EFDS has commissioned a number of mixed-methods studies, including qualitative depth interviews, focus groups and exposure sessions as well as large-scale quantitative surveys.

Results:

- **Disabled people** cite psychological barriers – including personal perceptions and those of others – as the greatest challenge to participation, with physical and logistical barriers also apparent
- 89% of **disabled people's supporters** say they have some influence on disabled people's activity. 68% think disabled people they support would like to be more active but too many practical and emotional barriers exist

- 14% of **non-disabled people** are aware of having taken part in sport with disabled people. 67% had no prior knowledge of what the term 'inclusive sport' means but 73% are open to taking part with disabled people
- 77% of activity **deliverers** have no experience of providing for disabled people, leading to low confidence and interest in such delivery. Many do not understand what the term 'inclusive activity' means but fear the concept might negatively impact non-disabled people

Conclusion: A lack of experience of inclusive activity and resulting psychological barriers are prevalent among those with influence on disabled people's activity levels. An across-the-board approach is essential in increasing participation and improving health and wellbeing.

External funding details: Sport England and SOGB/Mencap

Interim evaluation results from the parkrun PROVE project

Helen Quirk, Steve Haake, Sheffield Hallam University

parkrun provides free-to-enter, weekly 5km running/walking events in community parks and open spaces. The "parkrun: running or volunteering for everyone" (PROVE) project aims to support the positive experience of parkrun by people with LTCs/disabilities by: i) understanding the prevalence of LTCs/disabilities among parkrunners, ii) recruiting 'Outreach Ambassadors' for LTC/disability groups, iii) implementing interventions that remove barriers and improve accessibility to parkrun, and iv) working with advocacy groups to promote parkrun to non-parkrunners with LTCs/disabilities. The evaluation will use data from parkrun statistics, surveys, interviews and observations. To date, parkrun has engaged with ten LTC/disability groups including deaf and hard of hearing, diabetes, endometriosis and learning disabilities and has appointed 24 Outreach Ambassadors. Interventions include accessibility guidelines, blog posts, newsletters, new volunteer roles and Facebook support groups. Baseline survey responses from 643 parkrunners across LTC/disability groups suggest that the majority of parkrunners with LTCs/disabilities have had a positive experience of parkrun, feel supported, feel part of a community, and have not experienced any difficulties accessing events. The most common method of being 'referred' to parkrun has been by word-of-mouth (55%), with almost no referrals being made via health professionals or charities. Surveys will be repeated every 6 months. Baseline interviews have been conducted (n = 16) with parkrunners and Outreach Ambassadors and will be followed-up up at 12 months. This evaluation will enable lessons to be learnt as the PROVE project develops.

External funding details: The PROVE project is funded by the Department of Health and Sheffield Hallam University have been commissioned to evaluate it.

Physical fitness and falls among rural elderly in Japan: A cross-sectional study

Koji Yamatsu, Saga University

Background: Fallings are common among the elderly population, since ageing is a risk factor of falling. It is important to prevent long-term care as a result of fall. Balance disorders and muscle weakness are associated with increased risk for falling among the elderly, but the relationship with falls is unclear among rural elderly. The aim of this study was to determine whether physical fitness was associated with falls among rural elderly.

Methods: Participants were 636 elderly (mean age: 73.6+/-7.3, male: 10.7%, mean body mass index [BMI]: 23.3+/- 3.5) living rural area in Japan. All participants completed the questionnaires and two types of physical fitness tests (hand grip-strength and usual walking speeds). The

physical fitness tests were reported to be valid by previous study (Shinkai et al., 2000). Independent measures were handgrip force and walking speed.

Findings: Of 636 subjects, 21.4% reported falling during the past year. Even after controlling for covariates (age, sex, BMI, healthy eating, sitting time, exercise class adherence and chronic conditions), falls were associated with hand grip (OR=0.94, 95% CI=0.90, 0.98) and with walking speed (OR=0.19, 95% CI=0.07, 0.53).

Discussions: Hand grip-strength and usual walking ability were significantly associated with falls in Japanese rural elderly.

External funding details: This study was supported in part by JSPS KAKENHI Grant Number JP26282188 and JP15K12723 from the Ministry of Education, Culture, Sports, Science and Technology of Japan.

The carry-over effect of an aquatic-based intervention in children with cerebral palsy

Rowena Naidoo, Samantha Ballington, University of KwaZulu-Natal

Background: Cerebral palsy (CP) is the most common motor disability in childhood. Children with CP are more likely to have decreased physical activity levels than their peers, thus they are at risk for negative health implications. However, there is a belief that aquatic exercise can be used for the improvement of the level of fitness among children with CP.

Objective: To determine the carry-over effect of an aquatic-based programme (postural control and balance) on land (walking, running and jumping) in children with CP pre- and post-intervention.

Methods: The study was a pretest-posttest randomised groups, cross-over design. Children (n=10) were divided into intervention (n=5) and control (n=5) groups. The intervention group participated in two 30 minute sessions a week, while the control group continued with activities as per normal. Pre- and post-intervention testing was conducted using the Gross Motor Function Measure. The ten-point programme of the Halliwick Concept was used.

Results: Results demonstrated that the aquatic therapy had a significant effect on the Gross Motor Function Measure score. The aquatic-based group showed increased growth following the intervention compared to the control group (z=-2.803, p=0.005). Furthermore, the aquatic-based therapy improved the average score for The Gross Motor Function Measure, post-intervention.

Conclusion: In conclusion, an 8-week aquatic-based intervention produced greater gains in gross motor function in children with cerebral palsy, hence producing a significant carry-over effect on land.

External funding details: University of KwaZulu-Natal College of Health Sciences Scholarship

Theme: Economics

Tuesday 16 October

Do local authorities' resource allocation decisions have an impact on physical activity among adults: A panel study

Virpi Kuvaja-Köllner¹, Eila Kankaanpää², Johanna Laine², Katja Borodulin³, Tomi Mäki-Opas⁴, Hannu Valtonen²

¹University of Eastern Finland, ²Department of Health and Social Management, University of Eastern Finland, ³National Institute for Health and Welfare, ⁴University of Eastern Finland; National Institute for Health and Welfare

Background: In Finland, local authorities (municipalities) play a major role in providing many services, including sport and physical activity

facilities. Most of the decision-making related to physical activity settings takes place at the local level.

Methods: The data on local resources for physical activity (expenditure on physical activity and sport, number of sports associations receiving subsidies from the municipality, kilometres of pedestrian walkways and hectares of parks) in 1999 and 2010 were gathered from national registers. This data were combined with a two-wave national survey data from the Health 2000 Study, conducted in 2000 and 2011. We had individual level data on physical activity in leisure time (N=3,193) and commuting physical activity (N=1,408). Due to this hierarchical data structure, i.e., where individuals are nested within municipalities, multi-level analyses are applied.

Results: The resources for physical activity increased and varied between municipalities. Still, these differences and changes did not explain the variation in individuals' physical activity. Our model shows that mainly individual characteristics like higher education level, better health status and male gender increased leisure time physical activity. Living in an urban area increased physical activity and women practised more commuting physical activity than men.

Conclusions: The decision-makers should know better which facilities or what motivates citizens into being physically active, and then allocate local resources accordingly.

External funding details: This study was funded by Finnish Ministry of Education and Culture (DNRO 50/626/2012) and South Savo Regional fund.

Inequality in socio-economic status and the differences in physical activity pattern

Chutima Yousomboon, Kornkanok Pongpradit, Piyawat Katewongsa
Institute for Population and Social Research, Mahidol University

Introduction: Thailand is one of LMIC with the large inequalities between the rich and the poor in many ways such as incomes, occupation, and education. This created the difference in lifestyle, living standard, quality of life, including physical activity. This paper aims to examine the effects of differences in geographical residence, economic status, education level, or occupation on physical activity pattern among Thai population.

Method: National representative data of 7,602 samples aged 18 to 64 years from Thailand Physical Activity Surveillance System conducted in 2017 by Institute for Population and Social Research, Mahidol University supported by Thai Health Promotion Foundation was employed.

Results: It is found that the overall percentage of sufficiently MVPA among Thai population in 2017 is 72.9%. In the detail, people who lived in rural area (+1%), outside Bangkok (+5%), agricultural sector (+12%), and educated at primary education and lower (+3) would have higher percentage of sufficient MVPA comparing to others. Most of these groups of people are more likely to involve with work-related physical activity than leisure and recreation physical activity (chi-square = 199.334***).

Conclusion: The results confirmed that the differences in SES among Thai population, particularly occupation, continuously creating inequalities in physical activity opportunity.

External funding details: This project has been supported by Thai Health Promotion Foundation, Thailand

What's a cycling master plan worth? HEAT 4.0 applied to cycling promotion schemes in Austria, Germany, France & the European Union

Randy Rzewnicki, ECF - European Cyclists' Federation

Introduction: Could better health, less air pollution & CO₂ & fewer crashes from cycling for transport really worth 10,000,000,000 € or even 20,000,000,000 €? Using the Health Economic Assessment Tool for walking and for cycling (HEAT), the estimated 134,00,000,000 kilometres cycled annually in the EU prevented 27,860 deaths per year worth 96,554,944,000 € (ECF, 2016).

Since that time, the HEAT has been updated to reflect the health consequences of air pollution, crashes and carbon emissions. The new user guide was published in 2017 and translations in French and German are available on the WHO website. The purpose of this study is to assess the value of cycling with the new tool for the European Union and a selection of member states.

Method: We calculate the value of cycling for transport in Austria, Germany, France and the European Union as a whole. For each population we use the best available data to value current rates of cycling. Likewise we apply the values for cycling projected by each relevant master plan or strategy.

Conclusion: The results of our calculations show that the value of cycling for society, the environment and the economy is higher than previously estimated, in line with research efforts to frame cycling as a form of active mobility with acknowledged multiple benefits. For political decision makers it delivers parameters for sustainable development and transport research policy: Investments in cycling, from planning and budgeting through construction and maintenance, can be realised in sustainable ways.

Theme: Environment

Tuesday 16 October

Barriers and facilitators to the implementation of 20mph speed limit schemes: A qualitative exploration

Kieran Turner¹, Graham Baker¹, Ruth Hunter², Ruth Jepson³

¹The University of Edinburgh, ²Queen's University Belfast, ³The Scottish Collaboration for Public Health Research and Policy, The University of Edinburgh

Introduction: Process evaluations are important in assessing the fidelity and quality of the implementation of an intervention. They also identify contextual factors associated with variation in outcomes. This presentation aims to understand the barriers and facilitators to the recent implementation of twenty mile per hour (30 kmh) speed limits in Edinburgh and Belfast.

Methods: Seventeen semi-structured interviews were conducted with key stakeholders based on their involvement within four areas of implementation of the schemes in Edinburgh and Belfast: legislation; introduction of signage; awareness-raising and education; and enforcement activities. These included representatives from the local authority, central government, and relevant enforcement agencies.

Purposeful and snowball sampling methods were used. Interviews investigated: what implementation consisted of; barriers/facilitators to implementation; contextual factors influencing implementation; and differences between implementation phases (Edinburgh only). Data were managed in NVivo 11, and key themes were identified using thematic analysis.

Results: Ensuring effective collaborative working between involved parties (i.e. the local authorities, enforcement agency, and schools) was described as facilitating implementation. Additionally, the geographical street layout of Edinburgh was viewed as lending itself to lower traffic speeds. One barrier to implementation identified in Edinburgh related to the lengthy statutory processes associated with introducing a scheme of such scale. Another barrier identified in both sites related to resources available for enforcement.

Conclusions: Authorities should note the substantial processes required before 20mph policies can be implemented and consider the importance of 'joined-up working' for effective implementation.

External funding details: This research was funded by a grant from NIHR grant number 15/82/12.

Built environment constructs for defining walking-friendly environments in Mexico and their correlates to physical activity among Mexicans

Celida Isabel Gomez Gamez¹, Eugen Resendiz Bontrud²

¹Universidad Iberoamericana, A. C., ²Instituto Nacional de Salud Publica

Studies investigating the built environment (BE) correlates of physical activity (PA) suggest that their relation may be context-specific. The US Walkability Index is considered a good predictor of PA in high income countries; however, their adequacy to middle income countries such as Mexico must be studied in consideration to more specific BE elements; elements such as aesthetics, proximity of parks, road and public safety are relevant BE features of PA. The purpose of this study is to identify the contextually-relevant BE measures that best define walking-friendly environments in Mexico and assess their correlates to PA among Mexicans.

The study has three phases. a) the identification of contextually-relevant perceived BE constructs for measuring PA in the Mexican context as reported in peer-reviewed literature in urban planning, urban design and architecture. b) the face validation of the constructs of relevance with public health, PA, urban planning and architecture leaders in Mexico. Third, the adaptation of current instruments such as the Abbreviated Neighborhood Environment Walkability Scale (A-NEWS).

Relevant BE constructs for PA among Mexicans were identified: public spaces realms, including parks, streets and plazas, as well as other pedestrian spaces, are relevant measures of BE in relation to PA. Safety from transit and public safety were contextually-appropriate variables. Obstacles for pedestrians (e. g. street vendors, public telephones) emerged as other important BE elements. This study drew on scientific evidence and the expertise of local leaders to identify key BE constructs for defining the characteristics of walking friendly environments in Mexican cities.

Characteristics of the environment and physical activity in midlife: Findings from UK Biobank

Lindsey Smith, Jenna Panter, David Ogilvie, University of Cambridge

Characteristics of the environment influence health and may promote physical activity. We explored associations between neighbourhood environmental characteristics grouped within five facets (spaces for physical activity, walkability, disturbance, natural environment, and the socio-demographic environment) and objective and self-reported physical activity in adults from UK Biobank.

Activity was assessed objectively using wrist-worn accelerometers (2013-2015, N = 65,967) and time spent in moderate-to-vigorous physical activity, walking, and walking for pleasure was self-reported (2006-2010, N = 337,822). We used objective data on 15 environmental characteristics and assessed the associations with five outcomes (recorded mean acceleration and time spent in MVPA, and reported time spent in MVPA, walking, and walking for pleasure) using linear and multinomial logistic regression models.

We found walkability and rural status were positively associated with physical activity. Participants living in areas with higher concentrations of air pollution recorded and reported lower levels of physical activity and those in rural areas and more walkable areas had higher levels of both recorded and reported

activity. Some associations varied according to the specificity of the outcome, for example, those living in the most deprived areas were less likely to record higher levels of moderate-to-vigorous physical activity (upper tertile: RRR: 0.80 95% CI: 0.74, 0.86) but were more likely to report higher levels of walking (upper tertile: RRR: 1.09, 95% CI: 1.06, 1.13).

Environmental characteristics have the potential to contribute to different physical activities but interventions which focus on a single environmental attribute or physical activity outcome may not have the greatest benefits for public health.

External funding details: MRC

Cross-sectional associations of environmental perception with leisure-time physical activity and screen time among older adults

Ming-Chun Hsueh, Yung Liao, National Taiwan Normal University

Introduction: This study investigated the associations of perceived environmental factors with leisure-time physical activity (LTPA) and screen time (ST) among older adults.

Method: A cross-sectional study was conducted by administering computer-assisted telephone interviews to 1,028 older Taiwanese adults in November 2016. Data on personal factors, perceived environmental factors, LTPA and ST were included in the study. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to examine the associations between environmental perception with LTPA and ST by using logistic regression analyses.

Results: The results showed that after adjusting for potential confounders, older adults who perceived their neighborhood with good access to shops (AS) and good access to public transportation (AT) were more likely to meet sufficient LTPA (AS: OR = 1.64, 95% CI: 1.16-2.32; AT: OR = 1.43; 95%CI: 1.00-2.03) and less likely to have excessive ST (AS: OR = 0.70; 95%CI: 0.50-0.97; AT: OR = 0.64; 95%CI: 0.46-0.90).

Conclusion: Different perceived environmental factors were also found to be associated with LTPA and ST, respectively. This study highlights environment perception as a crucial factor for LTPA and ST. These findings suggest that policy makers and physical activity intervention designers should develop both common and individual environmental strategies in order to improve and increase awareness of the neighborhood environment to promote LTPA and reduce ST among older adults.

Keywords: the senior citizens; perceived environmental factor; recreational physical activity; screen based sedentary behavior

Development and validation of the school physical activity index

Michalis Stylianou¹, Stewart Trost², James Woodforde¹

¹The University of Queensland, ²Queensland University of Technology

Introduction/Background: Schools have been identified as key physical activity (PA) promotion sites, and multifaceted and coordinated school PA programs have been proposed as a promising strategy to help youth meet the PA guidelines. This study's purpose was to develop and assess the content validity and reliability of the School PA Index (SPAI), a self-assessment and planning guide for elementary schools that is based on a whole-of-school, multi-component approach to PA promotion.

Methods: This study involved four phases: (a) developing the SPAI based on relevant policies/guidelines, (b) assessing its content validity using expert feedback, (c) conducting cognitive interviews with Physical Education (PE) teachers, and (d) administering the SPAI to a sample of PE teachers two times, two weeks apart (test-retest). Data analyses included descriptive statistics for expert ratings and a review of qualitative feedback

from phases (b) and (c). Analytical methods for phase (d) included percentage agreement and weighted Kappa coefficient to examine the reliability of responses to the SPAI items.

Results: In the content validity phase, experts ($N = 28$, 21 academics, 7 PE teachers/school PA coordinators) rated the relevance and clarity of the SPAI sections and items as high (M range: 5.81 – 6.76, on a 7-point scale). Qualitative feedback from the experts and cognitive interviews with three PE teachers were used to revise the SPAI. Participant ($N = 19$) responses in the test-retest phase demonstrated moderate to almost perfect agreement for the SPAI items.

Conclusion: The SPAI is a valid and reliable instrument for assessing PA policies and practices in elementary schools.

Development of a theoretical framework of children's school travel behaviour

Erika Ikeda¹, Erica Hinckson¹, Karen Witten², Melody Smith³

¹Auckland University of Technology, ²Massey University, ³University of Auckland

Introduction: Children's school travel behaviour is associated with multiple factors across numerous levels including built and social environments, school, household and the individual. The aim of this study was to test a theoretical framework of children's school travel behaviour using structural equation modelling. The theoretical framework was developed based on Mitra's Behavioural Model of School Transportation.

Method: A cross-sectional study of children aged 9-12 years across 19 schools was conducted in Auckland, New Zealand. An online softGIS survey was used to measure children's travel mode and school route, and attitudes towards active school travel. Computer-assisted telephone interview (CATI) with children's parents or caregivers was conducted to measure household socio-demographics and neighbourhood perceptions. School representatives were interviewed regarding their school policy and active travel programme. Built environment attributes around children's school route were calculated using Geographic Information Systems (GIS). Descriptive statistics were generated using SPSS Statistics 24. Structural equation modelling was performed using Mplus Version 8.

Results: Overall, 1102 children participated in the study. A new, comprehensive model of children's school travel behaviour was supported by multiple data sources that accounted for mediating and moderating effects. Car (46.2%) was the most frequently reported travel mode followed by walking (33.9%), public transportation (12.3%), bike (3.9%), scooter (3.2%) and skateboard (0.5%).

Conclusion: The theoretical framework of children's school travel behaviour provides a comprehensive understanding of children's school travel behaviour. This framework can contribute to policy making to improve children's active school travel.

External funding details: Health Research Council of New Zealand

Influence of nature contact on PA in early childhood education and care (ECEC)

Hayley Christian¹, Liz Wenden¹, Pulan Bai¹, Stewart Trost², Clover Maitland¹, Michael Rosenberg¹, Gina Trapp³, Leanne Lester¹, Bryan Boruff¹, Jasper Schipperin⁴

¹The University of Western Australia, ²Queensland University of Technology, ³Telethon Kids Institute, ⁴University of Southern Denmark

Introduction: Natural outdoor experiences are associated with children developing a sense of identity, autonomy, psychological resilience, self-regulation, gross motor skills and healthy behaviours. This study

investigated the relationship between nature contact within and surrounding ECEC centres and children's PA.

Methods: The Play Spaces & Environments for Children's Physical Activity (PLAYCE) Study collected 7 day accelerometer data from 1762 pre-schoolers attending ECEC (n = 118) in Perth, Australia. Audits collected data on natural environmental features (mature trees, shrubs/bushes, natural/artificial grass, edible gardens, flower beds). Access to green space within 500m of each centre was calculated using the Normalised Difference Vegetation Index (NDVI).

Results: Artificial grass was present in 66% of centres and many had no mature trees (37%), shrubs/bushes (35%), edible gardens (45%) or flower beds (67%). Each additional 10 shrubs/bushes and edible gardens were associated with 2-6 mins less MVPA per day at ECEC. The presence of natural and artificial grass (fake > artificial) and flower beds were associated with more PA per day at ECEC. The NDVI and educator-reported use of nearby green space was not associated with PA whilst at ECEC.

Conclusion: Some natural features in ECEC were not conducive to PA while others were positively associated with PA. The relationship between nature contact and children's health may be dependent on the context and outcome of interest. Future research should investigate the interplay between natural features, PA and other health and development indicators in children attending ECEC.

External funding details: The PLAYCE Study is supported by the Western Australian Health Promotion Foundation (Healthway; #24219).

Park characteristics preferred for adolescent park visitation and physical activity: a choice-based conjoint analysis using manipulated photographs

Benedicte Deforche¹, Linde Van Hecke¹, Ariane Ghekiere¹, Jenny Veitch², Ilse De Bourdeaudhuij¹, Peter Clarys³, Nico Van de Weghe¹, Delfien Van Dyck¹, Jelle Van Cauwenberg¹

¹Ghent University, ²Deakin University, ³Vrije Universiteit Brussel

Creating environments supportive for physical activity, could be a valuable strategy to increase physical activity at the population level. The purpose of this study was to understand the relative importance of park characteristics for park visitation and park-based physical activity among adolescents, using manipulated photographs of parks. Participants (n = 1197, 54% girls, 13.4 ± 1.3 years) were asked to perform two sets of ten choice tasks. For each choice task, a choice had to be made between two photographs of a park where ten characteristics were manipulated: naturalness, upkeep, walking paths, outdoor fitness equipment/playground, sport field, benches, drinking fountain, peers, mother with children and homeless person. In the first set of choice tasks participants had to select the park most inviting for visitation, in the second, they had to select the park most inviting for physical activity. Hierarchical Bayes Estimations were used to calculate (1) average utilities that represent the desirability of each level within a characteristic and (2) importance scores which reflect the effect each park characteristic had on the choice. The results indicate that among the studied characteristics, park upkeep was the most important characteristic for park visitation and park-based physical activity followed by the presence of playground/outdoor fitness equipment and sport fields. Policymakers could ensure that parks are well maintained, have sport fields and outdoor fitness equipment in order to meet adolescents' needs. Evaluation of such initiatives can confirm whether these park characteristics will influence actual adolescent park visitation and park-based physical activity.

External funding details: Research Foundation Flanders (FWO, 54488-G0A8514N)

School travel mode among adolescents: The NEArBY Study

Anna Timperio¹, Jenny Veitch², Billie Giles-Corti³, Suzanne Mavoa⁴, Ester Cerin⁵, Hannah Badland³, Kate Parker², Jo Salmon²

¹Deakin University, ²IPAN, Deakin University, ³RMIT, ⁴University of Melbourne, ⁵Australian Catholic University

Introduction: This study examined moderating effects of distance and perceived traffic safety on correlates of habitual school travel modes among adolescents in Melbourne, Australia.

Method: Adolescents (n = 468, 15.4 ± 1.6 y, 59% girls) self-reported usual frequency of 8 travel modes to/from school and agreement with 7 road safety items (summed score) and 19 barriers to walking/riding to school (collapsed into 6 categories). Regular (≥5 times/week) active transport (AT), public transport (PT) and car travel were computed. Objective built environment measures around homes and schools were generated. Mixed effects logistic regression was conducted.

Results: Overall, 46% regularly used AT, 76% PT and 55% regularly travelled by car. Regular AT was associated with personal, planning and safety-related barriers (OR = 0.3-0.6), intersection density around home (OR = 1.1), residential (OR = 1.1) and intersection (OR = 1.2) density around school, and distance from school to PT (OR = 0.2). Regular PT was associated with traffic safety concerns (OR = 1.1), distance (OR = 2.2) and personal, planning, social, infrastructure and safety-related barriers (OR = 1.7-3.2), and car travel with home residential density (OR = 0.96). There were several interactions. Home PT options and intersection density were more conducive to AT, and planning-related barriers more prohibitive of car travel, at shorter distances to school. School residential density was positively associated with AT, and home PT options more prohibitive of car travel, with increasing distance. Personal, aesthetic and safety-related barriers were stronger deterrents, and school residential density more conducive, to AT among those with more favourable road safety perceptions.

Conclusion: The results highlight the complexity of influences on mode choice.

External funding details: NIH 1R01HL111378

The influence of neighborhood environment on obesity in Korean adults: Using Bayesian spatial modelling

Eun Young Lee, Sugie Lee, Bo Youl Choi, Jungsoon Choi, Hanyang University

This study aimed to examine the association between the neighborhood environment that provide more opportunities for physical activity (PA) and obesity in Korean adults using Bayesian spatial multilevel model to account spatial association. Data from 78,014 adults living in Gyeonggi province of Korea was drawn from the 2013-2014 Korean Community Health Survey. Korean government databases and Arc GIS software were used to measure neighborhood environment variables from 546 administrative districts of Gyeonggi province. A Bayesian spatial multilevel model was implemented across gender and age group (i.e. 19-39, 40-59, and over 60). Results showed that neighborhood environment that provide more opportunities for PA was negatively related to obesity. The study also found that women aged 19-39 years who lived in community with the farthest distance to public park were more likely to be obese (OR = 1.29, 95% CI = 1.01-1.65). Men aged 40-59 years who lived in community with farther distance to public PA facility were more likely to be obese (OR = 1.13, 95% CI = 1.03-1.23), while men who lived in community with higher population density were less likely to be obese (OR = 0.88, 95% CI = 0.79-0.98.) Overall, the neighborhood environment was more related to obesity in women ages 19-59 years, comparing with in men and women over 60.

The findings suggest that neighborhood environments that provide more opportunities for PA may help to prevent the sharp increase of obesity. Creating more PA favorable neighborhood environment considering gender and age could provide a valuable strategy to reduce inequality in population health.

External funding details: This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean Government (MSIT) (No. 2015R1C1A2A01054052)

Theme: Epidemiology

Monday 15 October

Applying a quantitative bias analysis to estimate attenuation of association between self-reported physical activity and colorectal cancer risk due to measurement error

Shahid Mahmood¹, Nga Nguyen², Julie Basset², Robert MacInnis², Amalia Karahalios³, Neville Owen⁴, Roger Milne², Graham Giles², Dallas English³, Brigid Lynch²

¹The University of Melbourne, ²Cancer Epidemiology and Intelligence division, Cancer Council Victoria, ³The University of Melbourne, ⁴Behavioural Epidemiology Laboratory, Baker Heart and Diabetes Institute, Melbourne

Background: Although it is well known that self-reported physical activity is inaccurate, few investigators have attempted to adjust for measurement error when computing relative risks for health outcomes. We performed a calibration study and applied the attenuation factor to hazard ratios for physical activity and colorectal cancer risk from a cohort study.

Methods: A cohort of 235 Australian adults completed a telephone-administered IPAQ-short, and wore an accelerometer for seven days (Actigraph GTX3+, Freedson cutpoints applied). A validity coefficient and an attenuation factor were calculated from a structural equation model adjusted for age, sex, education and body mass index. The attenuation factor was applied to data from the Melbourne Collaborative Cohort Study to compute bias-adjusted hazard ratios and 95% confidence intervals (CI).

Results: Average daily minutes of physical activity reported in the IPAQ-short were significantly higher than the duration from accelerometry (54.5 vs 31.7 minutes, $p=0.003$). The validity coefficient (0.32; 95% CI: 0.20-0.43) and attenuation factor (0.20; 95% CI: 0.12-0.28) were low, indicating substantial measurement error in the IPAQ-short. For participants reporting 150 minutes per week vs no physical activity, the hazard ratio for colorectal cancer risk before and after bias adjustment was 0.88 (95% CI: 0.68-1.13) and 0.52 (95% CI: 0.14-1.94), respectively.

Conclusions: Over-estimation of physical activity by the IPAQ-short attenuated the association substantially, suggesting that the protective effect of physical activity has been previously under-estimated. Our attenuation factor may provide other researchers using IPAQ-short the opportunity to undertake a quantitative bias analyses within their own studies and adjust estimates.

Associations of context-specific sitting time with cardio-metabolic risk in Australian adults

Paddy Dempsey¹, Nyssa Hadgraft², Elisabeth Winkler³, Bronwyn Clark³, Paul Gardiner³, David Dunstan⁴, Neville Owen⁴, Brigid Lynch⁵

¹Baker Heart and Diabetes Institute & Swinburne University of Technology, ²Swinburne University of Technology, ³University of Queensland, ⁴Baker Heart and Diabetes Institute, ⁵Cancer Council Victoria

Introduction: Higher volumes of sitting time are associated with adverse cardio-metabolic health outcomes. However, previous studies have predominately used total sitting or TV-viewing time as exposure measures, limiting potential inferences about context-specific sitting. We examined associations of sitting time in four contexts (occupational, transportation, TV/video-viewing, computer use) with clustered cardio-metabolic risk.

Methods: Participants ($n=3,429$; mean age 58 years) without clinically diagnosed diabetes or cardiovascular disease were from the 2011-2012 Australian Diabetes, Obesity and Lifestyle (AusDiab) study. Multiple linear regression examined associations of self-reported context-specific sitting time with a clustered cardio-metabolic risk score (calculated from: waist circumference; blood pressure; fasting triglycerides; HDL-cholesterol; and, fasting glucose).

Results: After adjusting for potential confounders (socio-demographics and health behaviours, including physical activity), each hour/day of sitting was associated with significant ($p<0.05$) increases in the clustered cardio-metabolic risk score for TV-viewing (0.04, [0.03-0.06]) and for computer use (0.04, [0.02-0.06]). When keeping the total amount of sitting time constant, and comparing each form of sitting to all other forms of sitting combined, TV-viewing (0.03, [0.01-0.05]) and computer use (0.02, [0.00-0.04]) were significantly more deleterious and occupational sitting was significantly less deleterious (-0.02, [-0.03-0.00]) than other forms of sitting.

Conclusions: More sitting time in leisure contexts was associated with higher cardio-metabolic risk scores. Of the ways to accumulate sitting, occupational sitting tended to be comparatively less adverse, while TV-viewing and computer use tended to be comparatively more deleterious. Limitations of our methods notwithstanding, these findings may assist in identifying priorities for sitting reduction initiatives.

Estimating the current and future cancer burden attributable to inadequate leisure-time physical activity among adults in Canada

Christine Friedenreich¹, Darren Brenner², Yibing Ruan¹, Abbey Poirier¹, Xin Grevers¹, Eduardo Franco³, Paul Villeneuve⁴, Stephen Walter⁵, Karena Volesky⁶, on behalf of the ComPARE Study Group⁷

¹Alberta Health Services, ²University of Calgary, ³McGill University, ⁴Carleton University, ⁵McMaster University, ⁶McGill University, ⁷ComPARE

Background: Despite established associations between inadequate physical activity and cancer risk, levels of physical inactivity in Canada remain high. In the Canadian Population Attributable Risk of Cancer (ComPARE) study, we estimated the current and future proportion of cancer incidence attributable to inactivity in Canada.

Methods: We identified 15 cancer sites associated with inadequate physical activity. Age-sex-specific incidence data were combined with self-reported leisure-time physical activity prevalence data. We estimated the cancer burden attributable to moderate inactivity (energy expenditure between 1.5-3.0 kcal/kg per day) and inactivity (<1.5 kcal/kg per day) and forecast the number of cases that could be avoided between 2012-2042 if the prevalence of physical inactivity was reduced.

Results: Approximately 79% of women and 69% of men in Canada were characterized as moderately inactive or inactive in 2000. Overall, 10.4% (10% for men and 11% for women) of incident cancers in 2012 were attributable to inadequate physical activity (11,048 cases). Encouraging projections demonstrated that if the prevalence of physical inactivity continues on the current trend, the proportion of attributable cases will decrease to 8.6% by 2042. However, if the prevalence of inactivity was reduced by 50%, a cumulative 39,701 cases of cancer could be prevented by 2042.

Conclusion: In Canada in 2012, 10.4% of incident cancers were attributable to inadequate physical activity. These results will help inform and prioritize strategies to increase physical activity, which could reduce future cancer burden in Canada.

External funding details: This research is supported by a Canadian Cancer Society Research Institute Partner Prevention Research Grant (#703106).

Physical inactivity, sedentary and suicidal behaviours of adolescents in Bangladesh

Asad Khan¹, Riaz Uddin¹, Tracy Kolbe-Alexander²

¹The University of Queensland, ²University of Southern Queensland

Introduction: Insufficient physical activity (iPA) and sedentary behaviours (SB) may have deleterious effects on adolescents' mental health. This study aimed to examine the relationship between iPA and SB, as well as their interactions, with suicidal behaviours of Bangladeshi adolescents.

Methods: Data were from the 2014 Bangladesh Global School-based Student Health Survey (GSHS), a population-based survey of students aged 13-17 years in Bangladesh. Students reported on suicidal and PA behaviours along with socio-demographic characteristics.

Results: Of the participating students (n=2,989; 35% female), 52% did not meet the recommended PA level (60 min/day), while 15% spent ≥3 hrs/day in SB. The weighted prevalence of suicidal behaviour was 4.9%, 7.4% and 6.3% respectively for suicidal ideation, suicidal plan, and suicidal attempt. Logistic regression analysis found that iPA and SB were independently associated with suicide attempts, after adjusting for age, sex, and weight status (OR = 2.01; 95%CI 1.36-2.96; and OR = 2.14; 95%CI 1.40-3.26, respectively). Further adjusted analyses showed that compared to active+non-sedentary students, students who were inactive+non-sedentary had nearly double the odds of attempting suicide (OR = 1.80; 95%CI 1.15-2.82), while the odds were four times higher for students who were inactive+sedentary (OR = 4.58; 95%CI 2.64-7.97). The odds were significantly higher among students who were inactive+sedentary compared to those who were inactive+non-sedentary or active+sedentary, although no significant difference was found between the two latter groups.

Conclusions: Students who are not sufficiently active and/or sedentary are at an increased risk of attempting suicides. Promoting PA and reducing SB can potentially minimise the burden of suicides in adolescents in Bangladesh.

Prolonged occupational standing: How long is too long for musculoskeletal health?

Leon Straker¹, Sharon Parry¹, Genevieve Healy², David Dunstan³, Pieter Coenen⁴

¹Curtin University, ²The University of Queensland, ³Baker Heart and Diabetes Institute, ⁴Vrije University Medical Centre

Introduction: Given the increasing evidence of negative health consequences associated with too much sitting, workplaces are establishing initiatives to encourage workers to replace some sitting with standing. However too much standing is also associated with negative health consequences, both acute and chronic. To inform occupational health and safety policies regarding this issue the aim of this study was to systematically review evidence from laboratory studies to determine appropriate limits to avoid acute musculoskeletal discomfort from prolonged standing.

Method: Following PRISMA guidelines, a pre-registered search of databases using terms related to standing and work was conducted. Peer-reviewed journal articles published in English were selected which

reported on laboratory studies examining musculoskeletal symptoms associated with standing for periods of longer than 20 minutes. Titles, abstracts and (if needed) full texts were independently screened by two authors and data were extracted from included articles. Dose-response relationships were examined via linear interpolation of pooled data. Sub-group analysis was conducted on participants who developed symptoms.

Results: Of 13,702 unique records, 507 full text articles were reviewed with 26 articles (reporting on 25 studies; n = 591 participants) meeting eligibility criteria. Pooled data indicated that musculoskeletal symptom intensity increased to a clinically meaningful level (>9/100) after 71 minutes of continuous standing for the whole group and after 42 minutes in the sub-group who developed symptoms.

Conclusion: Systematic review evidence from laboratory studies suggests workers should be encouraged to avoid continuous standing for longer than 40 minutes to minimise musculoskeletal discomfort.

Replacing objectively measured sedentary time with physical activity: Cross-sectional associations with cardiometabolic risk factors in Japanese employees

Naruki Kitano¹, Yuko Kai¹, Takashi Jindo¹, Kenji Tsunoda², Yumiko Onodera¹, Satoshi Hanawa¹, Tsutomu Kuchiki³, Ken Uchida⁴, Toshiya Nagamatsu¹

¹Meiji Yasuda Life Foundation of Health and Welfare, ²Yamaguchi Prefectural University, ³Hyogo University, ⁴Meiji Yasuda Shinjuku Medical Center

Introduction: Growing evidence indicates associations between substituting time of sedentary behaviors (SB) with equal time of physical activity (PA) and cardiometabolic risk factors (CmRFs). However, evidence on Japanese subjects who spend long durations in sedentary conditions is limited. We aimed to investigate the effect of reallocating time from SB to low-intensity PA (LPA) or moderate-to-vigorous PA (MVPA) with CmRFs in Japanese employees.

Methods: Study participants were 1,184 Japanese employees (52.1 ± 9.6 years; 72.1% women) from the 2017 Meiji Yasuda Lifestyle study who underwent annual health checkups for measuring CmRFs. Participants were instructed to wear an accelerometer for 10 days. Time spent in SB (≥1.5 METs), LPA (1.6-2.9 METs), and MVPA (≥3.0 METs) were evaluated. Days with ≥10 h of wear time were considered valid; participants with more than two valid weekdays and one weekend were included.

Results: Independent of potential confounders, isothermal substitution modeling indicated that reallocating 30 min/day of SB into an equal duration of MVPA was associated with significantly more favorable waist circumference (B = -1.17), HDL-c (B = 2.74), triglycerides (B = -9.84), and fasting glucose (B = -1.21), and was significantly related with lower prevalence of metabolic syndrome (OR = 0.75). In contrast, reallocating 30 min/day of SB into LPA was associated with significantly more detrimental LDL-c (B = 1.66) and triglyceride (B = 2.67).

Conclusion: The interrelationships between SB and PA concerning CmRFs would differ by PA intensity; replacing SB with MVPA seems to be effective in Japanese employees. Future studies using bouts/sporadic LPA are warranted to examine its associations with CmRFs.

The longitudinal relationship between unhealthy lifestyle behaviours and development of psychological distress

Gregory S Kolt, Ian Davidson, Tanya Meade, Emma S George, Western Sydney University

Introduction: A range of unhealthy lifestyle behaviours, including physical inactivity, unhealthy dietary intake, smoking, and alcohol consumption, have been shown individually to impact mental health, and in particular, psychological distress. Given that such unhealthy lifestyle behaviours often occur in combination, it is possible that the clustering of such factors has a more impactful effect on mental health. The aim of this study was to investigate the longitudinal association between unhealthy lifestyle behaviours and psychological distress.

Methods: Data for this study were drawn from the 45 and Up Study, a large-scale longitudinal cohort study of a range of health and social indicators in adults aged 45 years and older from across New South Wales, Australia. Participants were 25,152 adults with complete baseline and 5-year follow-up data for psychological distress (Kessler-10). An index of unhealthy lifestyles was constructed using binary indicators of whether a participant failed to adhere to published guidelines for physical activity, alcohol consumption, consumption of fruit, vegetables and processed meat, and tobacco smoking.

Results: After adjusting for age, gender, marital status, education, income, employment status, and BMI, participants with 4 (OR 1.50; 95%CI 1.06, 2.13), 5 (OR 2.48; 95%CI 1.56, 3.91), or 6 (OR 3.26; 95%CI 1.08, 9.86) unhealthy lifestyle behaviours at baseline had significantly higher odds of reporting high/very high psychological distress (Kessler-10 scores of $\geq 22/50$) at follow-up compared with those with fewer unhealthy lifestyle behaviours at baseline.

Conclusion: A higher number of unhealthy lifestyle behaviours may lead to higher levels of psychological distress.

The socio-demographic correlates and domain-specific patterns of physical inactivity in diverse African populations: An individual pooled data meta-analysis of WHO STEPS survey data

Anna Louise Barr¹, Elizabeth Young², Manjinder Sandhu¹, Ayesha A Motala³

¹University of Cambridge, ²Wellcome Sanger Institute, ³University of KwaZulu-Natal

There is currently a limited understanding of the socio-demographic correlates of physical inactivity, and the domain-specific physical activity patterns, in African populations.

A two-step individual pooled data meta-analysis was conducted using data collected through the WHO STEPS tool in Democratic Republic of Congo (DRC) (n=1757), Liberia (n=2565) and South Africa (n=1202). We investigated associations between key socio-demographic measures and physical inactivity, and further examined domain-specific physical activity patterns within countries, and overall.

The age-standardised prevalence of inactivity was significantly different between DRC (26.2%; 95%CI:24.0%-28.4%), Liberia (31.0%; 95%CI:28.5%-33.5%) and South Africa (8.4%; 95%CI:6.8%-10.0%); pooled prevalence: 21.8 (95%CI:7.3%-36.4%; $I^2=99.1\%$). Various socio-demographic factors were associated with increased risk of inactivity in individual populations, with women (RR:1.28; 95%CI:1.11-1.46; $I^2=0.0\%$) and retirees (RR:2.01; 95%CI:1.18-2.84; $I^2=0.0\%$) at a significantly higher risk of inactivity across all countries, after adjustment. Domain-specific physical activity proportions differed between inactive and active individuals and by sociodemographic group, with inactive individuals spending the majority of active time travelling and notably increasing proportions of time spent in recreational activity among increasingly educated individuals.

Consistent with previous work, we observed a high prevalence of physical inactivity across three African countries. Furthermore, we extend this to

illustrate important differences in physical activity patterns by socio-demographic sub-groups. Our findings provide critical insight into the design and targeting of effective policies addressing physical inactivity in African populations. Data from seven additional countries are being analysed.

External funding details: This work is funded by the African Partnership for Chronic Disease Research strategic award from UK Medical Research Council (grant number MR/K013491/1).

U.S. Physical Activity Guidelines Advisory Committee 2018: Cancer Prevention & Survival

Anne McTiernan, Fred Hutchinson Cancer Research Center

According to the International Agency for Research on Cancer, there were 14.1 million new cancer cases and 8.2 million cancer deaths in 2012. The 2018 U.S. Physical Activity Guidelines Advisory Committee investigated associations between physical activity and risk for several types of cancer, as well as prognosis among cancer survivors. The Committee considered epidemiologic research conducted through 2016, and primarily relied on systematic reviews, meta-analyses, and pooled analyses of cohort and case-control studies. The Committee found strong evidence that high levels of physical activity reduce risk for bladder, breast, colon, endometrium, esophagus (adenocarcinoma), renal, and gastric cancers, with risk reductions ranging from approximately 10 percent to 20 percent. The Committee's review of the literature on sedentary behavior and risk of endometrial, colon, and lung cancers found that highest versus lowest levels of sedentary time increased risks of these cancers by a range of 20 percent to 35 percent. The Committee further found inverse association between greater amounts of physical activity and decreased all-cause and cancer-specific mortality in individuals with a diagnosis of breast, colorectal, or prostate cancer, with risk reductions ranging from 38 to 48 percent. The Committee identified several needs for future research, including studies in diverse populations, studies to determine dose-response effects, and randomized controlled trials. This presentation will include the methodology used, the results obtained, and implications for the public and for cancer survivors.

When and how do adolescents sit? ActivPAL measured patterns of daily sitting time, bouts and breaks

Lauren Arundell¹, Jo Salmon², Harriet Koorts², Ana Maria Contardo Ayala², Anna Timperio²

¹Deakin University, ²Deakin University, Institute for Physical Activity and Nutrition (IPAN)

Introduction: Understanding how adolescents accumulate their sitting time is important for informing intervention studies. Patterns of adolescents objectively-measured sitting time, sitting bouts, and breaks in sitting during different periods of the day were examined.

Methods: Adolescents (n=308, 15.4 $\pm$ 1.6 years) wore an activPALTM for 8 days. Data were extracted during early morning, id-morning, morning break, late morning, lunch, early afternoon, late afternoon and evening on weekdays and weekends, and school time, class time and out-of-school time on weekdays. For each period, the percentage of time spent sitting (%SIT), percentage of each hour in prolonged sitting (bout ≥ 10 minutes), and number of breaks/hour in sitting were calculated. Differences according to sex and week and weekend days were determined using t-tests.

Results: Participants spent 68% of their day sitting, 29-30% of each hour in prolonged sitting, and performed 3.1 breaks in sitting/hour. The proportion of time sitting was greater in school (70%) and class time (75%) than out-of-school time (65%). Compared to boys, girls had higher

%SIT during class (76% vs 72%) and school hours (72% vs 67%), performed more prolonged sitting/hour during school hours (27% vs 23%), and had more sitting breaks/hour during out-of-school time (2.6 vs 2.4), but fewer during class (2.5 vs 3.3) and school hours (2.7 vs 3.3), respectively. %SIT differed between week and weekend days for all periods except for the evening period.

Conclusion: Adolescents spend the majority of their time sitting, with distinct patterns on weekdays and weekend days. Findings provide novel information for intervention development.

Tuesday 16 October

Association between mortality and time-use composition of the 24 hour day

Duncan McGregor¹, Sebastien Chastin², Philippa Dall¹, Javier Palarea-Albaladejo³

¹Glasgow Caledonian University, ²Glasgow Caledonian University, ³Biomathematics and Statistics Scotland (BioSS)

Introduction: Previous studies of the association between mortality and physical activity have used isotemporal substitution. A compositional approach allows for co-dependency between different behaviour types and the relative scale of time-use data.

Methods: A prospective analysis of NHANES 2005-06 on N = 1134 adults (d = 105 deaths) between ages 50-79 was undertaken using Cox Proportional Hazards regression. Daily composition of time spent in sedentary behaviour (SB), light intensity (LIPA) and moderate to vigorous physical activity (MVPA) was determined from waist-mounted accelerometer data (Actigraph 7164) and supplemented with self-reported sleep data to determine the time-use composition of the day. The association of the composition with mortality was assessed both with and without covariates.

Results/findings: The composition of time spent in SB, LIPA, MVPA and sleep was significantly associated with mortality rates in the absence of covariates ($p < 0.001$), and allowing for age and sex ($p = 0.011$). This association appears to be driven primarily by the deleterious associations of high SB relative to MVPA and LIPA. No significant association was found after incorporating self-reported health assessment, or lack of mobility. All models considered explained a low proportion of the observed variation ($R^2 < 0.1$).

Conclusions: There was some evidence of a weak association between composition of the day and mortality rates, however this could not be distinguished from an individual's current state of health. More data, or ideally longitudinal data, is needed to better understand the association.

External funding details: J. Palarea-Albaladejo has been supported by the Scottish Government's Rural and Environment Science and Analytical Services Division.

Associations of physical activity and sedentary time with body composition outcomes in young adults

Bruna Gonçalves C. da Silva, Inácio Crochemore M. da Silva, Shana Ginar da Silva, Natália Peixoto Lima, Bernardo Lessa Horta, Federal University of Pelotas

Introduction: The aims of the present study are to evaluate 1) the association of changes in self-reported leisure-time physical activity (LTPA) from 23 to 30 years of age with body composition at 30 years and 2) the cross-sectional association of objectively measured physical activity and sedentary time with body composition at 30 years of age.

Methods: Analyses with participants from the 1982 Pelotas (Brazil) Birth Cohort were conducted. LTPA was measured using questionnaire when the individuals were 23 and 30 years old, and moderate-to-vigorous physical activity (MVPA) and sedentary time by accelerometer at 30 years. Body mass index, waist circumference, visceral abdominal fat, and fat mass index were evaluated at 30 years. Multiple linear regressions were performed and interaction between MVPA and sedentary time was tested.

Results: 3,206 subjects had information on LTPA at 23 and 30 years of age and at least one of the outcomes. Individuals who were active at 23 and 30 years and individuals who became active at 30 years had lower values of body composition. Individuals who became inactive had similar mean values to individuals who were inactive at both ages. Individuals with higher amount of MVPA had lower values of body composition at 30 years, but a high amount of sedentary time attenuated this benefit.

Conclusion: LTPA was inversely associated with adiposity, but there was no lasting association of previous LTPA on current body composition in young adults. Moreover, spending excessive time in sedentary activities attenuated the benefits of MVPA on body composition.

External funding details: From 2004 to 2013, the Wellcome Trust supported the 1982 birth cohort study. The International Development Research Center, World Health Organization, Overseas Development Administration, European Union, National Support Program for Centers of Excellence (PRONEX), the Brazilian National Research Council (CNPq), and the Brazilian Ministry of Health supported previous phases of the study.

Does reallocation of time from sedentary bouts to physical activity reduce adiposity in children?

Ales Gaba¹, Jan Dygryn¹, Nikola Stefelova¹, Karel Hron¹, Zeljko Pedicis², Dorothea Dumuid³

¹Palacky University Olomouc, ²Victoria university, ³University of South Australia

Substituting sedentary time with physical activity (PA) has several health benefits. However, the effects of reallocating time from different sedentary bouts (SBs) to PA on health outcomes are not well-known. This study investigates the effects of reallocating time spent in different SBs to light-intensity (LIPA) and moderate-to-vigorous PA (MVPA) on adiposity in children. Participants were 425 school-aged children. Total sedentary time (TST) and time spent in different SBs (i.e., 1-9, 10-29 and ≥ 30 min) and PA were monitored using an ActiGraph accelerometer. Adiposity was expressed as fat mass percentage. To investigate the effects of reallocating TST and time spent in different SBs to PA, the compositional isotemporal substitution model was applied. The composition of movement behaviors was significantly associated with adiposity ($R^2 = 0.07$; $p < 0.001$). Further, the relative contributions of time spent in 10-29 min SB ($\beta_{itr} = 0.21$; $p = 0.036$), LIPA ($\beta_{itr} = 0.37$; $p = 0.045$) and MVPA ($\beta_{itr} = -0.21$; $p = 0.004$) were associated with adiposity. A negligible decrease in adiposity while reallocating TST and time in SBs to LIPA was observed. In contrast, reallocating 1 h/week of TST to MVPA resulted in a decrease of about 0.3 percent points in body fat percentage. The maximum effect on adiposity was observed while time from 10-29 min sedentary bout was reallocated to MVPA. In this case, body fat percentage decreased of about 0.4 percent points with every hour reallocated from 10-29 min SB to MVPA. Replacing sedentary time with MVPA is associated with positive effects on adiposity in children.

Daily walking time and traditional and novel inflammatory biomarkers in the elderly: A subcohort from NISSIN Project

Wenjing Zhao¹, Akiko Tamakoshi¹, Shigekazu Ukawa¹, Jun Morinaga², Motoyoshi Endo², Takashi Kawamura³, Kenji Wakai⁴, Kazuyo Tsushita⁵, Masahiko Ando⁶, Yuichi Oike², Koji Suzuki⁷

¹Faculty of Medicine, Hokkaido University, ²Graduate School of Medical Sciences, Kumamoto University, ³Kyoto University Health Service, ⁴Nagoya University Graduate School of Medicine, ⁵Comprehensive Health Science Center, Aichi Health Promotion Public Interest Foundation, ⁶Center for Advanced Medicine and Clinical Research, Nagoya University Hospital, ⁷Fujita Health University School of Health Sciences

Introduction: There is growing evidence that shows the association between physical activity and inflammatory biomarkers. But it is not yet clear whether daily walking is associated with the traditional and novel inflammatory biomarkers in the elderly.

Method: A subcohort of 715 Japanese community-dwelling residents aged 64/65 years was abstracted from an age-specific prospective cohort study, NISSIN Project (The sampling fraction, about 25%). Daily walking time was evaluated by self-reported questionnaires at baseline and inflammatory biomarkers were measured at baseline and after about 5-year follow-up. Generalized linear model was applied to analyze the cross-sectional and longitudinal association between daily walking time and each protein. The crude and multivariate adjusted model were conducted.

Results: Walking ≥ 0.5 hour/d was inversely and significantly associated with plasma Angiopoietin-like protein 2 level, and this cross-sectional association did not substantially change after adjustment for gender, work status, tobacco use, alcohol assumption, sleep duration, medical status of hypertension, hyperlipidemia and diabetes mellitus, history of heart disease, cerebrovascular disease and cancer, BMI, dietary behavior and hs-CRP. Walking ≥ 2 hours/d was positively and significantly associated with plasma adiponectin level before and after full adjustment. But the longitudinal association of daily walking with ANGPTL2 or adiponectin level was not detected. No any significant association between daily walking and hs-CRP was found.

Conclusion: We found the cross-sectional association of daily walking with the novel pro-inflammatory biomarker of ANGPTL2 and the anti-inflammatory biomarker of adiponectin. It provides new evidence of mechanisms between physical activity and health in the elderly.

Individual, social and environmental determinants of physical activity in peri-urban Australia

Jenny Olson¹, Sonja March², Stuart Biddle³, Michael Ireland²

¹University of Southern Queensland, ²Institute for Resilient Regions, University of Southern Queensland, ³Physically Active Lifestyles Group (USQ-PALs), Institute for Resilient Regions, University of Southern Queensland

Peri-urban Australians experience poorer health/wellbeing compared to residents of major cities. Physical activity is critical for health and wellbeing; however, 70% of this population are insufficiently active. Neither benefiting from the range of activity-conducive characteristics of major cities, nor the full consequences of extreme isolation in rural localities, peri-urban communities are unique and warrant specific consideration. This study examines the correlates of physical activity among peri-urban Australians. The design was a quantitative cross-sectional survey of adults living in peri-urban Australia. The outcome was self-reported moderate and vigorous leisure-time physical activity (MVPA) in the previous week. Correlates were based on our prior qualitative work and established theoretical frameworks. These included demographic, health,

psycho-social and environmental factors. Preliminary analyses identified self-rated health, BMI, social cohesion, community participation, neighbourhood self-selection, aesthetics, autonomy, intentions, attitudes, norms, perceived behavioural control, action planning and automaticity as significant correlates of MVPA. Psycho-social factors demonstrated the strongest correlations with MVPA (e.g. intentions, $r=0.468$). Together, predictors explained a large proportion of variance (28.5%, $p<.001$) in MVPA. Individually, only intentions were uniquely associated with MVPA ($b=.34$, $p<.001$). This study is the first to systematically examine empirically- and theoretically-derived correlates of physical activity in this vulnerable population. Explaining almost a third of all variability in physical activity, the results can inform the development of policy and interventions designed to support physical activity participation for improved health among peri-urban Australians.

External funding details: JO was supported by an Australian Government Research Training Program Scholarship.

Influence of accelerometer calibration approach on MVPA estimates for adults

Charles Matthews¹, Sarah Keadle², David Berrigan¹, John Staudenmayer³, Pedro Saint-Maurice¹, Richard P. Troiano¹, Patty S. Freedson³

¹U.S. National Cancer Institute, ²California Polytechnic State University, ³University of Massachusetts – Amherst

Purpose: To compare estimates of moderate-vigorous physical activity (MVPA) duration derived from accelerometers calibrated only to walking and running activities to estimates from calibrations based on a broader range of lifestyle and ambulatory activities.

Methods: In a study of 932 older (50-74 yrs) adults we compared MVPA estimates from accelerometer counts based on three ambulatory calibration methods (Freedson 1952 counts/min (cpm); Sasaki 2690 cpm; activPAL 3 + METs) to estimates based on calibrations from lifestyle and ambulatory activities combined (Matthews 760 cpm; Crouter 3+ METs; Sojourn3x 3+ METs). We also examined data from up to 6 previous-day recalls describing the MVPA in this population.

Results: MVPA duration values derived from ambulatory calibration methods were significantly lower than methods designed to capture a broader range of both lifestyle and ambulatory activities ($p<0.05$). MVPA (hrs/d) estimates in all participants were: Freedson (median [inter-quartile range] = 0.35 [0.17-0.58]); Sasaki (0.91 [0.59-1.32]); and activPAL (0.97 [0.71-1.26]) compared to Matthews (1.82 [1.37-2.34]); Crouter (2.28 [1.72-2.82]); and Sojourn3x (1.85 [1.42-2.34]). Recall-based estimates in all participants were comparable (1.61 [0.89-2.57]) and indicated participation in a broad range of lifestyle and ambulatory MVPA.

Conclusion: Accelerometer calibration studies that employ only ambulatory activities may produce MVPA duration estimates that are substantially lower than methods calibrated to a broader range of activities. These findings highlight the potential to reduce differences among device-based measures of MVPA due to variation in calibration study design by including a variety of lifestyle and ambulatory activities.

Lipoprotein subclasses and their associations with physical activity and sedentary time in Norwegian schoolchildren: The Active Smarter Kids study

Paul Remy Jones¹, Olav Martin Kvalheim², Geir Kåre Resaland³, Sigmund Alfred Anderssen¹, Ulf Ekelund¹

¹Norwegian School of Sport Sciences, ²University of Bergen, ³Western Norway University of Applied Sciences

Background: Physical activity (PA) is associated with certain lipoproteins, but not consistently across lipoprotein subclasses. We examined cross-sectional associations in children between objectively measured PA and sedentary time (SED) with a number of biomarkers of lipoprotein metabolism.

Methods: We included 1055 healthy fifth-grade (mean age 10.2 yrs) Norwegian schoolchildren (47.4% females). PA intensity (light (LPA); moderate (MPA); vigorous (VPA)), and SED were assessed using accelerometry. We quantified 31 measurements of lipoprotein metabolism using nuclear magnetic resonance spectroscopy. We used linear regression (median regression for skewed data) models adjusted for age, sex, sexual maturity and socioeconomic status. Additional models were adjusted for adiposity. An isotemporal substitution regression model quantified associations of replacing 30 minutes LPA or SED with 30 minutes MVPA. We applied a false discovery rate adjustment to p-values.

Results: Total PA, LPA, MPA, VPA and SED were associated with 10, 0, 16, 19 and 5 of the 31 biomarkers, respectively. The number of significant associations were attenuated after adjusting for adiposity (10, 0, 12, 11, and 0), respectively. Substituting 30 minutes of SED or LPA for MVPA revealed significant associations with 22 and 21 biomarkers, respectively. Following adjustment for adiposity, 10 and 12 associations, respectively, remained statistically significant ($p < 0.05$).

Conclusion: PA of higher intensity is associated with certain biomarkers of lipoprotein metabolism independent of adiposity. Substituting SED or LPA for MVPA shows favourable associations with these biomarkers. This suggests that increasing PA of at least moderate intensity may favourably affect lipoprotein metabolism in healthy children.

External funding details: Research Council of Norway

Longitudinal relationships of physical activity and aerobic fitness with academic achievement in Japanese adolescents

Akira Kyan, Minoru Takakura, Masaya Miyagi, Minoru Kobayashi, University of the Ryukyus

Background: Physical activity (PA) and aerobic fitness (AF) do not only play an important role in improving health outcomes but also the level of academic achievement (AA) of adolescents. However, its causal relationship remains debatable. The purpose of this study was to explore the impact of PA and AF on the academic achievement of junior high school students over a three-year period.

Methods: In 2015, baseline data were collected from a total of 608 grade seven students (326 boys) at five public junior high schools in Okinawa, Japan. Of these, 570 students (304 boys) were eligible at the end of the two years. AF was assessed through the 20-meter shuttle run test. To gain information about students' PA, the 2-item assessment instrument (PACE +) was administered. Academic achievement was evaluated using the overall grade point average (GPA). To determine the predictive value of AF and PA at baseline for AA at follow-up assessment 2 years later, multiple linear regression analyses were conducted. All analyses were adjusted for BMI, family structure, parental education level, achievement motive, and baseline values of AA.

Results: After adjustment for the confounding factors, high AF was associated with higher subsequent GPA in boys. In girls, neither PA nor AF at baseline was associated with the overall GPA at follow-up.

Conclusions: We found a significant positive effect of AF on AA after adjusting for parental socioeconomic status and weight status, and psychological characteristics in boys.

External funding details: This study was supported by JSPS KAKENHI Grant Number JP15K12725.

Maintaining a high fitness physical activity pattern reduces cardiometabolic risk in Malaysian adolescents

Zoi Toumpakari¹, Russell Jago¹, Angeliki Papadaki¹, Yazid Jalaludin², Maznah Dahlui², Shooka Mohammadi², Nahar Mohamed², Tin Su², Hazreen Majid², Laura Johnson¹

¹University of Bristol, ²University of Malaya

Introduction: Limited evidence exists on physical activity (PA) patterns and cardiometabolic risk in Malaysia. A novel high-fitness PA pattern score, characterised by high frequencies of football, cycling, and activity in the evening, after school and at the weekend, was investigated for cardioprotective associations during adolescence

Methods: Participants (N = 1,828) were from the Malaysian Health and Adolescent Longitudinal Research Team study (MyHeARTs). Adolescents self-reported PA. Body Mass Index (BMI), fitness, waist circumference, % body fat, systolic and diastolic blood pressure (BP), fasting plasma glucose, LDL cholesterol and triglycerides were measured. Reduced Rank Regression derived a pattern incorporating the type/timing of physical activity from 13-17y, explaining 13% variation in cardiorespiratory fitness. Linear multilevel models estimated PA pattern trajectories by age. Standardised regression coefficients measured associations of PA trajectories with cardiometabolic risk at 17y adjusting for demographics, lifestyle, puberty and baseline cardiometabolic factors (in n = 508 with complete data).

Results: PA pattern score was mean -0.07 (SD 1.2) at 13y and declined by mean -0.0001 (SD 0.04) per year. A higher baseline PA pattern score was associated with a decrease in systolic BP ($B = -0.07$, $p = 0.02$) at 17y, and a faster decline in the pattern score was associated with an increase in later waist circumference ($B = 0.11$, $p = 0.02$) and BMI ($B = 0.11$, $p = 0.01$). There was no evidence of associations with other risk factors.

Conclusion: Targeting behaviours characteristic of a high-fitness PA pattern in early adolescence and preventing their decline, may help to reduce cardiometabolic risk later on.

External funding details: Funded by Medical Research Council grant MR/P013821/1.

Objectively assessed moderate-to-vigorous physical activity is strongly associated with cardiovascular disease after 15 years

Ing-Mari Dohrn, Maria Hagströmer, Karolinska Institutet

Introduction: We investigated associations of objectively assessed physical activity (PA) and sedentary time with morbidity in a nationally representative sample with 15-years follow-up.

Methods: Data from 1221 women and men, 18-75 years, from the population-based Sweden Attitude Behaviour and Change study were included. Exposure variables were tertiles of daily time spent sedentary, in light intensity PA and in moderate-to-vigorous PA (MVPA), and total counts from an Actigraph 7164 accelerometer. Data on diagnosed cardiovascular disease (CVD), cancer, type-2 diabetes, obesity, depression, dementia, and stroke were obtained from the National Patient Register, which includes all in-patient and out-patient care in Swedish hospitals. Kaplan-Meier survival curves and Cox proportional hazards models estimating hazard ratios (HR) with 95% confidence intervals were used for analyses.

Results: Over 14.2 years follow-up, 425 persons were diagnosed with at least one of the diseases. Kaplan-Meier analyses showed lower morbidity for CVD, cancer, obesity, dementia, and total morbidity for those in the highest tertile of MVPA compared with the lowest tertile; and lower morbidity for CVD, cancer, type-2 diabetes, and obesity in the highest tertile of total counts

compared with the lowest tertile ($p < 0.05$). Those in the highest MVPA tertile had a HR=0.51 (0.32, 0.82) for CVD, HR=0.88 (0.58, 1.33) for cancer, and HR=0.63 (0.48, 0.82) for total morbidity compared with those in the lowest tertile. A similar pattern was found for total counts. No associations were found between morbidity and light intensity PA or sedentary time.

Conclusion: This study confirms the importance of MVPA for preventing chronic disease.

External funding details: The original ABC study was funded by Stockholm County Council, Swedish National Centre for Research in Sports, and the project ALPHA, European Union Public Health Programme (agreement 2006120). This study was funded by Folksam Insurance, Sweden.

Physical activity and risk of myocardial infarction: An analysis of lifestyle behaviours in a large population-based cohort

Jason Lacombe¹, Miranda Armstrong², Charlie Foster², Lucy Wright¹

¹University of Oxford, ²University of Bristol

Myocardial infarction (MI) is responsible for 200,000 hospital admissions per year in the United Kingdom (UK). Physical inactivity, an unhealthy diet, smoking, and alcohol consumption are major modifiable lifestyle risk factors for MI. Here we examined the independent associations of these four lifestyle behaviours with incident MI and all-cause mortality in UK adults. We followed a total of 349,337 participants from the prospective UK Biobank Study (recruitment 2006-11). To assess physical activity (PA), questions on the baseline touchscreen questionnaire about walking, moderate PA and vigorous PA, which are similar to those found in the International Physical Activity Questionnaire, were used to estimate metabolic equivalent (MET) minutes/week of PA. Cox regression models were used to calculate the associations between PA, smoking, alcohol consumption, or fruit and vegetable intake with incident MI or all-cause mortality. During an average of 7 years follow-up, 3955 participants had experienced a first MI event, and 7230 had died. The greatest reduction in MI risk occurred in those who met PA guidelines (600-999 MET-minutes/week) when compared to inactive participants (<120 MET-minutes/week (RR=0.75, 95% FCI 0.69-0.81). No additional benefit was observed for higher levels of PA. Those who were most active (≥ 8000 MET-minutes/week) saw the greatest reductions in risk of death (RR=0.74, 95% FCI 0.67-0.83). Healthier levels of all four lifestyle behaviours led to reduced risk of death (ptrend <0.001). Overall, healthier behaviours reduced the risk of incident MI and all-cause mortality.

External funding details: Jason Lacombe is supported by the British Heart Foundation as part of a non-clinical studentship.

Physical activity correlates in the Thai population: A systematic review

Nucharapon Liangruenrom¹, Melinda Craike¹, Stuart Biddle², Zeljko Pedisic¹

¹Victoria University, ²University of Southern Queensland

Introduction: Understanding determinants and correlates of physical activity (PA) is crucial for the development of effective PA promotion strategies. No previous studies have systematically reviewed evidence on correlates of PA in the Thai population. This review, therefore, summarises available evidence on individual, social, environmental, and policy-related correlates of PA in the Thai population.

Method: A systematic literature search was conducted through ten bibliographic databases with additional articles identified through secondary searches including reference lists, relevant websites of Thai health

organisations, Google, and Google Scholar. Study selection was conducted independently by two authors.

Results: A total of 73 included studies investigated associations of PA with its 32 potential correlates among children and adolescents, 61 potential correlates among adults, and 75 among older adults. For nearly half of the explored variables the studies reported predominantly significant associations with PA (49.4%). However, consistent evidence from multiple studies was only found for the associations of higher PA levels with: male gender and lower age among children/adolescents; male gender and lower education level among adults; and higher income, better self-rated general health, better mental health, lower perceived barriers of exercise/PA, and better neighbourhood environment and facilities among older adults.

Conclusion: A number of correlates of PA in the Thai population have been explored in individual studies. However, strong evidence from multiple studies is lacking for most PA correlates. More studies on correlates in the Thai population are needed, particularly on social, environmental, and policy-related factors that are potentially related to PA.

Physical activity, sedentary behaviour and obesity in elderly women: A compositional analysis

Jana Pelcova, Nikola Štefelová, Jan Dygrýn, Jana Hodonská, Palacký University Olomouc

Purpose: The aim of the study was to investigate the combined effect of time spent in SB, light-intensity PA (LIPA), moderate PA (MPA) and vigorous PA (VPA) on the risk of obesity within a robust compositional data analysis framework in elderly women. Compositional character of the data was considered when conducting the analysis.

Methods: Accelerometer and body composition data of 314 elderly women (aged 66.6 ± 6.5 years, BMI 27.1 ± 4.4 kg/m², percent of body fat (FM%) 36.1 ± 7.1) were included into analysis. At least 7 valid days of monitoring with 10 h of accelerometer wear per day were required. According BMI values, the sample was divided into non-obese (111 women) and obese (203 women) group.

Results: According to compositional mean barplot, SB and VPA were the key drivers of the difference between non-obese and obese women. In obese women, the proportion of time spent in SB was higher by 11.7% and the proportion of time spent in VPA was reduced by 12.5% to the overall mean composition. In non-obese women, the proportion of time spent in SB was reduced by 20.5% and the proportion of time spent in VPA was higher by 24.2% to the overall mean composition. Results from compositional MM-regression implied that both BMI and FM% were positively associated with relative dominance of SB (β 1.83, 3.87, respectively, $p < 0.001$) and negatively associated with relative dominance of MPA and VPA (β ranging from -2.9 to -0.59, $p < 0.001$).

Conclusions: Re-allocating time from SB to MPA and VPA can prevent obesity in elderly women.

Risk of lung cancer and physical activity by smoking status and body mass index, the Norwegian Women and Cancer Study

Kristin Benjaminsen Borch¹, Elisabete Weiderpass², Tonje Braaten³, Merethe Selnes Hansen³, Idlir Licaj³

¹UiT, The Arctic University of Norway, ²3.Department of Research, Cancer Registry of Norway, Institute of Population-Based Cancer Research, Oslo, Norway, ³Department of Community Medicine

Introduction: We aimed to investigate physical activity (PA) and risk of different histological subtypes of lung cancer according to smoking status

and BMI and to take advantage of repeated measurements in a large cohort of women in Norway.

Methods: The study sample for the baseline data analysis consisted of 80,802 women. Repeated measurements of PA level, smoking, weight, and height were available for 54,691 women (63.2%), who were included in repeated measurement analyses combined with multiple imputation to address attrition. Cox proportional hazard regression models were used to calculate hazard ratios with 95% confidence intervals.

Results: During a median follow-up of 12.9 years, 782 cases of primary lung cancer were identified. We found an inverse dose-response association between PA and lung cancer overall. The results were consistent when using baseline data and repeated measurements of PA and possible confounders. We observed a similar trend for adenocarcinoma, but not for squamous cell or small cell carcinomas.

Conclusion: Our findings suggest a more pronounced association between lung cancer and PA levels in current and former smokers and in normal-weight and overweight participants with increasing PA levels.

External funding details: This project received financial support from the Norwegian Extra Foundation for Health and Rehabilitation through EXTRA funds, grant number 2012/2/0048 - 1220048001.

The role of exercise partner in sustained exercise participation among community-dwelling older adults: A 3-year longitudinal study

Yuya Fujii¹, Keisuke Fujii², Jaehoon Seol³, Naruki Kitano⁴, Tomohiro Okura³

¹Graduate School of Comprehensive Human Sciences, ²Ibaraki Prefectural University of Health Sciences, ³University of Tsukuba, ⁴Physical Fitness Research Institute, Meiji Yasuda Life Foundation of Health and Welfare

Purpose: This study aimed to investigate whether the ratio of exercise participation at 3-year follow-up differs according to the presence of exercise partner and identify more favorable types of exercise partners among older adults.

Methods: A 3-year longitudinal study was conducted through a mail survey in Japan. Subjects were 688 older adults (mean age: 72.8 ± 5.6 years; men: 45.2%) who had the habit of exercising (at least once a week) at baseline. We asked them about the presence of an exercise partner, with the following options (multiple answers allowed): by oneself, with spouse, with same-gender friends, with opposite-gender friends, and with exercise experts. At the 3-year follow-up period, subjects were asked about their exercise habits again. To investigate the relationship between the presence of exercise partner at baseline and exercise participation at follow-up, a logistic regression analysis adjusted for potential confounders was conducted.

Results: People who exercise with others showed a higher ratio of exercise participation at follow-up than those exercising by themselves (OR: 1.70, 95%CI: 1.13-2.58). Among people who exercise with others, exercise with same-gender friends (OR: 2.05, 95%CI: 1.07-3.90), opposite-gender friends (OR: 2.50, 95%CI: 1.06-5.95), and exercise experts (OR: 3.62, 95%CI: 1.37-9.57) were favorably associated with the ratio of exercise participation. Exercise with a spouse was not associated with future exercise participation.

Conclusion: The presence of exercise partner may contribute to sustained exercise participation among older adults. Especially, friends and exercise experts might be favorable types of exercise partners.

Weekend catch-up sleep, physical activity and childhood obesity

Wendy Yajun Huang¹, Stephen H. Wong²

¹Hong Kong Baptist University, ²The Chinese University of Hong Kong

Introduction: This study aimed to measure the weekend catch-up patterns of sleep and physical activity over a 2-year period, and to examine the prospective associations between these weekend patterns and obesity in Chinese children.

Methods: Prospective data from 599 Chinese children (54% boys) in the Understand Children's Activity and Nutrition (UCAN) cohort study were analyzed. Weekly patterns of obesogenic behaviors (physical activity and sleep duration) were assessed annually over a 2-year period. Moderate-to-vigorous physical activity (MVPA) and sedentary time were determined by ActiGraph accelerometry. Data on sleep durations and sociodemographic factors were obtained from parental-reports in response to questionnaires. Weekend catch-up sleep and MVPA patterns were calculated and examined in relation to childhood obesity after controlling for sociodemographic variables and sedentary time.

Results: Every additional hour of average weekly sleep duration was associated with a 16% decrease in the odds of obesity (OR: 0.841, 95%CI: 0.709-0.999). After adjustment of average sleep duration, weekend sleep catch-up categories showed no association with obesity risk. Over a 2-year period, approximately half of the children demonstrated weekend catch-up MVPA. Weekend catch-up MVPA for less than 20 minutes (OR: 0.473, 95%CI: 0.258-0.867) or more than 20 minutes (OR: 0.505, 95%CI: 0.257-0.993) were both related to lower risk of obesity.

Conclusions: Weekend catch-up sleep did not ameliorate the risk of childhood obesity, whereas weekend catch-up MVPA did reduce that risk. More research is needed to explore the factors contributing to these obesogenic behavior patterns.

External funding details: General Research Fund from the Research Grants Council, Hong Kong, China (GRF#451308).

Theme: Inequalities

Monday 15 October

An app that maps communities' physical activity assets and barriers

Christine Hancock, Phil Veasey, Elisabeth Morgans, C3 Collaborating for Health

Background: Addressing the risk factor of physical inactivity can help curb the non-communicable disease (NCD) epidemic. CHESSTM (Community Health Engagement Survey Solutions) is an innovative process to shift decision-making to local communities, while also reducing inequalities in the broader determinants of health. Emerging from research in India, China, Mexico and the United States, CHESSTM has been implemented in eight London boroughs and two United Kingdom communities.

Methods: CHESSTM engages communities in a data-driven investigation about health and the built environment. Using the CHESSTM application, community members collect and interpret quantitative data on local assets and barriers that are conducive to physical activity (or not!). Personal stories provide vital context about social, economic and health inequalities. These quantitative and qualitative results inform evidence-based recommendations, guided by public health expertise, for interventions that make it easier to be healthy. The community presents their recommendations to local decision-makers in a compelling argument for change. CHESSTM leverages social capital and mobile technology to address physical inactivity and equity issues, to make the healthy option the easy option for all.

Results: Thanks to evidence collected by CHESSTM, communities have been awarded over £2 million to improve physical activity opportunities in their neighbourhoods. An East London project led to two new playgrounds co-

designed with local parents. And, outcomes from a recently completed project in Scotland and England (which engaged over 5,000 people) included improving access to physical activity options through sport sessions, dance sessions, community clean-ups of multi-use game areas, and indoor and outdoor activity sessions.

Girls Active

Chris Wright, Ali Goodall, Youth Sport Trust

Girls Active tackles declining physical activity in adolescent girls. It's a partnership between teachers and girls working together to enable girls to fully engage in physical activity through leadership and marketing to develop, sell and deliver inspiring and relevant opportunities for all girls.

Girls Active starts with professional development for teachers, enabling them to reflect on practice and provision within school ensuring that girls are integral to designing, marketing and delivering opportunities to their peers.

Approaches include:

- Working with girls to revise the curriculum
- Using fundraising events as a basis for being active
- Profiling females as role models across the school
- Improving engagement in physical activity
- Creating a club for a targeted group of girls
- Raising adolescent health issues using physical activity e.g. breast cancer

Impact:

- Girls who look forward to PE (38% to 65.7%).
- 62% improved their view physical activity
- 50% more see activity as being feminine.
- Girls who look forward to sport (35.5% to 65.7%).
- 73.3% 'like the way they feel' after physical activity
- 50% increase in desire to be active
- Positive feelings about school (24% to 78%).
- 50% increase in girls who enjoy coming to school
- Number of days each week taking part in physical activity outside of school increased by +14%
- Number of days each week taking part in 60 minutes or more of physical activity increased by +17%
- Minutes a day spent doing physical activity each week increased by +14% (from 72 minutes to 82)

External funding details: YST TOP Foundation, Sport England Lottery, NIHR Research Fund

Is physical activity in middle-income countries driven by necessity or choice? Exploring the roles of motor-vehicle ownership and socioeconomic status on transport-based physical activity in Cuernavaca, Mexico and Chennai, India

Deborah Salvo¹, Deepti Adlakha², Aaron Hipp³, Ross Brownson⁴, Michael Pratt⁵

¹The University of Texas School of Public Health, ²Queens University Belfast, ³North Carolina State University, ⁴Washington University in St. Louis, ⁵University of California, San Diego

Introduction: Findings from middle-income countries (MIC) support that necessity (vs. choice) drives physical activity (PA). This study examined the role of socioeconomic status (SES) and motor vehicle ownership (MVO) on transport-based PA in Cuernavaca, Mexico (MEX), and Chennai, India (IND).

Methods: Cross-sectional analysis of 674 and 367 adults (≥18 years) from MEX (2011), and IND (2015), respectively. Data were collected using

standardized procedures of the International Physical Activity Environment Network study. Outcomes (yes/no) were: public transit use; active travel, ≥150 minutes/week of transport-based PA (TPA). Three logistic regression models were run per outcome: SES (income) as single-independent variable, MVO as single-independent variable, and SES plus MVO as mutually-adjusted independent variables. Models were adjusted for age, sex, marital status, and neighborhood cluster.

Results: In both sites, SES was inversely associated with public transit use, active travel, and TPA. After adjusting for MVO, the relation between SES and public transit use was no longer significant. In both sites, SES (IND: OR = 0.1, 95%CI = 0.1-0.4; MEX: OR = 0.7, 95%CI = 0.5,1.0) and MVO (IND: OR = 0.2, 95%CI = 0.0,0.6; MEX: OR = 0.2, 95%CI = 0.2,0.4) remained independently and inversely associated with active travel, and with TPA only in IND ([SES]OR = 0.1, 95%CI = 0.1,0.2, [MVO]OR = 0.3, 95%CI = 0.1,0.8). In MEX, only MOV remained significantly associated with TPA (OR = 0.7, 95%CI = 0.5,1.0).

Conclusion: Findings suggest that drivers of transport-based PA in MICs may be both necessity- and choice-driven. The independent effect of MVO on active travel implies that necessity is an important contributor. Socio-cultural norms such as status, social stigma, and cultural beliefs also appear to influence transport-based PA in MICs.

External funding details: This work was supported by an NCD Prevention Training Grant from the CDC Foundation (Mexico site), and by an International Dissertation Award from the Brown School of Washington University in St. Louis (India site).

Older Canadian adults living in public housing's perceptions of access to physical activity in their residential environment: a study using walk-along interviews

Kadia Saint-Onge, Paquito Bernard, Célia Kingsbury, Janie Houle, Université du Québec à Montréal

Introduction: Older adults and low-income individuals have been described as "hard to reach" through physical activity promotion. Worldwide, health inequalities have been observed between older adults having a low-income compared to the general population. In Quebec, Canada, the gap is even greater between low-income individuals living in public housing and those living in private dwellings. Improved access to physical activity in their residential environment (apartment, building and close neighbourhood) could possibly improve older adults living in public housing's activity levels and thus their well-being.

Method: Individual walk-along interviews were conducted with 27 older adults living in three public housing sites in Montreal, Canada. Thematic analysis served to survey perceptions of opportunities, facilitators and barriers to everyday all-level physical activity. Two raters coded transcripts guided by the Environmental human-friendliness model (EHF). It identifies four residential environment structures considered to foster well-being: 1) physical (built environment), 2) functional (available services), 3) participative (community participation) and 4) sociocultural (interpersonal interactions).

Results: Notable factors emerged from the participative, functional and sociocultural structures, but not the physical structure. Facilitators include an active tenants' association as well as knowledge and availability of low-cost opportunities, accompanied by information on which are appropriate according to specific health conditions. Conversely, interpersonal relations and low perception of control on their environment could hinder tenants' physical activity.

Conclusion: The EHF model allowed to reveal factors that may specifically help or hinder older adults living in public housing's physical activity. Potential courses of action will be discussed.

External funding details: Funded by the FRQ-SC.

Outdoor sports participation of women in urban areas of southern Europe: Motives and barriers

Vicky Dellas, Agnes Elling-Machartzki, Mulier Instituut

There are numerous advocacy and communication initiatives to enhance girls' and women's sport participation in European countries. However, less attention has been paid to design women friendly urban environments for recreational physical activity (RPA)/sports. Research showed that girls and women continue to experience more barriers, compared to boys and men regarding participation in outdoor PRA/sports. This may be especially the case in countries with lower gender equality in sports and larger society like many southern and eastern European countries.

The aim of this study is to identify barriers and motives of adolescent girls and women in southern Europe to participate in outdoor RPA/sports. The research is part of the larger Erasmus+ project Sport for women in Urban Places (SW-UP). A questionnaire will be distributed in March 2018 among adolescent (young) women, aged 15 to 65, in six southern European cities in five countries, with an aimed response of 200 per city. The questionnaire contains items about sociodemographic positions, sport participation, attitudes and about, possibly gender specific, motives and barriers (e.g. physical competence, self-consciousness, social support (partner/peers), experienced safety and inclusiveness to women of public sports places.

The results will be analyzed according to different structural and psychosocial perceived motives and barriers among specific groups of women (age, country of residence, education, household). The results will provide input to guidelines about how to further stimulate outdoor RPA/sports among different groups of women and how to design women friendly urban environments for outdoor RPA/sports.

Outdoor walking groups insufficiently address inequalities: Findings from a scoping review

Benjamin Rigby, Emily Oliver, Caroline Dodd-Reynolds, Durham University

Introduction: Outdoor walking groups are purportedly accessible physical activity interventions which may therefore address health inequalities. Critiquing this position, this paper presents findings from an equity-focused scoping review of published outdoor walking group literatures.

Methods: Arksey and O'Malley's protocol was followed to develop a comprehensive search strategy and identify relevant academic and grey literatures, which were screened using pre-defined inclusion and exclusion criteria. An extraction form was developed to chart data and collate article characteristics. Data were organised by Cochrane PROGRESS-Plus equity characteristics and thematically analysed across: (1) equity integration strategies; (2) intervention reach; (3) effectiveness; (4) potential social determinants of engagement.

Results: Sixty-two articles were included. Key findings in each theme were: (1) Intervention trials were commonly targeted. Delivered programmes demonstrated principles of proportionate universalism by tailoring national schemes to regional activity and health needs. However, participant demographics seldom informed analyses. (2) Participation was more likely among white, middle-class, middle-to-older aged, female and able-bodied adults. (3) Positive physical and psychological outcomes did not extend along social gradients. (4) Interventions primarily addressed intermediary determinants (e.g. psychosocial barriers; material resource). Social capital (e.g. friend-making) was identified as potentially important for addressing physical activity inequities.

Conclusions: Outdoor walking groups insufficiently address inequalities as advantaged subpopulations are typically afforded preferential access. Future research may address inequalities through multi-paradigmatic approaches, which focus on social determinants, rather than individualistic ecological perspectives.

External funding details: ESRC/Wolfson Research Institute (Durham, UK).

Prevalence and correlates of objectively measured sedentary time among pregnant women in the UK

Janelle Wagnild, Helen Ball, Tessa Pollard, Durham University

Introduction: While sedentary behaviour has been increasingly examined among the general population, the prevalence and correlates of sedentary behaviour during pregnancy are poorly understood.

Methods: Pregnant women recruited from two hospitals in the North East of England wore activPAL accelerometers continuously for seven days during the 20th week of pregnancy (second trimester). Those who provided at least four valid days of measurement ($n = 192$) were included in analyses.

Results: On average, participants spent 9.57 hours ($SD = 1.62$) per day sedentary, which accounted for 65.2% of waking hours. Univariate analyses indicated that BMI ($b = -2.65$, $p = 0.04$) and index of multiple deprivation (IMD) tertile ($p < 0.01$ for trend) were significant predictors of sedentary time (minutes). However, in a multivariate model adjusting for age, BMI, and other factors, IMD tertile was the only significant predictor of sedentary time such that residing in a neighbourhood corresponding with the middle tertile was associated with significantly higher sedentary time ($b = 49.6$, $SE = 19.2$, $p = 0.01$) compared to the most deprived tertile. While the least deprived tertile followed a similar pattern, this did not reach significance ($b = 30.4$, $SE = 19.5$, $p = 0.12$).

Conclusion: In this sample of pregnant women, sedentary time accounted for the majority of waking hours, and living in less-deprived areas was associated with higher sedentary time than residing in the most deprived IMD tertile. These findings are among the very first to describe an association between socioeconomic position and objectively measured sedentary time during pregnancy.

Socioeconomic inequalities in participation and the amount of moderate-to-vigorous physical activity: analysis using the Health Survey for England 2008 and 2012

Shaun Scholes, Jennifer Mindell, Epidemiology & Public Health, University College London

Introduction: It is unknown whether describing socioeconomic inequalities using the average amount of time spent in moderate-to-vigorous physical activity (MVPA) masks differences in the proportion of persons that are active or differences in the amount of activity performed by those who are active.

Methods: Hurdle models are increasingly used in physical activity research to accommodate outcomes with a stack of zeros (non-participation) and a continuous positively-skewed part (amount amongst those active). Using the Health Survey for England (HSE 2008; 2012), we applied hurdle models to estimate inequalities in these two separate parts of MVPA data, and assess changes over time. Analyses were sex-specific and adjusted for potential confounders.

Results: Differences in the proportions of persons active per week were largest for overall MVPA (difference in percentage active for highest-versus lowest-income tertiles: 14.9 percentage points (pp) men; 12.7pp women); walking (20.5 pp; 15.8 pp); and sports (22.7 pp; 25.0 pp). Amongst those who were active, differences in the average hours-per-

week (hpw) spent active between the highest- and lowest-income tertiles were most pronounced in overall MVPA [men: 3.8 hpw (95%CI: 2.6-4.9); women: 3.4 hpw (2.5-4.2)]. Amongst both sexes, time spent in sports/exercise was 1.3 hpw higher in the highest-income group. Time spent walking showed the opposite pattern amongst men [-1.9 hpw (-2.8 to -1.0)], but showed no difference amongst women. Patterns were similar in 2008 and 2012.

Conclusions: Inequalities were more pronounced for participation than for the amount of activity, highlighting the importance of tackling inactivity. Our results will be updated when HSE 2016 data are available (spring 2018).

Sports-based active recreation for children and young people living in marginalized neighbourhoods: a life course and settings-based approach for reducing inequality in health

Peter Elsborg¹, Glen Nielsen², Charlotte D. Klinker³, Julie H. Christensen³, Paulina S. Melby³, Peter Bentsen³

¹Steno Diabetes Center Copenhagen, ²Department of Nutrition, Exercise and Sports, University of Copenhagen, ³Health Promotion Research, Steno Diabetes Center Copenhagen

The rising global burden of non-communicable diseases (NCDs) amongst the lowest social classes in society has heightened the awareness of the necessity for primary risk prevention programs in marginalized neighborhoods.

Viewing this problem through a life course perspective and taking a risk population approach points to the solution of making sustainable changes with children and young people that belong to marginalized groups in society. This is proposed to be achieved through programs that facilitate long-term behavior changes in children and adolescents living in marginalized neighborhoods with the aim of reducing NCD risk factors and disease onset in later-life. Ample empirical evidence supports that extrinsic motives for participating in physical activities, such as increasing health, are insufficient when long term participation is the goal.

In this debate paper, we argue that interventions with the aim of reducing the social gradient in health should adopt a settings-perspective and include activities which hold both broad health and sustainable participation potentials. Here, we advocate that basing such interventions on sports-based active recreation hold several advantages. To argue these advantages a comprehensive argument model is presented demonstrating why interventions that provide sport-based active recreation activities are an especially beneficial direction for future interventions and intervention-based research.

External funding details: The research is funded by the Novo Nordisk Foundation (NNF17SH0026986).

Theme: Interventions—Adults

Monday 15 October

A rapid review to identify physical activity accrued whilst playing golf

Jack Luscombe¹, Andrew Murray², Evan Jenkins¹, Daryll Archibald³

¹University of Edinburgh, ²Physical Activity for Health Research Centre, University of Edinburgh, ³School of Psychology and Public Health, La Trobe University

Objective: To identify physical activity accrued whilst playing golf, and modifiers of physical activity accrued.

Design: A rapid review of primary research studies. Quality was assessed using the National Heart, Lung, and Blood Institute quality assessment tool for cohort and cross-sectional studies.

Methods and outcomes: The following databases were searched from 1900 to March 2017: SPORTDiscus, Web of Science, PsycINFO, MEDLINE, Google Scholar, Google Advanced Search, ProQuest, World Health Organisation International Clinical Trials Registry Platform. All primary research investigating golf or golfers with any of the following outcomes was included: metabolic equivalent of task, oxygen uptake, energy expenditure, heart rate, step count, distance covered, strength, flexibility, balance, sedentary behaviour.

Results: Phase one searching identified 4944 citations and phase two searching identified 170 citations. In total 19 articles met inclusion criteria. Golf is primarily a moderate intensity physical activity, but may be low intensity depending upon the playing population and various modifiers. Less physical activity is accrued by those who ride a golf cart compared to those walking the course.

Conclusions: Golf can be encouraged in order to attain physical activity (PA) recommendations. Further research is required into the relationship between golf and strength and flexibility physical activity recommendations, and how modifiers affect physical activity accrued.

Systematic review registration: PROSPERO 2017:CRD42017058237

External funding details: Dr Andrew Murray works in a clinical capacity for the European Golf Tour, and has received research funding (although not for this project) from the World Golf Foundation.

Ageing well with physical activity in the over 75's

Jessica Jeffreys¹, Karen Tocque²

¹Brio Leisure CIC, ²University of Chester

Introduction: Brio Leisure trialled a novel Public Health intervention, with a view to making a measurable difference to the quality of life and wellbeing of older people living in Cheshire West and Chester.

Method: A free membership to all 75+ year old residents was rolled out in 2015 to support improved health and wellbeing in a rapidly increasing aging population. All attendances for these members was extracted from Brio's membership activity database and analysed with regard to the type of activity.

Results: During 2016/17, there were 1,450 75+ concession members (4.6% reach). In reality, only two thirds of these (960) actually attended one of Brio Leisure facilities; 33% did not actually attend. In total, these 960 individuals had over 40,000 attendances (an average of 42 attendances per person) over a 14 month period, equating to 3 times per month. The main activities were swimming (19 times) and gym (13 times) but they also made use of the sauna (5 times), fitness programmes (2.5 times) and aquafit (2 times). Prior to this scheme, only 203 (14%) of free 75 concessions were previous members.

Conclusion: Whilst these elderly individuals may already be the more active residents of the borough, evaluating the impact of this programme has led to a revised scheme and a review of targeted support for hard to reach cohorts which is financially sustainable.

External funding details: £54k (4.8%) per annum of a £1.18 PH Integrated Wellbeing service awarded to Brio Leisure was allocated to provide the free memberships to residents aged 75+.

Community-based, citizen-led approach to jogging participation- examples from jogsotland and parkrun UK

Godze Ozakinci, University of St Andrews

Purpose: A variety of programmes exist aiming to increase physical activity with differing levels of success. Approaches involving volunteers and physical activity taking place outside gym environments are popular. The purpose of the studies was to understand the facilitators and barriers of continued participation and participant characteristics when it comes to two popular community-based approaches.

Methods: Two studies will be presented. Study 1: Interviews were conducted from three 'jogscotland' groups (Scotland's recreational running network for runners of all abilities) (N=20; 11 women; Age: 29-77). Self-determination theory guided the study and thematic analysis was used. Study 2: A cross-sectional online/paper survey of parkrunners with open-ended items (N=655; 322 women; Age: 16-79) was conducted in 4 UK parkrun sites using participatory action research.

Results: jogscotland data indicated several themes: inclusivity of the groups facilitating participation; social-contextual factors fostering feelings of 'competence' enhancing intrinsic motivation; and a combination of intrinsic and integrated regulation factors sustaining the activity.

parkrun data showed that the sense of belonging to parkrun in a familial sense; sense of achievement and challenge; health/wellbeing benefits; and the event format were key factors for participation.

Both groups emphasised the importance of structure and the volunteer-led nature of these activities for its success.

Conclusions: These complementary data show that volunteer-led, community-based approaches to physical activity offer potential for sustainable behaviour change. Increasing access to these approaches need to be considered in policy development to increase public health benefit.

External funding details: The parkrun work was funded by Cancer Research Cancer Prevention BUPA Foundation Fund

Efficacy of a multi-component intervention to reduce workplace sitting time in office workers: A cluster randomised controlled trial

Daniel Bailey¹, Benjamin Maylor¹, Charlotte Edwardson², Julia Zakrzewski-Fruer¹, Rachael Champion¹

¹University of Bedfordshire, ²University of Leicester

Introduction: High levels of sedentary behaviour are associated with poor metabolic health and increased risk of cardiometabolic disease and mortality. Office workers are an important population to target reduction in sedentary behaviour due to prolonged periods of sitting in the workplace. The aim of this study was to investigate the efficacy of a work-based multicomponent intervention to reduce office workers' sitting time.

Methods: Offices (n=12; 89 workers) were randomised into an 8-week intervention (n=48) incorporating organisational (education and brainstorming session, step challenge), individual (health report feedback, software prompts, telephone support), and environmental elements (changes to workspace) or control arm. Sitting time and physical activity (activPAL) and cardiometabolic health were measured at baseline and at the end of intervention.

Results: Linear mixed modelling revealed no significant change in workplace sitting time but changes in workplace prolonged sitting time (-39 min/shift), sit-upright transitions (7.8 per shift) and stepping time (12 min/shift) at follow-up were observed, in favour of the intervention group (p<0.01). There were also significant changes in the number of sit-upright transitions (4 [0.8, 7.2] transitions/day) and total steps (550 [276, 825] steps/day) across the whole day, in favour of the intervention group. Results for cardiometabolic health markers were mixed.

Conclusion: This short multicomponent workplace intervention was unsuccessful at reducing total sitting time but successful at reducing

prolonged sitting time and increasing physical activity in the workplace. The potential for incorporating such interventions into common workplace practice now requires investigation.

Evaluation of the implementation of a national workplace sport and physical activity intervention

Emma Adams, Loughborough University

Introduction: Understanding how to effectively implement interventions at scale is important for increasing population physical activity levels. This study aimed to identify the factors which influenced the implementation of the Workplace Challenge, a national sport and physical activity intervention in England.

Methods: Interviews/focus groups were conducted using a semi-structured protocol with delivery partners (n=7 interviews), workplace representatives (n=6 interviews), workplace champions (n=10 interviews) and programme participants (n=9 focus groups). Data were coded in NVIVO 10 and analysed thematically to identify factors influencing implementation.

Results: Four overarching themes emerged: 1) delivery model (national leadership with local delivery, ability to adapt national programme to suit local needs, comprehensive intervention package, local partnership development, support from National Governing Bodies, responsive to feedback); 2) workplace engagement (no joining cost, inclusiveness, flexibility in using the intervention to complement existing workplace health programmes, positive influence on workplace culture for physical activity and health promotion); 3) engagement of the target group (tailored information, low level taster sessions/alternative activities, emphasis on fun, enjoyable and social activities, awareness raising and prompting intention formation, use of incentives, role of workplace champions); and 4) employee participation (individual registration, flexible participation, competition element, benefits for working relationships and morale).

Conclusions: A number of factors were identified which influenced the successful implementation of a national scaled-up workplace physical activity intervention. These factors should be taken into consideration in developing future workplace physical activity interventions to facilitate successful scale-up.

External funding details: Workplace Challenge was funded through Sport England's Lottery Funded Get Healthy Get Active portfolio.

HIIT@work: Acute circulatory, metabolic, thermal, cognitive and perceptual responses to prolonged sitting interrupted by a six-minute session of high-intensity interval exercise

Birgit Sperlich¹, Ine De Clerck², Billy Sperlich¹

¹Julius-Maximilian University Würzburg, ²Artevelde University College Ghent

Introduction: Experimental studies indicate that interrupting prolonged sitting with light physical activity reduces harmful cardio-metabolic health risks for physically inactive individuals. However, such short-term improvement in the metabolic profile could not be observed in physically active. The aim of this study was to examine health aspects while sitting following a brief session of high-intensity interval exercise (HIIT).

Methods: Twelve students (5 men; age, 22 ± 2 yrs) performed two trials involving either simply sitting for 180 min (SIT) or sitting for this same period with a 6-min session of HIIT after 60 min sitting (SIT+HIIT). At T₀ (after 30 min of resting), T₁ (after a 20-min breakfast), T₂ (after sitting for 1 h), T₃ (immediately after the HIIT), T₄, T₅, T₆ and T₇ (30, 60, 90 and 120 min after the HIIT), circulatory, metabolic, thermoregulatory, cognitive, and perceptual responses were assessed.

Results: The blood lactate concentration (at T₃-T₅), heart rate (at T₃-T₆), oxygen uptake (at T₃-T₇), respiratory exchange ratio, and sensations of heat (T₃-T₅), sweating (T₃, T₄) and odor (T₃), as well as perception of vigor (T₃-T₆), were higher and the respiratory exchange ratio (T₄-T₇) and mean body and skin temperatures (T₃) lower in the HIIT trial compared to only SIT-trial. Levels of blood glucose, feelings of anxiety/depression, fatigue or hostility, as well as the variables of cognitive function did not differ between HIIT and SIT+HIIT.

Conclusion: Interruption of prolonged sitting with a 6-min session of HIIT induced more pronounced circulatory and metabolic responses and improved certain aspects of perception.

The effects of exercise interventions on sedentary behaviour in women - intermittent versus continuous walking: Effects on physiological and psychological variables in sedentary employees during a 10-week intervention

Mynor Rodriguez-Hernandez¹, Danielle Wadsworth²

¹University of Costa Rica, ²Auburn University

Introduction: This study evaluated the effects of two different walking programs on psychological (self-regulation and self-efficacy) and physiological (Body composition, HbA1c, VO₂, MVPA, sedentary behavior) outcomes.

Methods: Fifty-one female sedentary employees were randomly assigned to one of three groups: intermittent walking (Age = 46 ± 9 years, BMI = 30.33 ± 5.79 kg/m²), continuous walking (Age = 48 ± 9 years, BMI = 30.53 ± 6.17 kg/m²) or control group (Age = 42 ± 10 years, BMI = 27.66 ± 5.11 kg/m²). Experimental groups were time and intensity matched and walking behavior was completed independently. Self-regulation and self-efficacy questionnaires, MVPA, sedentary behavior, and VO₂ were obtained at baseline, week 6, and week 11. HbA1c and body composition were obtained at baseline and week 11. Daily walking was measured via a wrist worn accelerometer.

Results: The continuous group significantly improved in self-regulation from pre-test to week 6 and week 11 (p < 0.05); increased MVPA from pre-test to week 6 (p = 0.009); increased daily steps from pre-test to week 6 (p = 0.033), had a significant higher percentage of change in MVPA compared to the control group (p < 0.05) and significantly reduced HbA1c (p < 0.05). Intermittent walking group increased lean mass significantly (p < 0.001). Fat mass, body weight, and fat percentage decreased significantly for all three groups (p < 0.05). No changes in VO₂ or sedentary behavior (p > 0.05) were observed. Self-efficacy decreased significantly from pre-test to week 6 (p = 0.047) and to week 11 (p = 0.008) for all groups.

Conclusions: Continuous walking activity seems to be a better approach to improve self-regulatory skills, physical activity and HbA1c and may provide a more feasible approach to prescribe exercise in sedentary office employees.

The Park Prescription Trial: Prescribing physical activity and park use to promote health and well-being of adults in Singapore

Falk Müller-Riemenschneider¹, Jiali Yao¹, Anne H Y Chu¹, Angelia Sia², Anbumalar Ramiah³, Michael Wong³, Han Jane³, Bee Choo Tai¹, Léonie Uijtdewilligen¹

¹National University of Singapore, ²National Parks Board, ³Khoo Teck Puat Hospital

Purpose: This trial investigates the effectiveness of a carefully developed park prescription intervention to improve physical activity (PA), PA in parks, physical and mental well-being among community-dwelling adults.

Methods: Participants aged 40 to 65 years were recruited through Population Health Screenings in Singapore if they were physically inactive, passed the PA Readiness Questionnaire and had blood pressure and blood glucose values within healthy ranges. They were randomly assigned to the Park Prescription Intervention or control. Participants completed baseline, 3- and 6-months follow-up assessments, including self-report questionnaires, accelerometer assessment, and health screening. T-test was used to compare outcomes between groups. A p-value < 0.05 was considered statistically significant.

Results: Eighty participants were allocated to each group with comparable characteristics at baseline. Participants were predominantly female (79.4%), of Chinese ethnicity (81.3%) and married (78.8%). At the 6-month follow-up, 90.6% of the participants provided outcome data. Mean time (minutes/month) spent in parks (Intervention: 333.9 ± 506.2; control: 186.4 ± 358.4; p-value: 0.047) and PA in parks (Intervention: 333.0 ± 499.3; control: 140.5 ± 270.7; p-value: 0.005) was significantly greater in the intervention group. Objectively measured PA, physical health and mental well-being outcomes will additionally be reported.

Conclusion: Park Prescription has the potential to be applied in community screenings in Singapore. Findings suggest that the intervention effectively increased park use and PA in parks. Outcomes on objectively measured PA, physical and mental well-being will provide further insights into the effectiveness of the intervention.

External funding details: National Parks Board Singapore and the National University of Singapore.

Sit less or exercise more? Differential effects on endothelial and metabolic risk markers

Bernard Duvivier¹, Johanne Bolijn¹, Annemarie Koster¹, Casper Schalkwijk², Hans H.C.M. Savelberg¹, Nicolaas C. Schaper²

¹Maastricht University, ²Maastricht University Medical Centre +

Introduction/Background: Recent studies suggest that substituting sitting with light physical activity has beneficial metabolic effects, but if this is associated with parallel changes in endothelial function is unclear.

Method: Data from three randomised cross-over studies, in which 61 subjects (normal weight; overweight; type 2 diabetes) followed different activity regimens (Sit, SitLess and/or Exercise) of four days each, were analysed. Subjects were instructed to sit 14 h/day ('Sit'), to substitute 1 h/day of sitting with moderate-to-vigorous cycling ('Exercise') or to substitute 5-6 h/day sitting with light-intensity walking and standing ('SitLess'). The Exercise and SitLess regimens were designed to have comparable energy expenditure. Physical activity was assessed 24 h/day by accelerometry (ActivPAL) and diet was standardised. Fasted circulating biomarkers of endothelial dysfunction, lipids and insulin sensitivity (HOMA2-IR) were assessed the morning after each activity regimen. The endothelial dysfunction score (ED-score) was computed by averaging the Z-scores of the circulating biomarkers of endothelial dysfunction (sVCAM1, sICAM and sE-selectin).

Results: Compared to Sit, Exercise resulted in a lower ED-score (p=0.003), while no change was observed after SitLess and the ED-score after Exercise was lower compared to SitLess (p=0.001). In contrast, compared to Sit, insulin sensitivity and plasma lipids (HDL-cholesterol, non-HDL-cholesterol, total cholesterol and Apo B) were improved after SitLess (p<0.017) but did not change after Exercise.

Conclusions: Light physical activity and moderate-to-vigorous physical activity had a differential effect on risk markers of cardio-metabolic health and suggest the need of both performing structured exercise as well as reducing sitting time on a daily basis.

What they talk about when they talk about running- implications for behaviour change of beginner runners' unhelpful beliefs about running

Katy Kennedy, University of Surrey, UK

Introduction: Beginner running groups are a popular way to start to run, providing an opportunity for examining trajectories of behaviour change and factors associated with success. The purpose of the Running Commentary study was to investigate participants' experiences in beginner running groups, following up to examine physical activity behaviour change.

Methods: This was a longitudinal, mixed methods field study, using mobile audio recordings and follow-up online questionnaires with 70 participants from 13 UK beginner running groups. Audio recordings were transcribed and analysed thematically using an inductive interpretative approach, combined with questionnaire data on running success at six months. A major theme identified and linked to dis/continuing running was how participants talked about 'what running is'.

Findings: Participants' use of concepts such as 'running should be hard', 'running is natural' and 'running is social' were key to negotiating running success or justifying drop-out. For example, believing 'running should be hard' meant participants ran unsustainably fast, with beginners thinking they were 'doing it wrong' if they weren't in discomfort or pain. However, successful participants used contrasting concepts, e.g. 'running is a challenge' or 'running should be enjoyable' to complement or challenge such beliefs. Implications for policy and practice are identifiable, such as social marketing and training for running group leaders, particularly emphasising older or less physically active demographics.

Conclusions: Participants' beliefs expressed about running were associated with long-term success rates. Transforming such taken for granted beliefs about running could improve beginner running experiences, with potential for contributing to physical activity behaviour change.

Tuesday 16 October

A gamefully designed intervention to impact motivation for physical activity and physical activity levels

Dominique Gummelt¹, Sebastian Deterding², Ernesto Medina³, Afroditi Stathi⁴

¹Andrews University, ²University of York, ³Loma Linda University, ⁴University of Birmingham

Introduction: Gameful design has been shown to have potential to increase motivation for physical activity (PA). However, well-designed theoretically grounded interventions identifying effective gamefully designed methods to support increased PA are still lacking.

Purpose: To assess whether a gamefully designed, web-based pilot intervention can impact motivation for PA and PA levels in sedentary adults between the ages of 25 – 44.

Methods: Participants (n = 83; mean age = 33.56; SD = 6.4; females = 48) were randomized, to either a six-week participation in a commercial web-/mobile-based gamefully designed PA application (consisting of various features including tracking PA, challenges, group engagement, feedback, earning badges and points) or to a control group. Assessments were conducted at six weeks, three months and six months including objective measurement of MVPA, the Behavioural Regulation of Exercise Questionnaire (BREQ-2) and the Intrinsic Motivation Inventory (IMI). Changes in MVPA and the relationship between intrinsic motivation for PA and MVPA levels were examined.

Results: No statistically significant changes to MVPA were observed (treatment x time interaction $p = 0.57$). At six weeks the intervention group showed statistically significant increased levels of identified regulation (internalised motivation) for PA ($p = 0.04$). Overall a significant association ($p = 0.03$) between intrinsic regulation and MVPA was also observed (adjusting for age, gender, baseline BMI, baseline MVPA, and time).

Conclusion: The small sample size reduced the statistical power to detect changes in MVPA and intrinsic motivation. The results related to internalised motivation merit further evaluation of more complex processes via qualitative assessment.

An m-health workplace-based 'sit less, move more' program: Impact on employees' sedentary and physical activity patterns.

Judit Bort-Roig¹, Emilia Chirveches-Pérez², Maria Giné-Garriga³, Lydia Navarro-Blasco⁴, Roser Bausà-Peris⁴, Pedro Iturrioz-Rosell⁵, Angel M González-suárez⁶, Iván Martínez-Lemos⁷, Emma Puigoriol-Juvanteny⁸, Kieran Dowd⁹, Anna Puig-Ribera¹⁰

¹University of Vic–Central University of Catalonia, Vic, ²Research Group on Methodology, Methods, Models and Health and Social Outcomes (M3O), Faculty of Health Sciences and Welfare, Universitat de Vic–Central University of Catalonia. Clinical Epidemiology Unit, Hospital Consortium Vic, ³Physical Activity and Sport Sciences Department, FPCEE Blanquerna, Universitat Ramon Llull., ⁴Hospital de Santa Creu i Sant Pau, ⁵Osakidetza, Servicio Vasco de Salud, ⁶Departamento de Educación Física y Deportiva, Universidad del País Vasco, ⁷Facultad CC.EE. e de Deporte, Universidad de Vigo, ⁸Tr2lab Tissue Repair & Regeneration, Faculty of Health Sciences and Welfare, Universitat de Vic–Central University of Catalonia. Clinical Epidemiology Unit, Hospital Consortium Vic, ⁹Department of Sports and Health, Athlone Institute of Technology, ¹⁰Research Group on Physical Activity and Sports, Centre for Health and Social Care Research, Department of Physical Activity Science, University of Vic–Central University of Catalonia

Introduction: This study evaluated the short-term impact of a 12-week m-health workplace-based 'sit less, move more' intervention (Walk@WorkApp; W@W-App, 2015) on objectively-determined physical activity (PA) and sedentary behaviours in employees.

Method: A site randomised control trial recruited employees at four Spanish hospitals (n = 141; 45 ± 9 years; 82% female). Participants were assigned by hospital to an Intervention (IG; used W@W-App; n = 90) or an active Comparison group (A-CG; monitored occupational activity n = 51). W@W-App, installed on participants' own smartphones, provided real time feedback for occupational sitting, ambulatory activity and gave access to automated strategies to sit less and move more at work. A mean comparison for repeated measures assessed changes in total sitting time, sedentary bouts, light and moderate-to-vigorous PA (activPAL 3™; minutes/day) between baseline and after program completion during weekdays and weekends.

Results: Over the A-CG, the IG reported a higher proportion of sedentary time in shorter bouts from 5 to 10 minutes ($p = 0.013$) outside work and a higher time spent in total moderate-to-vigorous PA ($p = 0.016$). Non-significant changes were found for light intensity PA and total sitting time.

Conclusion: W@W-App reduced prolonged periods of sedentary behaviour outside work but not during working hours, providing translational evidence that m-health programmes might have the potential to improve employees' daily sedentary patterns.

External funding details: The W@W-App Project was supported by the Spanish Ministry of Science and Innovation (DEP2012- 37169).

BariFit: Mobile health intervention to improve physical activity after bariatric surgery

Dori Rosenberg¹, Predrag Klasnja², Jane Anau², Chris Mack², Jing Zhou², Kevin Filocamo², Anirban Gupta¹, David Arterburn²

¹Kaiser Permanente Washington, ²Kaiser Permanente Washington Health Research Institute

Introduction: Physical activity remains low after bariatric surgery. Mobile health holds promise for supporting improvements in physical activity, particularly when embedded in clinical care. We developed and tested the feasibility of the BariFit intervention to increase walking after bariatric surgery.

Methods: Participants were recruited at Kaiser Permanente Washington at their post-operative visit (N=45 completers; mean age=45, % female=84; mean pre-surgery BMI=42.0). Between 1-2 months post-surgery, participants were given several commercial mHealth tools (Fitbit Charge 2, Fitbit app, and Withings scale), text messages providing daily adaptive step goals and contextually-tailored suggestions for 4 months, and progress reports at surgery follow-up visits. Step counts were assessed using the activPAL worn for 7 days before starting BariFit (baseline) and 4 months later and with Fitbit data from the first and last 2 weeks of the intervention.

Results: Among 27 participants with valid activPAL data, step counts increased by 1371 steps on average (p=.07). Among 43 participants with valid Fitbit data, mean step counts increased by 350 steps/day (p=.27).

Conclusions: Fitbit data was available for a larger number of participants but showed that steps improved only slightly over the course of the intervention; however, the Fitbit data did not have a true baseline level of steps. activPAL data collection was problematic in this population though those with activPAL data (i.e. a true baseline step count) had improvements in steps with a highly scalable and low-burden mHealth intervention warranting further investigation.

Effects of active commuting and leisure time exercise on markers of cardio-metabolic health in individuals with overweight and obesity: A randomised trial

Martin Petersen¹, Mads Rosenkilde¹, Anne Sofie Gram², Marie Tindborg², Anders Nymark Christensen³, Jonas Salling Quist², Bente Merete Stallknecht²

¹University of Copenhagen, ²University of Copenhagen, ³Technical University of Denmark

Objectives: To evaluate cardio-metabolic health effects of active commuting and leisure-time exercise of moderate and vigorous intensity.

Trial design: Single centre randomized controlled trial with repeated measures.

Primary outcome: Peripheral insulin sensitivity

Methods: Physically inactive, healthy, Caucasian women and men (20–45 years) with overweight or class 1 obesity (BMI: 25–35 kg/m²) were randomized in a 1:2:2:2 ratio to 6 months of no intervention (CON), active commuting (BIKE), or moderate (MOD, 50% VO_{2peak}) or vigorous intensity (VIG, 70% VO_{2peak}) leisure-time exercise. Exercise frequency was 5 days/week with a weekly exercise energy expenditure of 1600 kcal for women and 2100 kcal for men. Neither participants nor researchers were blinded to group allocation. Clinicaltrials.gov identifier: NCT01962259

Results: The study was completed in June 2016. 188 participants were recruited; of these 130 were randomized and 100 (CON n=16, BIKE n=20, MOD n=33, VIG n=31) completed follow-up testing. Peripheral

insulin sensitivity was 24% (CI95% 6 to 46, P=0.01) higher in VIG compared with CON after 3 months and tended to be higher in VIG compared with BIKE (P=0.06). After 6 months, peripheral insulin sensitivity was increased by 20% in BIKE (CI95% 1 to 43, P=0.04) and 25% in VIG (CI95% 7 to 47, P<0.01) compared with CON and a strong tendency for an increase was seen in MOD (17%, CI95% -0.2 to 37, P=0.053).

Conclusions: Active commuting conveys long-term cardio-metabolic health benefits on par with leisure-time exercise. Leisure-time exercise of vigorous intensity confers effects on peripheral insulin sensitivity at an earlier time point.

External funding details: The work is carried out as a part of the research program 'Governing Obesity' funded by the University of Copenhagen's Excellence Programme for Interdisciplinary Research (<http://go.ku.dk/>). Additional funding was provided by the Faculty of Health and Medical Sciences, University of Copenhagen, TrygFonden and Gerda and Aage Haensch's Fond.

Effects of active commuting and leisure-time exercise on total and non-exercise energy expenditure in individuals with overweight and obesity

Jonas Salling Quist¹, Mads Rosenkilde¹, Martin Bæk Blond¹, Anne Sofie Gram¹, Kevin Hall², Peter Walter², Bente Stallknecht¹

¹University of Copenhagen, ²National Institute of Diabetes and Digestive and Kidney Diseases

Background: Controversy exist whether physical exercise affects total energy expenditure (TEE) and non-exercise energy expenditure (Non-ExEE) in individuals with overweight and obesity.

Objective: To examine effects of active commuting and leisure-time exercise on TEE and NonExEE in individuals with overweight and obesity.

Methods: In a sub-study of a randomized controlled trial in younger, physically inactive women and men with overweight and obesity (BMI: 25–35 kg/m²), 32 participants completed 6 months of habitual lifestyle (CON, n=6), active commuting (BIKE, n=7), or leisure-time exercise of moderate (MOD, 50% VO_{2peak}-reserve, n=13) or vigorous intensity (VIG, 70% VO_{2peak}-reserve, n=8). TEE was measured by doubly labeled water at baseline, 3, and 6 months. Exercise energy expenditure (ExEE) was calculated based on heart rate monitoring. Here we present preliminary results.

Results: ExEE did not differ between groups (p≥0.16) as intended by study design. TEE did not change in any of the exercise groups after 3 months (p≥0.82 vs. CON). At 6 months, TEE (kcal/day) increased in VIG compared to the other groups (CON: 440 [91; 787]; BIKE: 361 [26; 696]; MOD: 352 [51; 654], all p≤0.04), but did not change in BIKE and MOD (p≥0.56 vs. CON). NonExEE (kcal/day) did not change at 3 or 6 months (p≥0.16 vs. CON) but increased in VIG compared with MOD at 6 months (399 [44; 754], p=0.03).

Conclusion: Our preliminary findings suggest that TEE and NonExEE are unaltered after 3 months of active commuting and leisure-time exercise but that TEE is increased after 6 months of vigorous intensity exercise.

External funding details: The study was funded by the University of Copenhagen Excellence Programme for Interdisciplinary Research (www.go.ku.dk), TrygFonden and Gerda and Aage Haensch's Fund. Jonas Salling Quist was supported by a PhD scholarship from the Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

Exploring effective physical activity interventions in women with previous gestational diabetes

Audrey Buelo¹, Ruth Jepson², Alison Kirk³

¹Scottish Collaboration for Public Health Research and Policy, University of Edinburgh, ²University of Edinburgh, ³University of Strathclyde

Introduction: Women with previous gestational diabetes are at seven times the risk of Type 2 diabetes later in life. Physical activity can reduce this risk, but most women with recent gestational diabetes are not active. We are systematically reviewing the literature to understand what factors in the lives of women with previous gestational diabetes influence the effectiveness of physical activity interventions.

Methods: A mixed-methods systematic review is currently underway in which a quantitative review of physical activity intervention effectiveness and a qualitative review exploring barriers and facilitators to physical activity in women with previous gestational diabetes are combined, to explore why different interventions are effective or ineffective. Following Cochrane methodology, we have systematically searched seven databases and grey literature, including forward and backward citation searches and no date/language restrictions. Two reviewers are independently selecting studies for inclusion, assessing methodological quality, and dividing records into quantitative and qualitative reviews to extract data. Using cross-study synthesis methodology, we will explore to what extent the interventions (results of quantitative review) address the factors (results of qualitative review) that influence physical activity in women with previous gestational diabetes.

Results: Results from this mixed-methods review will be completed by May 2018 and will show the 'how and why' of effective and ineffective physical activity interventions in women with previous gestational diabetes.

Conclusion: Combining the results of qualitative and quantitative studies can provide a nuanced understanding of the effectiveness of physical activity interventions.

External funding details: Diabetes UK

Prototyping in public health practice: Demonstrating a streamlined implementation process with a community-based weight management programme (Momenta)

Caroline Dodd-Reynolds¹, Lisa Nevens², Emily Oliver¹, Tracy Finch³, Coral Hanson⁴

¹Durham University, ²Northumbria Healthcare Foundation Trust, ³Northumbria University, ⁴Edinburgh Napier University

Background: While stakeholder co-production may reduce the 'implementation gap' in design of public health programmes, it can be time-consuming and costly. Prototyping offers a potential solution; we tested its value using a 3-month weight-management programme 'Momenta', in a deprived area with poor health indices, in Northumberland.

Evaluation Framework: Following pragmatic stakeholder consultation, a mixed methods evaluation framework was developed. Three referral groups (BMI ≥ 25 kg/m²) were compared: Momenta (M, n = 59), Momenta and fitness membership (MF, n = 58), fitness membership (F, n = 65). Effectiveness was examined at 3 and 12 months. Implementation and prototyping was evaluated through interviews with referring professionals (n = 5), programme participant focus groups (n = 13), and researcher reflection.

Results: Uptake and 12-week adherence respectively, were higher for M (84.7%, 45.8%) and MF (93.1%, 60.3%) versus F (75.4%, 24.6%).

12-week weight loss [median, (IQR)] was M -2.9 (-5.0 to -2.0) and MF -2.9 (-5.1 to -1.6) $p < 0.001$, compared to F 0.0 (-3.2 to 1.0) $p = 0.379$. BMI and waist circumference showed similar trends. 12-month follow-up data suggested persistence of weight loss for MF. 3-month change was positive for mental wellbeing, depression and anxiety in M and MF, remaining at 12 months ($p < 0.05$). Prototyping did not detrimentally impact on participants' reported experiences. Refinements included broadening inclusion criteria, with implementation gaps apparent around referral process and practitioner knowledge.

Conclusions: Momenta was effective for weight loss, particularly with fitness facility access. Prototyping aided implementation and we recommend this providing: a strong theoretical and empirical underpinning of the intervention, and co-production methods shape iterative refinement of implementation.

Running the gauntlet: Examining the occurrence of runner harassment

David Hindley, Department of Sport Science, Nottingham Trent University

Introduction: Personal accounts of recreational runners being subjected to intrusive practices when exercising in public spaces feature conspicuously in running blogs, discussion forums, and mainstream running literature. In contrast, academic investigation of this phenomenon remains scant. The aims of the research are a) to characterise runner harassment, b) to determine the prevalence of runner harassment, and c) to analyse typical strategies employed by publicly harassed runners.

Methods: This study employed a mixed methods approach, namely an online questionnaire (N = 430) then a series of semi-structured interviews (N = 10) to explore recreational runner's experiences of harassment. Thematic analysis of the transcribed interviews and open-ended survey data was undertaken to code the qualitative data to identify patterns.

Findings: The survey results indicated the prevalence of runner harassment (81.4%). Verbal abuse (67.1%) and car/vehicle horns (67.4%) were the most common. Physical assault or its threat was rare, whilst there were a few instances of runners who had objects thrown at them or who had been spat at. Some respondents recalled that their way had been intentionally obstructed or that attempts had been made to pursue them either on foot or in a vehicle.

Conclusions: From this study, runner harassment acts to perpetuate a number of hierarchies. There is a patriarchal social order, where there are significant differences for women and men. The accounts of harassment also speak to the notion of a mobile social order in which recreational runners are deemed to be in minority, sharing public spaces where pedestrians represent the 'normal' majority.

Systematic review of interventions outside the workplace for reducing sedentary behaviour in adults under 60 years

Elaine Murtagh¹, Charles Foster², Karen Milton³, Nia Roberts⁴, Clodagh O'Gorman⁵, Marie Murphy⁶

¹Mary Immaculate College, University of Limerick, ²University of Bristol, ³University of East Anglia, ⁴University of Oxford, ⁵University of Limerick, ⁶University of Ulster

Introduction: Excessive sedentary time is associated with increased risk of morbidity and mortality. As adults spend approximately 70% of their non-work time being sedentary there is great scope for changing behaviour to improve population health. This systematic review aims to evaluate the effectiveness of interventions for reducing sedentary behaviour in non-occupational settings.

Methods: The following databases were searched: CENTRAL, MEDLINE, Embase, Cochrane Database of Systematic Reviews, CINAHL, PsycINFO, SportDiscus. Randomised Controlled Trials (RCT) and Cluster RCTs that aimed to change sedentary behaviour in community-dwelling adults aged 18 – 59 years and free from pre-existing medical conditions that may limit participation in the intervention, were eligible for inclusion. Results will be reported as mean treatment effects and 95% confidence intervals using a random effects model. Subgroup analysis will be conducted to examine evidence of differential responses to the interventions. Sensitivity analysis will explore the impact of risk of bias on study findings.

Results: Searches yielded 7653 hits. 18 publications representing 9 studies were included. Results of the meta-analysis and narrative synthesis will be presented. This will include assessment of heterogeneity, reporting biases, subgroup and sensitivity analysis.

Conclusion: At present there is some evidence that interventions targeted in the home and leisure environment may reduce sedentary time in the short term. The present study augments the existing evidence base by synthesising available research and will therefore aid evidence-based decision making by policy-makers and practitioners working to address sedentary behaviour.

External funding details: EM is supported by a Cochrane Fellowship from the Health Research Board (Ireland).

Theme: Interventions—Children and Young People

Monday 15 October

A mixed method systematic review of primary school based interventions to promote physical activity and/or reduce sedentary behaviour

Michelle Jones¹, Emmanuel Defever¹, Kelly Mackintosh², Ayland Letsinger³

¹Southampton Solent University, ²Swansea University, ³Texas A&M University

Introduction: Evidence confirms few children engage in the recommended 60 minutes of daily moderate-to-vigorous physical activity and highlights a decline in participation from around 5 to 7 years. Children spend approximately 40% of their waking hours at school and form early health behaviours in childhood; primary schools are therefore an important setting to promote physical activity. This systematic review was conducted to ascertain the effectiveness of school based physical activity interventions in 5–11 year old children.

Methods: Adhering to the PRISMA guidelines, five databases were searched using predefined terms; additional records were identified through bibliographic searching. After removing duplicates, 444 records were screened by abstract, using inclusion criteria agreed a priori. Two independent reviewers used the mixed-methods appraisal tool (MMAT) to assess the methodological quality of 81 full text articles. Further methodological details can be found in the Prospero record (CRD42017082184).

Results and Discussion: The interventions were summarised using the TIDierR checklist and the volume, intensity and type of physical activity were considered. The articles were of variable methodological approach and quality. Research findings were analysed in relation to the theory of expanded (e.g., before/after school clubs, class breaks, and physically active learning), extended (e.g., increased physical education or play/break times) or enhanced (e.g., increasing physical activity within PE, play/break times) opportunities. A number of multi-component interventions were

also identified. Future research should not only ascertain the effectiveness of school-based interventions across a population, but rather for who it works, how and why.

A qualitative investigation of factors that influence children's enjoyment of physical education

Matthew Domville¹, Paula Watson¹, David Richardson², Lee Graves¹

¹Physical Activity Exchange, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, ²Research Institute for Sport and Exercise Sciences, Liverpool John Moores University

Introduction: Physical education (PE) is a key setting to engage children in health-enhancing physical activity. Little is known however about factors children perceive important to PE enjoyment, and how the current PE delivery framework in UK primary schools impacts motivational experiences. Self-determination theory (SDT) suggests enjoyment of activities is an intrinsic motivator for sustained engagement. Therefore, to better support PE instructors to promote physical activity within and beyond PE, this study investigated children's perceptions of factors influencing PE enjoyment.

Method: Eight mixed-gender focus groups with 47 children (24 girls, 7–11 years) from four schools within a socio-economically deprived area in North-West England asked children about their perceptions of PE, their feelings towards PE instructors, and, factors influencing their PE enjoyment. Transcripts were transcribed verbatim with data analysed thematically using NVivo10.

Results: Factors influencing children's PE enjoyment included 1) individual preferences, 2) peer and coach interactions, 3) instructor support and involvement. Findings interpreted in relation to SDT generated recommendations to help instructors and schools create a PE environment that enhances children's enjoyment and autonomous motivation for PE.

Conclusions: Instructors and peers are important in creating a PE environment that supports children's psychological needs for autonomy, competence and relatedness, which influence enjoyment. To consistently provide children with enjoyable PE lessons, schools should support the ongoing development of generalist teachers, and facilitate better working relationships between generalist teachers and specialist coaches. SDT can be used by instructors to guide practice that enhances children's enjoyment and autonomous motivation for PE.

External funding details: Match-funded by SOKKA Ltd.

Active Schools Skelmersdale: A multi-component intervention to promote primary school physical activity in a low socio-economic status community

Sarah Taylor¹, Robert J. Noonan¹, Zoe R. Knowles², Bronagh McGrane³, Whitney Curry¹, Stuart J. Fairclough¹

¹Edge Hill University, ²John Moores University, ³Dublin City University Institute of Education

Introduction: Whole-school approaches to physical activity (PA) participation, using a variety of strategies across different settings are advocated as a means of engineering a range of PA opportunities for children. This study evaluated the effectiveness of the Active Schools: Skelmersdale (AS: Sk) school-based multi-component intervention.

Methods: Year 5 classes (age 9–10 years) in four schools implemented an eight component PA intervention for eight weeks, three schools acted as controls. Schools were situated in an area of high deprivation. Informed consent was obtained for 232 children (n=117 intervention, n=115 control). The eight intervention components included: running/walking

club (daily mile or 100 mile club three times weekly), daily active classroom breaks for five minutes, 'bounce at the bell' three times daily, 'Born To Move' exercise videos twice per week, playground activity cards, PA homework challenges, physical education teacher development, and health newsletters. Children wore wrist-mounted ActiGraph GT9X accelerometers for seven days pre and post intervention.

Results: Mean baseline school day MVPA was 39.2 and 31.2 minutes in the control and intervention schools, respectively. At follow up, school day MVPA in the control schools decreased by 10.0 minutes and increased by 5.9 minutes in intervention schools. Differences in school day MVPA at follow up between control and intervention schools were significantly different when controlling for baseline MVPA ($p = .001$).

Conclusion: The AS:Sk multi-component intervention was effective in increasing MVPA levels of children attending the intervention schools.

External funding details: This project was funded by West Lancashire Sport Partnership, West Lancashire Leisure Trust, and Edge Hill University.

Addressing the decline in sport participation and physical activity in secondary school students

Erica Randle¹, Matthew Nicholson¹, Paul O'Halloran¹, Arthur Stukas¹, Emma Sherry¹, Kane Bradford², Greg Wood²

¹La Trobe University, ²Australian Sports Commission

Introduction: Sport programs were piloted at one-hundred secondary schools targeted at students who had disengaged from sport. The aims of the study were to identify what causes youth to disengage from sport and the key influences, barriers and enablers to increasing sport engagement and delivery in the secondary school environment.

Method: A mixed method approach was taken and data collected from the following stakeholders:

- Surveys (students) (N = 6,713);
- Surveys (teachers) (N = 282);
- Surveys (parents/guardians) (N = 1,345);
- Focus groups (N = 60) (students N = 566);
- Semi-structured interviews (PE teachers)(N = 200);
- Semi-structured interviews (sport deliverers) (N = 92).

Standard qualitative and quantitative analysis procedures were conducted.

Results: The secondary school environment is a complex and pressurised setting in which to deliver sport. We found that sport participation and delivery becomes more 'stressful' for all stakeholders, and the focus on competition in sport intensifies, shifting away from the social and 'fun' elements. There was a perception from students that sport has failed to modify its offerings (both those inside the school environment and those in the community) to address their motivations, needs and barriers.

Conclusion: Secondary school sport programs should not be fully prescribed by a National Sport Organisation, but the deliverer given the flexibility to build a relationship with the PE teacher and the program modified to address each school's context and student cohort. Further, deliverers should be skilled at building a positive group dynamic during the program, and contribute to building a positive sport culture with the wider school community.

External funding details: Australian Sports Commission

An insight into parent involvement in Scottish Primary School Health Education activities

Samantha Donnelly¹, Duncan Buchan¹, Ann-Marie Gibson², Rosie Arthur¹

¹The University of the West of Scotland, ²University of Strathclyde

Introduction: Childhood overweight and obesity is prevalent worldwide with Scottish children amongst the least active in the world. School-based physical activity interventions involving parents have found success, however limited research exists regarding the best methods to involve parents in these interventions. Socioeconomic status has been found to mediate parent involvement. Therefore, the aim of this study was to interview parents from a low socioeconomic status (SES) to gain insights into their involvement in school-based health activities.

Methods: Parents (n = 132) were recruited from five schools. Parents (n = 24) were identified based on the following criteria; being the mother of the child, from a Scottish Index of Multiple Deprivation decile 1 or 2 and scoring low on the Family Involvement Questionnaire- Elementary. Parents (n = 16) agreed to be interviewed. An inductive approach to hierarchical analysis was employed.

Results: From the transcripts, 130 first-, 16 second-, and 6 third-order themes emerged. Whilst the influence of children and family can encourage parents to be involved in school-based activities, there are several barriers which result in them being less-involved. The importance of home-school relationships, and the efforts parents and schools play in encouraging parent involvement was evident.

Discussion: It is clear that parents of low SES are less-involved in school-based activities. Barriers to their involvement include lack of confidence and additional responsibilities. Our findings indicate that many of these barriers can be overcome based on the recommendations within this study which can help inform future school-based interventions.

Changes in cycling-related knowledge, Self-efficacy and behaviour following cycle skills training in children and adolescents

Enrique Garcia Bengoechea¹, Charlotte Flaherty², Tessa Pocock², Kek Chiew Ching², Christina Ergler³, Palma Chillon⁴, Sandra Mandic²

¹University of Limerick, ²Active Living Laboratory, School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, ³Department of Geography, University of Otago, Dunedin, ⁴Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada

Introduction: Promoting cycling to school among children and adolescents is considered a promising strategy to increase physical activity in this group. This study examined the short- and medium-term effects of CST (1–10 weeks) with or without on-road training on cycling-related knowledge, self-efficacy and behaviour in children (both genders) and adolescent girls.

Method: Children (n = 429; 11.0–0.9 years; 52.1% boys; 3 schools) and adolescent girls (n = 117; 13.9–0.7 years; 2 schools) participated in either playground-based CST (Traffic-Free CST; n = 207) or playground-based plus on-road CST (Traffic-Free + OnRoad CST; n = 339) in Dunedin, New Zealand in 2015–2016. Participants completed pre-training, post-training, and follow-up (6–9 months after CST) self-report assessments of cycling-related knowledge, self-efficacy, and behaviour and practical skills assessment. Data were analysed using linear mixed models and generalized linear mixed models.

Results: Knowledge increased initially and, subsequently, the observed increase decelerated post-intervention, both in children and adolescent girls. Self-efficacy levels increased linearly from pre-test to follow-up, but no significant changes in cycling behaviour (frequency of riding a bicycle) were still apparent in either age group over the 6–9 month follow-up period. In children, initial gender differences in self-efficacy and cycling frequency favouring boys tended to disappear at follow-up. Similarly,

initial differences in self-efficacy and cycling frequency in favour of children who participated in CST with on-road training disappeared at follow-up.

Conclusions: Sustained increases in self-efficacy were not matched with changes in frequency of cycling during the period considered, particularly in adolescent girls. Therefore, additional supports may be necessary to encourage cycling to school among children and adolescents.

External funding details: Cycle skills training program in Dunedin, New Zealand, was supported by Dunedin City Council, New Zealand Transport Agency, Sport New Zealand, Otago Community Trust and Kiwisport. Evaluation of the program was supported by Dunedin City Council and Sport New Zealand.

Effect of a school-based intervention on screen time behavior and family support: the “MOVIMENTE” program

Priscila Santos, Alexandra Bandeira, Valter Barbosa Filho, Kelly Silva, Federal University of Santa Catarina

Evidence on effective strategies in school-based interventions to reducing screen time (ST) and psychosocial factors are unclear, mainly in vulnerable areas. This study aimed to verify the effect of a school-based intervention on ST and family support for ST among Brazilian students.

This cluster-randomized controlled study (3 intervention and 3 control schools) included 948 Brazilian adolescents from 7th to 9th grades. Intervention strategies were focused on environmental changes, teacher training and educational actions. Baseline (March/April 2017) and post-intervention (November/December 2017) evaluations included the self-reported ST (TV and computer/games) during the week days (<2 hours/day or >2 hours/day). Adolescents reported the agreement that their parents encouraged, commented on and controlled them in reducing ST. McNemar test was performed to assess statistical significance ($p \leq 0.05$) of follow-up changes.

At baseline, 81.3% and 77.6% of adolescents spent >2 hours/day on ST in the control and intervention groups, respectively. After the follow-up, there was a significant reduction of this prevalence in the intervention group (-6.6%, CI95%:-10.3;-2.8); no change occurred in control students (-5.1%, CI95%:-10.4;0.1). In the intervention group, there was a reduction in the prevalence of adolescents who agreed that the parents commented that excessive ST is harmful to health (-6.0%, CI95%:-10.3;-1.7), but no difference was found for encouragement to decrease ST (-2.4%, CI95%:-7.7;2.8) and controlling excessive ST (-2.8%, CI95%:-7.7;2.1). No change was found in control group.

The results suggest that the intervention was effective in reducing ST. However, other strategies to increase family support in reducing ST need to be assessed.

Effects of a technology-based and teacher-directed physical activity intervention in preschoolers: Findings from a pilot study

Wonwoo Byun¹, Erica Y. Lau², Timothy A. Brusseau¹

¹University of Utah, ²University of British Columbia

Introduction: This pilot study evaluated the effects of an intervention employing a physical activity (PA) monitoring system and teachers' self-directed modifications in instructional strategies to promote PA in preschoolers.

Method: Five childcare centers were recruited (N = 93 children, 53% girls, 4.7–0.6 years), and randomly assigned into Control (CON, N = 45) and Intervention (INT, N = 48) groups. The current intervention is based on the social ecological model. It consisted of a real-time PA monitoring system

that provided teachers with instant feedback on children's PA levels. Based on the feedback and their classroom contexts, teachers made self-directed modifications to their instructional strategies to provide more active opportunities. Time spent in sedentary behavior (SED) and total PA (TPA) were measured as primary outcomes using ActiGraph GT3X+ accelerometer over a 5-day period while children were attending childcare centers.

Result: Overall, children in the INT showed significantly lower level of SED (31.6 vs. 33.6 min/hr), and higher level of TPA (28.4 vs. 26.4 min/hr) than children in the CON, after adjusting for age, sex, race, parent education level, parent perception of child's PA, BMI, and childcare centers. The percentage of hours meeting the PA recommendation (≥ 15 min/hr of TPA) was slightly higher the INT than the CON (47.3% vs. 43.2%).

Conclusion: This technology-based, teachers' self-directed intervention showed promising effects on promoting preschoolers' PA at childcare centers. Subsequent studies at larger-scale are needed to fully determine the effectiveness of the intervention strategies used in this study.

Evidence into practice to increase children's physical activity through schools settings: Development of a framework for increasing physical activity in schools and colleges

Loretta Sollars, Claire Robson, Tatiana de Berg, Public Health England

Introduction: Schools and Colleges are recognised as settings with easy access to increasing the physical activity levels of children. Many organisations offer schools products or approaches to do this, but teachers do not know which are the most effective. Public Health England developed a resource to help schools to adopt an evidence based approach to this challenge.

Method: An evidence review was conducted. The key messages concerning effective practice and the links between physical activity and educational attainment were identified and distilled into a framework of eight principles. A consultation process that included practitioners, stakeholder organisations and school pupils refined the framework.

The Framework: The eight principles of the framework apply to all aspects of school life including curriculum provision, extra curricular activities and the physical environment.

Public Health Impact: The principles were published alongside practice examples and national policies in 2016. It has subsequently been used by policy makers, school programme developers and schools to develop and deliver programmes that embed physical activity throughout the school day. The document has also informed policy development at a national level. It was updated in 2018 which demonstrates its continued value as a resource in an environment where there is significant policy development.

External funding details: Public Health England funded and commissioned the Association of Colleges Sport and Youth Sport Trust to carry out the evidence review, framework design and consultation activity. Public Health England published the document “What Works in Schools and Colleges to Increase Physical Activity”.

Factors and strategies to prevent dropout in youth sport: results of a rapid review and expert opinions

Joseph Murphy¹, Catherine B Woods¹, Dorien Dijk², Jan Seghers³

¹University of Limerick, ²Knowledge Centre of Sport Netherlands, ³Department of Movement Sciences, KU Leuven

Introduction: Physical activity of young people in Europe is decreasing and dropout from sports participation is identified as a key problem between the ages of 12 and 19 years. The Erasmus+ collaborative partnership project “Keep Youngsters Involved” aims to find answers to

the question: 'How do we keep youngsters involved and connected with sport and physical activity?'

Methods: To collect relevant research information about dropout from sports participation in youngsters, a rapid review of the published literature was conducted using a selection of search syntaxes entered into relevant databases. Appropriate grey literature and strategies for preventing youth sports dropout were gathered from the partner countries in a systematic manner. Project meetings (n=4) and conferences helped gain expert opinions and generate a list of factors and strategies related to youth sports dropout.

Results: Of the 440 papers found in the rapid review, three review studies were identified as being relevant. Ten pieces of grey literature were added to the published literature findings. Factors (n=14) were identified as preventing sports dropout and were used to develop good practice statements. One hundred and fifty-nine strategies that aimed to influence one or more of the 14 factors for preventing youth sports dropout were identified. These strategies were organised as being useful for coaches, parents, or clubs.

Conclusion: The findings from this rapid review and the information generated from project meetings will be used to develop a manual and online toolkit for use at grassroots level to aid with the prevention of youth sports dropout.

Gaelic4Girls for increased physical activity participation - a multi-component, pilot intervention: Study design and protocol

Orlagh Farmer, Dr. Wesley O' Brien, University College Cork

Introduction: Multi-component sports-based interventions have the potential to increase childhood physical activity (PA) levels, motor skills, and psychosocial well-being. Few interventions, however, have been conducted for young girls in community sports-based environments, specifically in Ireland. This study aims to report the theory-based design protocol, and assess the effectiveness of a multi-component, community sports-based intervention for increasing girls PA levels, fundamental movement skill (FMS) proficiency, and psychosocial well-being.

Methods: A sample of 241 female participants, aged 8 to 12 years old, from five sub-urban and rural primary schools in County Cork were recruited. The Gaelic4Girls intervention was delivered once a week, for 60 minutes, over a 10 week period (March to May 2017) in a rural community sports club setting, as guided by the Social Ecological, and Self-Determination theoretical frameworks. Each session comprised of: 1) participatory child component (a 6 × 10 minute rotatory station-based structure emphasizing mastery of movement), 2) a coach volunteer component (providing continuous professional development) and 3) a parent component (knowledge-based PA support structures). The study outcomes were assessed at pre- and post- intervention, using reliable self-report PA questionnaires, and the Test of Gross Motor Development-2 (TGMD-2) for FMS. Three focus group interviews were also conducted with the child participants, parents and coaches to explore perceptions of the intervention. Data analysis is currently ongoing.

Discussion: This pilot study will provide evidence regarding the effectiveness of a multi-component, community-sports based intervention, and may help inform the development of theory-based interventions targeting PA promotion for pre-adolescent girls in Ireland.

Is it what it looks like? Physical activity opportunities in Southampton primary schools

Emmanuel Defever, Solent University

Background: The primary school setting has been promoted for physical activity intervention as it has the assets to educate and provide physical activity at population level. Despite growing evidence on poor physical activity levels within children, the health consequences and interventions there has been limited documentation of what opportunities commonly exist within primary school settings.

Aim: The purpose of the study was to conduct a city-wide analysis of Southampton primary and junior schools on physical activity opportunities for 7–11 year old children.

Methods: Southampton is a unitary authority of approx. ¼ million population and the 2017 health profile suggests higher proportion of low income families, deprivation, and overweight Year 6 children compared to national average. All 44 state primary and junior schools in Southampton were included and sources of information were a) a survey consisting of short answer questions, b) PE and Sport Premium Impact report and c) Ofsted report. Data was qualitatively analysed to explore the extent of current opportunities.

Findings: The main findings include: 1) a typical school day offering limited specific opportunities for physical activity promotion, 2) reliance of ad hoc internal and external events focusing on sporting activities as opposed to sustainable and balanced opportunities, 3) generally low quality and lacking in standardisation on reporting of the funding impact, and 4) implementation barriers including insufficient resource, staff training and pressures of academic attainment.

Conclusion: Collectively, schools provide a range of physical activity opportunities; however, the variability is wide-ranging and inconsistent throughout the city.

Moving Well-Being Well: An intervention aimed at increasing fundamental movement skills, while also increasing teacher confidence in delivering physical activity based lessons

Stephen Behan, Cameron Peers, Sarahjane Belton, Johann Issartel, Dublin City University

Physical Activity (PA) has long been positively linked with health benefits. Recent research shows that 67% of adolescents are not getting the recommended one hour of moderate to vigorous activity (MVPA) per day. In addition, 99.5% of the same sample did not achieve the level of Fundamental Movement Skill (FMS) proficiency expected of their age. In young children FMS proficiency is hypothesised to correlate with increased PA in later life, and these skills are best developed throughout the early school going years. To address these alarming statistics, phase one of the Moving Well-Being Well project has assessed a nationwide sample (n=2148) of primary school children (5–13 years) in Ireland. The range of assessments covered all aspects of the currently accepted physical literacy model: competence, motivation, confidence, and knowledge and understanding.

The results show that 77.5% of primary school children were classed as 'very poor' or 'below average' in FMS proficiency (n=2098, Male 53%). The findings also show significantly higher ($p < 0.001$) FMS proficiency for children who achieve high levels of MVPA, over those who are less active. Confidence and motivation both saw significant increases ($p < 0.05$) for those categorised as highly active, compared to those in the low activity group. There was significant difference between these groups for knowledge and understanding, and 54.8% did not know the minimum recommended MVPA guidelines. These findings have been used to develop the intervention aiming at addressing these deficiencies. The intervention targets increasing teacher confidence in delivering FMS programmes through an innovative school's in-service training program.

Optimising childhood movement in Ireland: The fundamental 'building blocks'

Wesley O'Brien¹, Diarmuid Lester¹, Orlagh Farmer¹, Sarahjane Belton², Johann Issartel², Bronagh McGrane²

¹University College Cork, ²Dublin City University

Introduction/Background: The prominence of 'motor competency' is now considered to be a critically important correlate of regular childhood physical activity participation and health-related fitness. Yet, most recent research has shown that the majority of Irish children and youth are insufficiently active and fail to reach a level of proficiency across basic movement skills. This lecture will present the performance of selected fundamental movement skills amongst 5- to 16- year olds (N=995) over a six-year timeline.

Method: Baseline data for fundamental movement skills were collected between 2010 and 2017, specifically as part of selected larger longitudinal childhood physical activity and movement-oriented intervention studies in Ireland. The following sample range of fundamental movement skills were assessed, with the use of reliable instrument protocol; run, skip, horizontal jump, vertical jump, leap, gallop, slide, hop, kick, catch, overhand throw, strike, underarm roll, stationary dribble and balance. To ensure participant consistency in both primary and post-primary school settings, no feedback from any of the trained field staff were given during individual skill performances.

Results and Conclusion: Overall, preliminary results across this large sample suggest that participants within Irish primary and post-primary schools are performing fundamental movement skills at a low level, in light of their expected age-related equivalence for movement proficiency. The lecture will use this example data to present key next steps for enhancing movement in European children.

Overweight and obese children's and families' experiences of physical activity and the opportunities offered as part of a community based weight management intervention

Vicki Coulton¹, Lindsey Reece², Robert Copeland¹, Helen Crank¹, David Broom¹

¹Sheffield Hallam University, ²Sheffield Hallam University and University of Sydney

Introduction: Childhood obesity is a global epidemic and effective multicomponent weight management interventions (WMI) are recommended to tackle it. This study explored children and families' experiences of a 12-week community-based WMI that comprised diet, physical activity and behaviour change approaches.

Method: Semi-structured interviews were conducted with children aged 8–12 years with a BMI ³91st centile and their families; pre (n=23), post (n=13), 6 months (n=5), 12 months (n=7) and 24 months (n=4) post intervention. Interviews were transcribed verbatim and analysed in NVIVO using the framework method.

Results: Prior to the intervention, families reported spending limited time together being physically active. Their home environments encouraged sedentary behaviour where screen time use was prominent. Parents concerns about their child's weight spanned breathlessness whilst being active, bullying, low self-esteem and not fitting in clothes for their age. Post intervention and at follow up, it was clear that the physical activity sessions were consistently reported as enjoyable whereas the didactic learning sessions were less so from the child's perspective. Only a few families reported sustained physical activity as a direct result of the WMI, and they generally cited activity as important for achieving energy balance. Parents

frequently cited the child's responsibility for making healthy choices as a concern, particularly as they get older and have more autonomy.

Conclusion: Practitioners need to consider how to integrate the families' home environment into WMI to enable sustained behaviour change once intervention support is withdrawn.

Popular road running events as physical activity promotion vectors for school-going children

Bengt Kayser, University of Lausanne

Background: In the realm of the largest Swiss popular city running event (Escalade race, Geneva, >44'000 finishers in 2017) we developed a health promotion program for children aged 6–12 yrs. Launched in 2004 in a few municipalities, in collaboration with the state education department the program was extended to schools in 2005, enrolling teachers and parents to run the program. It consists of 2 months of weekly running training preceding the race, combined with teaching of basic dietary concepts.

Methods: Comparison of the number of participating schools and children to official state statistics. Questionnaires before the race, just after and 6 months later.

Results: Participation increased from 145 children in 2006, to 4460 in 2017 and from three schools in 2006 to 84 in 2017. In 2017 about 40% of the Geneva state population between 6–12 yrs participated. Knowledge about good dietary habits increased significantly and was retained up to 6 months. Children liked to participate and teachers/parents value the program.

Conclusion: The increase in participation of children and the retention of knowledge of healthy eating habits suggest an adequate design of the program. The implementation in schools with support from the government was decisive. Whether these changes are accompanied by actual changes in behavior remains unknown but statistics of the State Juvenile Health Services indicate a trend for a decline in obesity prevalence in this age group.

External funding details: The sant'e'escalade project is made possible with financial help from the State of Geneva and the Gourgass Foundation.

Post primary school pupils' views on strategies employed by school based physical activity interventions: The Healthy Ireland Demonstration Project

Fiona McHale¹, Kwok Ng¹, Donal O'Shea², Catherine Norton¹, Gemma Barrett¹, Joanna Clifford¹, Pierce Murphy¹, Catherine Woods¹

¹University of Limerick, ²St Vincent's University Hospital

Introduction: Few post-primary school pupils meet the minimum physical activity recommendations of at least 60 minutes of moderate to vigorous physical activity (MVPA) daily, yet pupils who meet these recommendations have the best health profile of all. A vast range of physical activity (PA) programmes are being implemented worldwide, however the most effective formula for behaviour change in this age group is unknown. This formative research will be used to design an intervention.

Method: Pupils (aged 13–16 years) from three schools were recruited for nine focus groups. These were audio recorded, transcribed, and then a qualitative content analysis of the data was performed. Open-ended questions were used to determine the pupils' opinions regarding current PA promotion strategies employed internationally for this target group. Questions also asked pupils what they liked about PE and what they what change.

Results: Pupils (N=41; 20% males) would like more information on PA for good health. Providing choice and a greater variety of activities to

pupils for the PE programme throughout the year was suggested. Other ideas included one off sports days and PE trips. The element of fun was imperative.

Conclusion: Opportunities for involvement by pupils in the PE plan for the academic year could enhance intrinsic motivation for improved participation and provide greater enjoyment. The wide variety of activities available on the PE curriculum should allow for more autonomy of choice for pupils' preferences.

External funding details: Department of Health, Ireland, Department of Education, Ireland

The CHARMING study: Development and pilot of a school-based active role model program for pre-adolescent girls

Kelly Morgan¹, Jordan Godwin², Kirsty Darwen³, Alison Fildes⁴

¹Cardiff University, ²Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), Cardiff University, ³Faculty of Health Sciences and Sport, Stirling University, ⁴University of Leeds

Introduction: Many preadolescent girls do not meet current physical activity (PA) guidelines. Role models are one suggested mechanism to inspire young girls to become active. The Charming study aimed to develop and pilot a school-based, multi-component, role-model programme for girls aged 9–11 years.

Methods: Two primary schools from low-socioeconomic areas were recruited and all Year 5 and 6 girls (aged 9–11 years) invited to participate (n=66). Pilot measures included a pre- and post-intervention survey, attendance and session enjoyment data and post-intervention school staff surveys (n=4).

Results: Girls were provided with an after-school 60 min taster session for 6 weeks. Each session covered a different activity identified by the girls (including sports, dance and unconventional activities). Role models were sourced through sports governing bodies and community clubs. The number of girls attending each session ranged from 34 to 49 (45% of girls attended every session). Mean attendance was 3.8 sessions with session enjoyment between 69.6 to 93%. Follow-up data (91% completed) revealed that 36% of girls had since joined a new community club and 57% reported that they would like to. Main reasons for non-attendance included no free time (50%) and religious practice commitments (47%). Teacher evaluations concerned parental involvement and the duration and range of activities.

Conclusion: Findings suggest it is possible to recruit 9–11 year olds to participate in an after-school role model intervention, with role models sourced from local communities. The potential to positively influence girls PA levels using this approach requires future testing.

External funding details: Cancer Research UK

The implementation and effectiveness of Project FLAME: A multi-component, school-based, movement intervention in Ireland

Diarmuid Lester, Wesley O' Brien, University College Cork

Introduction/Background: Results from most recent Irish data found that adolescents are failing to reach a basic level of fundamental and functional movement proficiency while physical activity (PA) participation levels also decline dramatically during this period. Schools and the engagement of stakeholders, particularly qualified Physical Education (PE) specialist teachers, are key vehicles for the promotion and provision of movement-based opportunities in youth. The current research examines the effectiveness of a movement intervention for post-primary Irish youth, entitled

Project FLAME (Fundamental and Functional Literacy for Activity and Movement Efficiency).

Methods/Design: Using a non-randomized controlled trial, a target sample of 326 participants (mean age: 14.02 ± 0.89 years) were recruited in October 2017 from three mixed-gender sub-urban schools (two intervention; one control) in Cork, for pre-test data collection, followed by a 13-week consecutive Project FLAME intervention roll out, and post-test data collection in March 2018. This whole-school weekly delivered multi-component approach involves the following pillars: 1) student component, 2) specialist PE teacher component, 3) non-specialist PE teacher kinaesthetic classroom component, and 4) digital literacy component. Primary outcome measures assessing the intervention effectiveness include the assessment of fundamental movement skills (FMS), the functional movement screen (FMS™) and anthropometric characteristics (height and mass). Data analysis is currently ongoing.

Discussion: This Project FLAME intervention is the first of its kind in Ireland targeting fundamental and functional movement improvements for adolescents. The study will provide future evidence regarding the effectiveness of school-based, movement interventions, which specifically includes the concurrent involvement of specialist PE teachers, and non-specialist PE teachers.

Understanding youth personalities to help young people get active

Jayne Molyneux, Carol Fraser, Sport England

A high proportion of young people take part in sport and physical activity but many are not active enough. Sport England's 2014 qualitative research unearthed some significant emotional baggage attached to sport and found that sport and physical activity opportunities for young people tended to attract and cater for the more the active and engaged. There was a need to identify what could be done to tailor delivery to different groups of young people.

In 2015, Sport England carried out a survey of nearly 2,000 young people aged 14 to 25 to segment this age group based on their attitudes and behaviours in relation to physical activity. Six 'youth personalities' were identified and a panel of 100 young people was recruited in line with the segment profile in the population. This panel helped to co-create 'design principles' for physical activity for each personality – covering what would attract their attention, how the experience should feel and what would keep them involved.

A Youth Insight Pack (www.sportengland.org/media/10112/youth-insight_under-the-skin.pdf) was developed and published. The learning has helped to inform the Children and Young People programme of Sport England's Strategy 2016–2021.

We have data and case studies from many providers on how they have used the Pack to change their delivery and subsequently changed behaviour of young people. Examples include targeting inactive young women, helping students prepare for exams thus improving their mental wellbeing. We also have examples of how other countries have tailored the Pack to be used in their own country, eg, Japan.

Tuesday 16 October

Bi-directional associations among sedentary time, physical activity, and sleep duration in children: A longitudinal study from the PREVIENE project

Manuel Ávila-García, Carolina Díaz-Piedra, Francisco Javier Huertas-Delgado, Pablo Tercedor, Pedro Femia-Marzo, University of Granada

Introduction: Research to date shows contradictory results on the relationship between physical activity (PA) and sleep parameters in children.

In this study, we examined the bi-directional temporal associations among objectively measured sedentary time, PA, and sleep duration in school-aged children.

Method: We conducted a longitudinal study of 311 school-aged children (54.3% boys, 8.5 ± 0.5 years of age) from Granada (Spain) who wore a tri-axial accelerometer (Actigraph wGT3X-BT, Pensacola, FL, USA) for seven consecutive days (24 hours/day). We measured sedentary time, time spent in light, moderate and vigorous PA, and sleep duration (in minutes). We used 3-level (day, child, school) mixed models (adjusted by gender) to determine whether sedentary time and PA intensities during the day were associated with sleep duration on the same night, and whether sleep duration was associated with sedentary time and PA intensities the next day.

Results: Sedentary time and vigorous PA significantly predicted same-night sleep duration, $\beta = -0.11$, 95%-CI = $(-0.15, -0.06)$, $p < 0.001$; and $\beta = 0.09$, 95%-CI = $(0.04, 0.13)$, $p < 0.001$, respectively. Sleep duration predicted next-day light PA ($\beta = 0.05$; 95%-CI = $(0.001, 0.10)$; $p = 0.043$).

Conclusion: We found that the reduction of the sedentary time and the increase of vigorous PA would increase sleep duration on the same night, whereas longer sleep duration would increase light PA the next day. Therefore, a synergistic effect from school-based interventions that promote both PA and sleep health should be taken into account and could be beneficial for children.

External funding details: The PREVIENE Project was funded by the Spanish Ministry of Economy and Competitiveness (DEP2015-63988-R).

Do school-based physical activity interventions affect mathematics learning? A systematic review

Sirpa Sneek¹, Helena Viholainen², Heidi Syväoja¹, Anna-Maija Poikkeus³, Tuija Tammelin¹

¹LIKES Research Centre for Physical Activity and Health, ²Department of Education, University of Jyväskylä, ³Faculty of Education and Psychology, University of Jyväskylä

Introduction: Mathematics is a core subject in school curricula, and the role of mathematical skills in today's technological societies is unquestionable. There are global concerns about children's declining interest and performance in mathematics, as well as children's low levels of physical activity. Through this systematic review, we aim to elucidate the effects of school-based physical activity interventions on mathematics learning outcomes in children aged 5–16 years.

Methods: In the ongoing systematic review process, databases are searched for randomized and nonrandomized controlled trials and supplemented with quasi-experimental and crossover studies with control groups. The context of the eligible interventions is school, and physical activity was added in the form of physically active academic lessons, physical activity breaks, extra physical education lessons, or other types of physical activity during the school day. Mathematics skills were measured by either standardized tests or tests designed for the study. The characteristics and results of the included studies are extracted, and the risk of bias is assessed. Effect size calculations and a synthesis of the intervention effects are presented.

Results: Preliminary results from 30 studies included in the review indicate that adding physical activity to children's school day either affects mathematics learning outcomes positively or does not have detrimental effects.

Conclusion: The tentative findings indicate that the introduction of more physical activity into children's school day is recommendable and may even enhance mathematics achievement.

External funding details: Ministry of Education and Culture, Finland

Effects of physically active lessons on physical activity, health and educational outcomes: An updated systematic review and meta-analysis

Emma Norris¹, Artur Direito¹, Tommy van Steen², Emmanuel Stamatakis³

¹University College London, ²University of Bath, ³University of Sydney

Introduction: Physically active lessons, combining physical activity with educational content, have been investigated as an alternative to typical seated lessons. This updated systematic review provides a qualitative synthesis of evidence of physically active lessons, as well as the first meta-analysis of outcome data. Research questions are: 1) What are the effects of physically active lesson interventions on i) physical activity, ii) health and iii) educational outcomes? 2) What study features moderate these effects? and 3) What is the risk of bias within these identified interventions?

Methods: PubMed, Embase, PsycINFO, ERIC and Web of Science electronic databases and grey literature were searched. Reference lists of included studies were also searched and included authors were contacted for relevant, unpublished literature. Inclusion criteria were: 1) Population: typically developing school pupils of any age, 2) Intervention: classroom lessons combining educational content with physical activity, 3) Comparator: Studies featuring a control group (randomised or non-randomised), 4) Outcomes: Any physical activity, health or educational outcome, 5) Reported in English. Studies investigating active breaks without educational content, after-school or recess interventions or physically active lessons within complex interventions were excluded. Risk of bias of included studies will be assessed using the Cochrane Risk of Bias tool. Review was pre-registered via Prospero (CRD42017076933).

Results: Data extraction of identified papers is underway. Full results will be available in Summer 2018 ahead of the conference.

Conclusions: The review's findings will provide qualitative and quantitative syntheses of the effects of physically active lesson interventions, with assessment of risk of bias.

Going the EXTRA MILE with Inspiring healthy lifestyles

Doug Walmsley, Hazel Whittle, WLCT

Wigan have gone the 'extra mile' by not just delivering The Daily Mile in schools but also delivering their Daily Toddle to nurseries ensuring their children really do 'Start Well'.

We have found The Daily Mile not only provides teachers with a unique opportunity to assess their classes level of physical fitness but also is an enabler to inspire wider approaches for the community.

With over 12,000 children and 1200 staff taking part locally, the programmes make a difference to fitness levels alongside significant improvements in resilience, behaviour, attainment, self-esteem and wellbeing of pupils, staff and families.

This is about bigger picture thinking and understanding the wider sustainable impact programmes such as these have on our families resulting in why IHL started The Daily Toddle. A UK first, this gives pre-school children the chance to be more physically active and enhances the health and wellbeing of children and staff. Settings are encouraged to go even further by incorporating early morning sessions, school gate runs, walk leader awards and opportunities for embedding 30 minutes of physical activity outside the school day.

"The approach taken by Wigan to introduce The Daily Mile and Toddle to schools and nurseries has been outstanding. Their fully collaborative

approach, embraced by Health and Education, has worked brilliantly with the number of participating schools and nurseries rising quickly since the launch in 2016 helping to build better health for children for years to come.” Elaine Wyllie—Daily Mile Foundation

Implementation of an elementary school peer-teaching physical activity program: learnings from a non-randomised trial

Nicole Nathan¹, Rachel Sutherland², Mark Beauchamp³, Ryan Hulteen¹, Luke Wolfenden¹, David Lubans¹, Kristen Cohen¹

¹The University of Newcastle, ²Hunter New England Population Health, ³Psychology of Exercise, Health, and Physical Activity Laboratory School of Kinesiology The University of British Columbia Vancouver, British Columbia, Canada

Background: Few studies have used peer-teachers, involving the education of young people by young people, to improve elementary school students' physical activity (PA). A quasi-experimental study, conducted in two elementary schools in NSW Australia assessed the efficacy of the Great Leaders Active StudentS (GLASS) program, a school-based peer-led PA and object control skill intervention. This paper reports the methods of supporting schools' implementation of GLASS.

Methods: GLASS was designed to be delivered by peer leaders (Grade 6) to groups of students in Kindergarten-Grade 2, who attended two × 30-minute FMS sessions per week for 10 weeks. To support schools implementation of the GLASS program the following implementation support strategies were utilised; obtaining executive support, training for teachers and students, provision of tools and resources, feedback and on-going support. Student step count during school hours and object control skill competency were assessed.

Results: Executive support was obtained and demonstrated at staff, parent and student meetings and through timetable changes. All peer leaders received leadership training, feedback and resources. School timetables revealed that 19/20 FMS sessions were delivered. The study found no significant increase in PA but a significant intervention effect on students' overall object control skills (mean difference 5.8 (95% CI 4.1, 7.4; $p < 0.001$)).

Conclusion: The implementation support strategies utilised were found to be both feasible and acceptable. As the intervention resulted in improvements in students' object control a fully powered trial using peer leaders to deliver PA programs appears warranted.

External funding details: This project was supported by HMRI and HNEPH

Low level of compliance with physical activity recommendations at Spanish school recesses: The PREVIENE Project

Pablo Tercedor¹, Víctor Segura-Jiménez², Manuel Ávila-García¹, Francisco Javier Huertas-Delgado¹

¹University of Granada, ²University of Cádiz

Introduction: School recess might have a key role in physical activity (PA) promotion during childhood. The aim of this study was to describe the patterns of objectively assessed sedentary time and PA intensity levels during school recess in 8 year-old children.

Method: A total of 291 children (mean age $\pm$ sd = 8.3 $\pm$ 0.3, 156 boys) from 7 schools of Granada (Spain) wore an accelerometer during a 30-minute recess on five consecutive school days. The mean percentage of recess time spent in sedentary time and light (LPA), moderate (MPA), vigorous (VPA), and moderate-to-vigorous (MVPA) physical activity was

calculated. The percentage of children that met recess the PA recommendations (that is spending $\geq 50\%$ of recess time in MVPA) was analysed.

Results: Sedentary time (29.6 vs 40%) and LPA (33.2 vs 35.5%) was lower in boys than in girls (all $p < 0.001$). Conversely, MPA (26.7 vs 20%), VPA (10.5 vs 4.4%), and MVPA (37.2 vs 24.4%) were higher in boys than in girls (all, $p < 0.001$). Only 12% of the children met the recess break physical activity recommendations (21.2 vs 1.5% of boys and girls, respectively).

Conclusions: Overall, children did not spend sufficient time in MVPA during recess, mainly because they were engaged in sedentary or LPA intensity activities. Consequently, a very low percentage of children (particularly girls) achieved recess PA recommendations. Future strategies to motivate children to spend more time in MVPA during recess are warranted.

External funding details: The PREVIENE Project was funded by the Spanish Ministry of Economy and Competitiveness (DEP2015-63988-R, MINECO, FEDER, EU).

Physical education innovation: High-school students' perspectives and contribution

Petru Sandu¹, Catalin Ovidiu Baba², Razvan Chereches², Iuliana Boros-Balint³, Vasile Bogdan³

¹University Babes-Bolyai, Faculty of Political, Administrative and Communication Sciences, ²University Babes-Bolyai, Faculty of Political, Administrative and Communication Sciences, Department of Public Health, ³University Babes-Bolyai, Faculty of Physical Education and Sports

Introduction: Physical education (PE) should represent an important component of children and youth total physical activity time due to its structured contents, regularity and delivery in the school environment, where most children can access it as a safe and enjoyable activity. However, due to structural and non-structural conditions, in recent years, many countries have experienced steady decreases in PE, especially in high-school students. The aim of this study is to explore innovative methods for increasing participation and engagement of students in PE.

Methods: Pen and pencil questionnaires followed by focus-groups were conducted in October-December 2017 on a sample of students grades 9, 10 and 11 from 3 high-schools in Cluj-Napoca, Romania. Students were asked to comment about the quality and enjoyment of current PE classes, their needs and preferences and their potential contribution in the planning and development of future PE classes.

Results: Participants identified structural conditions (e.g. lack of proper gym or showers), organizational issues (e.g. PE class scheduling, having to share the gym) and evaluation system (e.g. too demanding indicators) as limits for attending and being active during PE. Teacher's performance in class and his/hers approach to evaluation were seen as important facilitators/barriers. Novelty, diversity and moderate intensity of activities were mentioned as important for more attractive PE.

Conclusion: Students can contribute to the planning and development of novel, more attractive PE classes.

External funding details: This project has been funded with support from the European Commission, Erasmus + Sport Programme. Project number: 2016-3210/001-00

School-based model for reducing sedentary behaviour among adolescents in Thailand

Chatinai Wanwacha, Piyawat Katewongsa Katewongsa, Institute for Population and Social Research, Mahidol University

Introduction: Increasing of sedentary behavior in daily life among adolescents become a crucial problem in Thailand. These situation can lead to a negative effect on health and affects development of adolescents.

Method: This study aims to understand the effects of an “Active Living Skills” model for reducing sedentary behavior and promoting active lifestyle among adolescents in school based on the theories of behavior modification. This study is a quasi-experimental research with case-controlled study design. The experimental group was implemented “Active Living Skills” activities while the control was not. A probability sample of 387 students were conducted quantitative surveys for 3 rounds: pre, post, and follow-up phrases.

Results: Independent sample t-test indicated that sedentary behavior of the experiment group is significantly decreased ($t = -3.48^{***}$). The physical activity level of the experiment group was also significantly higher compared to control group ($t = 4.26^{***}$). Paired t-test also confirmed that “Active Living Skills” yield positive results in reducing sedentary behavior ($t = -8.21^{***}$) and in increasing physical activity ($t = 2.97^{***}$). Multiple linear regression analysis also verified that “Active Living Skills” significantly reduce sedentary behavior and promote physical activity among adolescents.

Conclusion: The findings from this study suggested that “Active Living Skills” effectively reduce sedentary behaviors and increase physical activities among the adolescents as well as eliminating the equipment and budget inequality affecting the students’ behavior.

External funding details: This project has been supported by Thai Health Promotion Foundation

Technological approaches to objective measurement of fundamental movement skills in children

Michael Rosenberg, Brodie Ward, Ashleigh Thornton, University of Western Australia

The ability to rapidly and cost-effectively assess fundamental movement skills (FMS) at population levels remains a limiting step in the identification of children with the greatest needs. Current FMS assessments require substantial training, are often field based, and time intensive. Technology has the potential to overcome, or replace many of the time and resource intensive aspects of FMS assessment. However, there remains substantial barriers to the development and deployment of suitable technologies to achieve valid FMS assessment. This lecture will focus upon several promising technologies and lessons learnt in their application of objectively measuring FMS. Specifically, the use of the Microsoft® Kinect® motion capture system to measure FMS. Initially, comparing assessment scoring from point light (PL) displays produced by the Kinect®, and typical video presentations of skill performances. Fifty-three assessors scored 16 performances of 4 FMS presented as videos and PL displays using the Test of Gross Motor Development-2 (TGMD-2). We also present results from work looking into objectively measuring FMS through inter-trial variability in horizontal jump performances and comparing results to standardised TGMD-2 locomotor scores. Thirty-five children (7.8 ± 2.1 yrs) performed horizontal jumps in front of two Microsoft Kinect cameras. Finally, we will present research on the use of wearable blue-tooth enabled accelerometer and foot sensors to predict movement patterns. This presentation will provide an up to date overview of available technologies and propose likely avenues to successfully developing objectively measured FMS in children.

External funding details: Components of this presentation were supported by a research grant from the Western Australian Health Promotion Foundation

The feasibility of a school-based peer-led physical activity intervention for adolescent girls in English secondary schools: PLAN-A

Simon J. Sebire¹, Russell Jago¹, Mark Edwards¹, Kathryn Banfield¹, Rona Campbell¹, Ruth Kipping¹, Joe Matthews¹, Bryar Kadir¹, Kirsty Garfield¹, Ronan Lyons², William Hollingworth¹

¹University of Bristol, ²Swansea University

Background: Few adolescent girls meet physical activity recommendations. We evaluated the feasibility of PLAN-A, a peer-led intervention for girls.

Method: A two arm cluster randomised feasibility study in six schools (4 intervention, 2 control) with 427 12-13-year-old girls. The intervention involved girls nominating influential female peers (~18% of year) who were trained (3 days) to be peer-supporters (focusing on empowerment, physical activity knowledge and interpersonal skills) and informally diffuse messages to support their friends’ physical activity. Data provision, recruitment rates, intervention delivery and acceptability, evidence of promise to influence physical activity and estimated intervention cost were assessed. Accelerometer and questionnaire measures were taken at the beginning (T0) and end (T1, post intervention) of Year 8 and at the beginning of Year 9 (T2).

Results: 427 participants were recruited (95% recruitment rate) and 93% were retained at T2. 55 peer-supporters were recruited and 97% attended all the training. Questionnaire data provision exceeded 91% at all time points and accelerometer return rates (provision of 2 valid days) were 97% (84%), 91% (71%) and 90% (62%) at T0, T1 and T2 respectively. Complete-case adjusted linear regression analysis showed evidence of a 6.09 minute (95% CI = 1.43, 10.76) between-arms difference in weekday moderate-to-vigorous physical activity at T2 in favour of the intervention arm. On average PLAN-A cost £2685 per school to deliver (£37 per Year 8 girl).

Conclusion: PLAN-A is an acceptable intervention and the research needed to evaluate it is feasible. A definitive trial is warranted.

External funding details: National Institute of Health Research (PHR:13/90/16)

Theme: Interventions—Older Adults

Monday 15 October

A community-based physical activity intervention for elderly, jointly developed with local stakeholders: The Prevention Active Senior (PAS) Experience

Noemie Ferre¹, Antoine NOEL RACINE², David Fuente³, Dusan Pjevac³, Alain Fuch⁴, Jean Marie Garbarino², Christian Pradier⁵

¹CHU Nice / A2S, ²Université Côte d’Azur. Laboratoire Motricité Humaine, Education, Sport, Santé (LAMHESS), ³Association Azur Sport Santé, ⁴Sécurité Sociale des Indépendants Côte d’Azur, Nice, ⁵Département de santé publique CHU de Nice

Regular practice of physical activity is recognized as one of the key elements for ageing well. Several interventions are developed for this target group all around the world. The aim of this study was to examine the obstacles and levers for conducting a sustainable physical activity program for subjects aged 60 or more with participation of local stakeholders. This experience, coordinated by physical activity network, consisted of conception and implementation of a structured physical activity program for subjects aged 60 or more in France. In every municipality the program was conducted in partnership with a local sports instructor and a municipal representative. It consisted out of 3 weekly sessions of physical activity

during 3 months period and work for sustainability. The data was collected thanks to the tools developed for the evaluation. The program was conducted in 20 municipalities with different kind of sport instructor depending on the context. 517 participants have been involved and 445 completed the final evaluation. This project allowed an improvement of three main physical capacities (endurance, muscular strength, and balance) for most of the participants. More than 50% of the municipalities created or supported a creation of a long term physical activity offer for elderly. This study highlights the need to adapt this kind of intervention to the local context. It confirmed the interest of a combined individual and more general approach, as well as a cross-sectorial work in order to create the conditions for a sustainable every day physical activity for the target group.

Associations of nature perceived as a facilitator for outdoor mobility and physical activity among older people living in different types of neighborhoods

Kirsi Keskinen, Merja Rantakokko, Taina Rantanen, Erja Portegijs, Gerontology Research Center, University of Jyväskylä

Aims: To study associations between nature perceived as a facilitator for outdoor mobility and physical activity (PA) among community-dwelling older people living in neighborhoods with higher or lower variety of services.

Methods: Cross-sectional analysis among 75-90-year-old people are presented ($n = 848$, 62% women). Nature perceived as a facilitator for outdoor mobility (yes/no) and PA (at least moderate PA vs. only light PA) were self-reported. Neighborhood type was categorized according to objectively defined variety of services (high/medium/low) within a 500 m radius around participants' home using Geographical Information System. Binary logistic regression models were adjusted for age, gender, difficulty in walking 500 m, chronic conditions, education, and years in current address.

Results: Reporting nature as a facilitator was associated with higher odds for at least moderate PA (OR = 1.61, CI 1.10-2.34). Among people living in areas with high and low variety of services, perceiving nature as a facilitator for outdoor mobility increased the odds for at least moderate PA (in high OR = 2.67, CI 1.41-5.06; in low OR = 1.74, CI 1.03-2.95), while for those living in areas with medium variety of services no association was observed ($p \geq 0.401$). Higher variety of services in itself was not associated with physical activity ($p \geq 0.271$).

Conclusions: Nature may motivate older people to be physically active especially in neighborhoods with high and low variety of services. Future study is needed to determine whether similar associations are also found when studying objective environmental features.

External funding details: Finnish Ministry of Education and Culture; Academy of Finland (grant nr.255403); and Foundation for Municipal Development.

Co-development of a digital behaviour change intervention to facilitate engagement in physical activity for people with osteoarthritis

Alice Berry¹, Candy S McCabe², Sarah Muir³, Nicki Walsh¹

¹University of the West of England, ²University of the West of England / Royal National Hospital for Rheumatic Diseases, ³Bournemouth University

Introduction: Osteoarthritis (OA) affects 8.75 million people in the UK. Exercise is recommended as a core treatment, yet 44% of people with OA are inactive. Interventions are required that address barriers and facilitators to exercise, and which can adapt to individual needs. Digital interventions could do this, by providing tailored information to a wide number of

people. The aim of this project was to develop a digital intervention, to motivate people with OA to be active.

Methods: Determinants of physical activity were explored, by using a survey to gather information about beliefs and motivations for physical activity. Overarching programme objectives and goals were established. Research Partners took part in a consensus exercise to identify change objectives (what needs to be done to achieve change), and helped to select appropriate behaviour change techniques. They also provided valuable insight into the most effective ways to translate the techniques into practical applications.

Results: Key areas of the intervention included: Knowledge about the benefits of physical activity and access to resources for skills development (building confidence); tools to formulate and self-monitor goals (strengthening autonomy); support to develop new social links (developing relatedness to others).

Conclusion: This paper highlights the benefits of co-designing a digital intervention. The intervention is currently being developed into a prototype website, and will be pre-tested with a group of people with OA, to explore acceptability.

Dancing in Time: Feasibility and acceptability of a contemporary dance programme to modify risk factors for falling in community dwelling older adults

Laura Britten, University of Leeds

Objectives: This study investigated the feasibility, and impact of an 8 week contemporary dance programme on modifiable physical and psychosocial risk factors for falls.

Methods: Three groups of older adults were recruited from local community groups to participate in 3 separate, 8 week dance programmes (2, 90 minute dance classes per week). Quantitative measures of physical activity, sedentary behaviour, depression, mobility and fear of falling were measured at baseline and after 8 weeks of dance. Weekly attendance was noted, and post-study qualitative work was conducted in 3 separate focus groups.

Results: Of the 38 (Mean Age = 77.3 $\pm$ 8.4 yrs, 37 females; 1 male) who attended the dance sessions, 22 (Mean age = 74.8, $\pm$ 8.44 yrs, 21 females; 1 male) consented to be part of the research study. Mean adherence to the dance sessions was 84.3% ($\pm$ 17). Significant increases in moderate and vigorous physical activity were noted, with a significant decrease in sitting time over the weekdays ($p < 0.05$). Statistically significant decreases in depression ($p < 0.05$) and fear of falling ($p < 0.005$) score were noted, and mobility significantly improved ($p < 0.005$). Themes from the focus groups included the dance programme as a means of being active, health benefits, and dance-related barriers and facilitators.

Conclusions: The recruitment of older adults, good adherence and favourability across all three sites indicate that a dance programme is feasible to implement. Contemporary dance has the potential to positively affect the modifiable physical and psychosocial risk factors for falls. An adequately powered study with control groups are required to test this intervention further.

Effect of chair-based exercise and walking meditation on frailty in community-dwelling older adult at Thailand

Nongnuch Yamwong¹, Adichsorn Yamwong²

¹Her Royal Highness Princess Maha Chakri Sirindhorn Medical Center,, ²Command and General Staff College

Introduction: The increase in elderly amputation has prompted interest in recent years toward the study of frailty older adults, who is vulnerable to any kind of change in health status. Leading to an increase risk of frailty, increased physical activity has been proposed as preventive strategies for frailty. The aim of this study was to evaluated the effect of Chair-base

exercise and walking meditation on measures of physical frailty in older community-dwelling.

Study Design: Randomized control trials of community-dwelling older adults in Nakorn Nayok province, Thailand. Ninety men and women who were over 65 years old, defined as frail according to physical function and difficulties in activities of daily living.

Method: Participants were randomly assigned to a control group that performed a 4-month low-intensity home exercise program or chair-base exercise and walking meditation program. The instrument consist of Modified PPT score, performance of ADLs test, single leg stance test and Functional status Questionnaire.

Result: Chair-base exercise and walking meditation resulted in significantly greater improvements than home exercise in three of the four primary outcome measures, Adjusted 95% confidence bounds on the magnitude of improvement in the chair-base exercise group compared with the control group were 1.0 to 4.9 points for the modified PPT score, and 1.6 to 4.87 points for FSQ score.

Conclusion: This results show that chair-base exercise and walking meditation can improve of physical function and better than a low-intensity home exercise program. Moreover walking meditation is beneficial for older adults who are frail or high risk of frailty about mindfulness.

Evidence based physical activity policy and practice to promote physical activity: Adding years to life and life to years: Sporting Memories; promoting well-being & exercise across generations

Tony Jameson-Allen, Sporting Memories Network

We will explore the development and impact of using the history and heritage of sport to tackle three of the biggest challenges facing an ageing society; dementia, depression and loneliness. Founded in 2011 to develop an approach to engage older men through reminiscing about sport, we will describe how a chance encounter led to group members suggesting introducing physical activity into their weekly group. Working with over 400 organisations and across generations, toolkits, apps and digital resources have supplemented training of volunteers to establish over 100 groups to date.

Evaluation and impact measures have evolved in collaboration with researchers and academic institutions. Leeds Beckett University are evaluating Sporting Memories three year Sport England Active Ageing project that commences in January 2018. Early findings will be shared, along with case studies captured in previous projects and ongoing work, demonstrating how this approach is having a positive impact on getting inactive people over 55, physically active. In one region in Scotland, of 165 male participants 84% were totally inactive until joining a sporting memories group. All now undertake a minimum of one hour physical activity a week.

The approach would appear to be a sustainable community based, inter-generational solution to supporting older men, in particular those living with dementia, to gain the confidence to play sport once again

External funding details: 3 years funding from 1st Nov 2017 has been provided through Sport England's Active Ageing programme. Previous funders of the organisation have included Big Lottery, Heritage Lottery Fund & Sport Relief

Implementing strength and balance exercise programmes for the prevention of falls in older people: What intervention components work best to improve physical activity in older people? A systematic review

Sarah Audsley, Asiya Maula, Zena Lam, Denise Kendrick, Philippa Logan, Elizabeth Orton, University of Nottingham

Background: There is convincing evidence that increasing physical activity (PA) levels helps to ameliorate chronic disease and reduce the risk of falls in older people. However, evidence shows that older people rarely remain physically active after they have completed PA programmes. This review identifies which intervention components work best to help maintain PA in older adults.

Methods: Randomised and non-randomised controlled trials and controlled before-and-after studies assessing interventions for maintaining PA in people aged 65 years and older, published from 2010-2017, were identified from bibliographic databases and hand searching. Two researchers independently assessed for eligibility, extracted data and assessed risk of bias. Only studies that assessed community-dwelling older adults were included. Study characteristics, intervention strategies features and delivery methods were synthesised narratively.

Results: The systematic search yielded 25,761 publications and 19 studies met the inclusion criteria. There was considerable heterogeneity between the studies and interventions delivered. Of the nineteen studies, thirteen reported significant increases in PA outcomes between 9-36 months after the onset of interventions. Interventions delivered on a monthly, or quarterly basis over an intervention period of 6 months-2 years consistently showed significant effects on PA maintenance. Interventions were effective regardless delivery mode, setting, provider or whether delivered to groups or individuals. Providing pedometers, counselling and motivational interviewing helped to sustain PA increases.

Conclusion: PA maintenance programmes can help older adults stay active for up to 36 months. Intervention time periods and contact frequency appears to influence intervention effectiveness.

External funding details: National Institute for Health Research School for Primary Care Research.

Socially vulnerable older adults spend more time on passive sedentary behaviour

Hiroyuki Kikuchi, Shiho Amagasa, Shigeru Inoue, Tokyo Medical University

Introduction: Different types of leisure-time sedentary behaviors (LTSBs) were suggested to play different roles in health. To date, little is known how these types of sedentary behavior are different between older adults with and without social vulnerability. We investigated the associations between social vulnerability, types of sedentary behavior, and health outcomes.

Methods: This cross-sectional study included 1,833 community-dwelling Japanese older adults. LTSBs were categorized into two types i.e. passive sedentary behavior (PSB; TV viewing, talking, and sitting around) and mentally-active sedentary behavior (MASB; computer-use and reading) by explanatory factor analysis. We conducted 1) logistic regression analysis to assess the associations between each type of LTSBs and health outcomes (overweight and psychological distress), and 2) analysis of covariance to estimate the adjusted means of PSB and MASB time according to socially vulnerable status (educational attainment, driving status, and physical limitation), adjusted for potential confounders.

Results: Mean ($\pm$ S.D.) of PSB and MASB time were 3.67 ($\pm$ 3.02) and 1.19 ($\pm$ 1.38) hours/day, respectively. Longer PSB time were significantly associated with overweight and psychological distress, whereas MASB time was not associated with these health outcomes. More PSB time was observed among men with lower educational attainment and women who do not drive a car and with physical limitation. Meanwhile, more MASB time was associated with higher educational attainment among both men and women.

Conclusion: PSB time, which showed clearer association with adverse health outcomes, were longer among older adults with social vulnerability,

i.e. those with lower educational attainment, non-drivers and those with physical limitation.

System based approach to inequality in determinants of sedentary behaviour in older adults

Sebastian Chastin, Philippa Dall, Dawn Skelton, Glasgow Caledonian University

Background: Older adults are the most sedentary segment of society. We investigate what determines inequalities in sedentary behaviour for older adults based on DEDIPAC's Systems of Sedentary behaviours framework and results from analysis of harmonised data in Europe and in Scotland.

Methods: The System of Sedentary behaviours framework was developed by DEDIPAC through an international consensus. Data from European cohorts, the Eurobarometer and three Scottish cohorts (Study Senior USP) were analysed using this framework to determine sources of inequalities in sedentary time.

Results: The build and natural environment appear as the most important system that determines sedentary behaviour. Older adults in urban area spend more time in sedentary behaviour but longitudinally densification is associated with lower sedentary time. Perceived access to facilities or perceived absences of services, fear of crime are important factors in this system. Lower social economic status if associated with higher sedentary time but economic growth is not associated longitudinally with decrease in sedentary time in older adults. There are difference in determinant between men and women with the economic system being the second most influential system for men while for women it is health care and wellbeing including mobility issues.

Conclusion: There are complex inequalities in sedentary time among older adults. Some interventions might inadvertently widen these inequalities. More focus should be placed in providing access to safe and stimulating environment for older adults to be active.

Well going with dementia: Influence of a tailor made physical activity intervention for people with dementia on gait characteristics

Doris Gebhard, Christina Schmid, Carinthia University of Applied Sciences

Introduction: People with dementia show more impairment in gait and thus a higher risk of falling than their cognitive healthy peers. Although studies show positive impacts of physical activity on functional mobility, gait and falls there is a lack of information about how exercise programs should be designed to meet the special needs of this target group and can be implemented in relevant care settings.

Method: Following a participatory approach, the wishes and needs of people with dementia and the care personnel were unified with scientific evidence to develop a tailored physical activity program. The multicomponent exercise program was conducted in five long-term care facilities for 12 weeks, twice a week each for one hour. In course of a randomized controlled study design effects on fall associated gait parameters such as gait speed, stride length, step length and double support phase were examined via the GAITRite® system.

Results: The study included 63 persons with a mean age of 86.21 years and an average Mini-Mental State Examination of 19.19 points. The intervention group demonstrated significant improvement in gait speed (cm/sec) ($t_0: 46.97 \pm 21.30$; $t_1: 58.04 \pm 21.71$; $p = .001$), stride length (cm) ($t_0: 74.32 \pm 22.89$; $t_1: 81.23 \pm 21.99$; $p = .047$) and double support phase (sec) ($t_0: 0.53 \pm 0.23$; $t_1: 0.41 \pm 0.13$; $p = .013$). Furthermore gait speed ($p = .007$), step length ($p = .023$), stride length ($p = .020$) and double support phase ($p = .015$) significantly improved in group and time comparison.

Conclusion: The developed exercise program can improve fall associated gait parameters in people with dementia in long-term care facilities.

External funding details: Fonds Gesundes Österreich

Tuesday 16 October

Acute response of biochemical bone turnover markers to high-impact exercise in postmenopausal women

Rizky Suganda Prawiradilaga¹, Anders O. Madsen¹, Niklas Rye Jørgensen², Nadia Quardon², Eva W. Helge¹

¹University of Copenhagen, ²Department of Clinical Biochemistry, Rigshospitalet

Over three days, twenty-nine postmenopausal women (60.03 ± 5.58 years) were randomly assigned to 6x10 repetitions of three different jumps: Counter-movement(G), Diagonal(D), and Plinth(P). A fourth day without jumping served as control(C). Blood samples were collected before(PRE), immediately-after(POST), and 2 hours after exercise(2Hr). Ground reaction forces (GRF) in three directions were measured.

The bone formation marker procollagen type-1 N-terminal propeptide (PINP) increased ($p < 0.01$) by $8.01 \pm 1.83\%$, $11.80 \pm 1.63\%$, $10.20 \pm 1.25\%$ at POST for G, D, and P respectively and the increase was $11.45 \pm 1.84\%$, $15.26 \pm 2.20\%$, and $13.51 \pm 1.91\%$ higher (< 0.01) than for C. The bone formation marker Osteocalcin(OC) increased $5.19 \pm 1.76\%$ ($p = 0.046$) at POST for P, which was $9.12 \pm 2.18\%$ higher ($p = 0.02$) than for C. OC 2Hr decreased ($p < 0.01$) by $-7.65 \pm 1.46\%$, $-8.62 \pm 3.71\%$, and $-10.15 \pm 1.67\%$ compared to PRE for G, P, and C respectively. The bone resorption marker C-terminal telopeptide of type-1 collagen(CTX-1) 2 Hr decreased ($p < 0.001$) by $-15.27 \pm 2.42\%$, $-13.73 \pm 13.15\%$, $-17.41 \pm 2.34\%$, and $-15.38 \pm 2.11\%$ compared to PRE for G, D, P, and C respectively. The sagittal(Fx) GRF of P was 0.211 ± 0.05 body-weight(BW) higher ($p = 0.003$) than G and 0.158 ± 0.04 BW higher than D ($p = 0.003$). The transversal(Fy) GRF of D was 0.122 ± 0.03 BW higher ($p = 0.003$) than G and 0.072 ± 0.02 BW higher ($p = 0.02$) than P. The PINP change at POST for G correlated with Fy($r^2 = 0.463$, $p = 0.046$), Fz($r^2 = 0.605$, $p = 0.006$), and the combined three-axis GRFs($r^2 = 0.456$, $p = 0.024$).

The acute significant increase in PINP and OC without any increase in CTX-1 after all high-impact jumps indicate a change in bone turnover in favor of bone formation, without any change in bone resorption. This indicates that high-impact exercise for postmenopausal women activates bone modeling.

Cross-sectional association of leisure time physical activity and TV viewing with health-related quality of life in Taiwanese older adults

Li-Ting Wang¹, Ming-Chun Hsueh², Hsin-Hung Ho², Sui-Yu LEE², Shao-Hsi Chang²

¹National Taiwan Normal University, ²National Taiwan Normal University-Department of Physical Education

Background: Excessive television (TV) viewing and insufficient physical activity (PA) are independently associated with inverse health-related quality of life (HRQOL). However, the recommendations of TV viewing time (2 h/day) and multiple-intensity PA (≥ 150 min/week) in relation to HRQOL among older adults are not well understood. This study examined the associations of TV viewing time, walking time, moderate-to-vigorous PA (MVPA), and total PA with HRQOL among Taiwanese older adults.

Methods: The sample comprised 1,066 older adults (aged ≥ 65 years) from Taipei city, Taiwan. Cross-sectional data were collected through computer-assisted telephone-based interviews in 2015. Data on self-reported TV

viewing time, leisure-time PA (LTPA), sociodemographic variables, and HRQOL (including mental component summary [MCS] and physical component summary [PCS]) were collected in this study. A binary logistic regression analysis was performed to calculate the adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for TV viewing time, walking, MVPA, and total LTPA and the likelihood of HRQOL.

Results: Older adults with insufficient MVPA were more likely to report lower MCS (OR = 1.38, 95% CI 1.04, 1.82). After the results were stratified according to sociodemographic variables, older men (OR = 1.68, 95% CI 1.10, 2.59) with insufficient MVPA were more likely to have lower MCS, but not older women.

Conclusions: Older men with insufficient MVPA have lower perceived mental health, but not women. Additional prospective studies are required to confirm the observed relationship between MVPA and mental health in older adults residing in a metropolitan region.

Developing interventions with older adults: An exploratory mixed methods case study

Tanja Schmidt¹, Sidse Carroll², Jacqueline Kerr³, Charlotte Pawlowski¹, Jasper Schipperijn¹

¹University of Southern Denmark, ²The Royal Danish Academy of Fine Arts, Schools of Architecture, Design and Conservation, ³University of California, San Diego

Introduction: Neighborhood Open Spaces (NOS) might be a means to increase physical and mental health in older adults. However, research on how to build NOS for older adults is scarce. The aim of this study was to create age-friendly NOS by using co-creation to increase use of NOS and social interaction between older adults.

Methods: The study consisted of two baseline and two follow-up data collections and included a 6-month co-creation process with 25 elderly people from two senior housing areas. In each area three workshops were held, followed by a design and building phase. The System for Observing Play and Recreation in Communities was used to measure changes in use and social interaction. Interviews were conducted to get an understanding of participants' experiences with NOS and the intervention process.

Results: The workshops lead to a range of suggestions from participants, resulting in the construction of different NOS features focusing on social interaction. Including older adults in the process ensured highly tailored designs of NOS features. Preliminary results did not show change in use or social interaction. The second follow-up in spring 2018 will include a more elaborate data collection, to get a deeper understanding of possible change.

Conclusion: The study contributed to a better understanding of older adults' barriers and needs towards NOS, and how to include elderly in a co-creation process, which is valuable for future intervention studies in age-friendly communities.

External funding details: The study was funded by TrygFonden, Danish Foundation for Culture and Sports Facilities, and Velux Foundation.

Effects of three-stage training program on fear of falling and daily physical activity for community-dwelling old-old Japanese women

Hiroshi Kohno, Toyo University

Purpose: To examine the effectiveness of a three-stages physical training program on fear of falling and daily physical activity for community-dwelling old-old Japanese women.

Methods: After giving written informed consent, the subjects, unable to stand on one leg for more than 20 seconds with eyes open, were divided

into a 3 times/week group (HFG; 13 females, 81.5±2.7 yrs, BMI 22.8±1.6) and a 1 time/week group (LFG; 10 females, 81.7±3.2 yrs, BMI 21.9±1.3). The program was composed of three stages for 16 weeks. First, participants learned about management skill for their physical soreness. Second, they learned to strengthen their core and lower leg muscle using an elastic band. The last stage was to learn a three-minute arm and leg combined exercise program with music. One-leg standing time with eyes open, knee extension strength, and fear of falling score were obtained. Daily physical activity was measured by pedometer in the first and last 7 days during the intervention period. Student's T-test and two-way repeated measures ANOVA were used to test the effectiveness.

Results: The class participation were 82±4% and 81±8% respectively. Fear of falling score (P=0.034), daily steps (HFG: 3864±747 to 4454±632 steps, LFG: 3831±832 to 4001±860 steps, F=5.28, P=0.032) improved significantly in HFG. ADL-related functional fitness (P=0.002), one-leg standing time with eyes open (P=0.000), knee extension strength (P=0.040), also improved significantly in HFG.

Conclusion: Three-stage physical training program was effective for fear of falling score and daily physical activity by old-old Japanese females.

Motivating older people to move more: participant impressions of a physical activity intervention combining health coaching and activity trackers

Anne Tiedemann¹, Catherine Kirkham¹, Elisabeth Ramsay¹, Shona Manning¹, James Wickham², Catherine Sherrington¹

¹The University of Sydney, ²Charles Sturt University

Introduction: This study evaluated participant impressions of a physical activity promotion strategy for people aged 60+, including telephone-based health coaching, activity trackers and fall risk assessment, currently being tested in a cluster randomised controlled trial.

Methods: This was a process evaluation of intervention group data. Participants had completed 6 months of the physical activity promotion intervention and completed a survey, rating out of 10 (higher scores = more positive rating): a) overall program benefit; b) usefulness of health coaching; c) usefulness of activity tracker; and were asked if they would recommend the program to others. Descriptive statistics summarised the participant responses.

Results: 134 participants (mean age 74, SD 10, 81 females) were included. Mean rating of program benefit was 7.5 (SD 1.8), with the main benefits being the health coach support to meet goals and stay motivated, increased awareness and use of the activity tracker to monitor activity and provide motivation. One hundred and eleven (83%) participants took part in the health coaching and mean rating of benefit was 8 (SD 1.2). Support, encouragement, motivation and tailoring of exercises were the main benefits cited. The activity tracker/pedometer was rated 8 (SD 1.1) for usefulness, with participants viewing it as a good motivator and reminder. Overall, 111 (83%) participants said they would recommend the program to others.

Conclusion: Our physical activity intervention was well received, and participants appreciated the support gained from regular contact with a health coach and feedback provided by the activity tracker.

External funding details: National Health and Medical Research Council, Australia

Move 4 Life: An evaluation of a peer mentoring intervention designed to cascade and consequently up-scale existing programmes to help inactive 50+ become more active

Catherine Woods¹, Andrew O'Regan¹, Liam Glynn¹, Monica Casey¹, Amanda Clifford¹, Alan Donnelly¹, Andrew W Murphy², Stephen

Gallagher¹, Susan Coote¹, Paddy Gillespie², Mary Harkin³, Phelim Macken⁴, John Sweeney⁵, Mo Foley-Walsh⁶, Geraldine Quinn⁷, Kwok Ng¹, Nollaig O'Sullivan¹, Enrique Garcia¹¹ ¹University of Limerick, ²National University of Ireland, Galway, ³Age and Opportunity, ⁴Limerick Sports Partnership, ⁵Clare Sports Partnership, ⁶Healthy Limerick, Limerick City and County Council, ⁷Health Promotion & Improvement Service, HSE Health & Wellbeing Division

Introduction: International physical activity (PA) guidelines are that adults should be moderately active at least 30 minutes a day on 5 days or 150 minutes weekly. In Ireland, 63% do not meet these guidelines. Staff shortages can limit health promotion delivery efforts. The Move4Life (M4L) peer mentoring intervention is designed to cascade and up-scale existing programmes to help inactive 50+ year olds become more active. We will test the programme's feasibility involving professionals and peer mentors promoting PA.

Method: M4L is a three-arm feasibility and parallel, pilot cluster randomised controlled trial. Eight Western Ireland community sport and PA Hubs were recruited, 68 participants per Hub, each Hub randomised post-baseline into usual care, true control or M4L (N=544). ActivPAL accelerometers provide data on primary (PA) and secondary (sedentary behaviour) outcomes; while questionnaires will gather data for cost-effectiveness, behaviour change and quality-of-life analysis. Participants are assessed at baseline, 3 and 6 months, with post intervention debrief interviews concluding the study.

Results: This protocol paper will provide information on design and evaluation of a complex community-based intervention. As a feasibility trial it will contribute to understanding of potential effects of empowering non-professionals to teach behavioural skills and provide informational and social support to their peers and how this might promote PA, reduce sedentary behaviour in a cost-effective manner.

Conclusion: Our vision is that adults 50+ will live a more active, healthy lifestyle as a result of being part of M4L. This study has the potential to inform how best to achieve this goal.

External funding details: This study is funded by the Health Services Executive Health and Wellbeing Division (Healthy and Positive Ageing Initiative - HaPAI), the Department of Health, the Atlantic Philanthropies and Age Friendly Ireland.

Neighbourhood destinations and barriers for outdoor mobility and older adults' physical activity

Erja Portegijs, Kirsi Keskinen, Béla Pavelka, Johanna Eronen, Milla Saajanaho, Merja Rantakokko, Taina Rantanen, Gerontology Research Center, University of Jyväskylä

Aim: To study associations between older adults' physical activity and locations of neighbourhood destinations and environmental barriers for outdoor mobility.

Methods: Cross-sectional analyses of the MIIA study comprising 196 participants aged 79-94 years living independently in Central Finland. Level of physical activity was self-reported using one seven-category question and categorized into low and high (≥ 4 h moderate or intensive activity). Neighbourhood destinations perceived to facilitate outdoor mobility (PENFOM questionnaire; items parks, trails, nature, scenic, services) and environmental barriers for outdoor mobility (PENBOM questionnaire) were located on an online map. Euclidean distances between homes and locations were calculated using geographic information system. Logistic regression models were adjusted for age, sex, chronic conditions, Short Physical Performance Battery score, and years of education.

Results: 19% of participants reported one, 52% multiple destinations facilitating outdoor mobility. About half of participants reported one or

more barriers. Barriers were generally located closer to the home (range 3-2691 m; median 119 m) than destinations (range 19-6100 m, median 343 m). Longer maximal distances to destinations were associated with higher odds for reporting high physical activity (OR = 2.8, 95%CI = 1.1-6.6). The presence of barriers was associated with lower odds (OR = 0.28, 95%CI = 0.12-0.66) and longer maximal distances to barriers were associated with higher odds (OR = 6.2, 95%CI = 1.4-27.7) for reporting high physical activity.

Conclusions: Self-reported locations of perceived environmental attributes reflect the size of an individual's activity-space. Consequently, longer distances to neighbourhood destinations and longer distances to barriers for outdoor mobility were both associated with higher physical activity.

External funding details: Funding. Ministry of Education; Academy of Finland (grant 255403)

Water-based training as non-pharmacological treatment alternative to improve lipid profile of dyslipidemic elderly women: A randomised clinical trial.

Rochele Costa¹, Natalia Bagatini¹, Leandro Coconcelli¹, Adriana Butelli¹, Laura Frances¹, Alexandra Vieira¹, Alexandre Fagundes¹, Juliano Farinha¹, Thaís Reichert¹, Ricardo Stein², Luiz Fernando Kruei¹

¹UFRGS, ²HCPA

Background: Regular physical exercise is highly recommended for dyslipidemia treatment. Aquatic environment presents some beneficial characteristics for this population, however, the modality that promotes better results is still unknown.

Objective: To compare the effects of water-based aerobic training and water-based resistance training on lipid profile of dyslipidemic women.

Design: Three-arm randomized controlled clinical trial with groups in parallel.

Setting: University swimming pool.

Patients: Sixty-nine elderly (65.79 years; 95%CI 64.55 to 67.04) dyslipidemic women.

Interventions: Water-based aerobic training (WA), water-based resistance training (WR) and control group (CG), with two weekly sessions, during 10 weeks.

Measurements: Biochemical analyses were used to measure total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL) levels and TC/HDL ratio, before and after the 10-weeks period.

Results: In intention-to-treat analysis, WA and WR subjects obtained similar decreases in TC levels (10%), TG (13% and 16%, respectively), LDL (16% and 17%) and TC/HDL ratio (17% and 23%). Also, both interventions promoted increases of 8% and 17% in HDL levels. The CG maintained their TC and LDL values unchanged, the concentrations of TG and TC/HDL were increased in 4 and 11%, respectively, and the HDL levels were decreased in 5%.

Limitations: The lipid metabolism enzymes activity was not tested.

Conclusions: Water-based training (aerobic and resistance) induced improvements in lipid profile of the dyslipidemic elderly women. Both strategies are useful as non-pharmacological treatment and promote similar benefits.

Trial Registration: NCT02900612.

External funding details: This research was supported by the International Research Fund (FIPE) from HCPA, CAPES and CNPq.

We're still teeing off! Why do older adults play golf?

Brad Stenner¹, Amber Mosewich², Jon Buckley¹

¹University of South Australia, ²University of Alberta

Introduction: Participation in organised sport is declining, but golf participation by older adults is defying this trend. This study investigated why older Australians play golf using the Golf Participation Questionnaire for Older Adults (GPQOA) which was developed and validated specifically for this purpose.

Method: The GPQOA has 30 items, reflecting nine key themes based on previous research related to why older adults play golf. Participants (N = 3262; 83% male; male: 64.0±5.6 yrs.; female: 64.1±5.1 yrs.) completed the GPQOA. Reasons for participation were ranked and compared between genders.

Results: Fun, the pleasant Natural Environment, and Competition were the three most important reasons for participation for both men and women, and were more important than reasons related to health. Fun, Environment, Part of Community, Mental Health, Cognitive Health and Physical Health were more important to female golfers, whilst Competition, Exercise for Older Age and Time for Self were not different between genders.

Conclusion: Older adults play golf primarily because it is fun, played in a pleasant natural environment and provides an enjoyable source of competition. While social and health benefits were important determinants of participation, females rated these as more important than males. Marketing and participation strategies should focus on these reasons when promoting golf participation.

Theme: Measurement and Surveillance

Monday 15 October

An analysis of physical activity and sedentary behaviour using accelerometers in a mixed student population in the United Arab Emirates

Sarah Dalibalta, American University of Sharjah

Physical inactivity is linked to cardiovascular disease and diabetes. Data suggests that 58% of the UAE population is physically inactive (Malik et al., 2007). The aim was to obtain the first dataset that quantifies physical activity and sedentary behavior. Upon ethical approval, 125 university students participated in this study. We obtained an accurate measure of body fat, muscle mass, bone mass, and BMI. Subjects were also asked to wear an accelerometer device (ActiGraph) for 7 days. Participants were divided into the "normal" weight and "overweight/obese" cohorts. Summary measures of physiological parameters as well as physical activity values were compared using a sample T-test. According to BMI, 14 females and 25 males were overweight/obese with an average BMI of 29.9 kg/m². Their fat percentage was 29.3% compared to 22.8% in the normal BMI group (p ≤ 0.05). Although their BMI was significantly higher, they also had a higher muscle mass and expended more energy per day (602.8 versus 293.9 kcal/day)(p ≤ 0.05). Time spent in sedentary activity was similar in both groups with an average of 8374 minutes. This translates to 85.6% of their time spent sedentary. Their physical activity was primarily in the light range (10.9%), with no significant differences in their moderate or vigorous intensity exercise. Average MVPA values were similar (342.7 minutes) as was their step counts per day (7564.3 steps). This demonstrates that this young UAE population is sedentary with an alarming average of 12.4 hours a day. Regardless of BMI, subjects were not meeting the minimum recommendations of exercise.

Feasibility and reliability of the Spanish version of the Youth Activity Profile questionnaire (YAP-Spain) in children and adolescents

Jos Manuel Segura-Diaz, Yahira Barranco-Ruiz, Romina Gisele Saucedo, María Jesés Aranda-Balboa, Cristina Cadenas Sanchez, Jairo H Migueles, Manuel Herrador-Colmenero, Palma Chillón, Emilio Villa-González

PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada

Introduction: Adequate physical activity (PA) level in childhood may be essential for the prevention of the obesity and comorbidity in later life. However, there are few feasible and reliable questionnaires to assess physical activity in Spanish youth. Thus, we aimed to study the feasibility and reliability of the Youth Activity Profile (YAP) questionnaire in Spanish young people.

Method: A total of 414 children (5-10 y) and 298 adolescents (from 12-18 y) completed twice a questionnaire separated 15-days. Feasibility was examined using an observational sheet. We examined the reliability of the 19-questions included in the questionnaire categorizing in 1) Activity at School (Questions 1-9), 2) Activity Out-of-School (Questions 10-14), and 3) Sedentary Habits (Questions 15-19). The test-retest reliability was calculated using the Weighted Kappa Coefficient (κ).

Results: Regarding the feasibility analysis, the participants understood the whole questionnaire and lasted 25 minutes (children) and 10 minutes (adolescents). In both children and adolescents, a low-to-very good reliability were displayed for Activity at School questions (κ:0.28-0.81 and κ:0.23-0.84), a low-to-good reliability for Activity Out-of-School questions (κ:0.29-0.43 and κ:0.43-0.62), and a low-to-good reliability for Sedentary Habits questions (κ:0.36-0.55 and κ:0.53-0.73).

Conclusion: The Spanish version of the YAP questionnaire is a feasible and reliable tool for assessing PA in Spanish children and adolescents. Future Spanish studies may use this tool to share a standardized measurement.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R (MINECO/FEDER, UE), DEP2013-47540-R, and DEP2016-79512-R]

Measuring change in trials of physical activity interventions: a comparison of self-report questionnaire and accelerometry within the PACE-UP trial

Elizabeth Limb¹, Shaleen Ahmad¹, Derek Cook¹, Sally Kerry², Ulf Ekelund³, Peter Whincup¹, Christina Victor⁴, Steve Iliffe⁵, Michael Ussher¹, Julia Fox-Rushby⁶, Cheryl Furness¹, Judith Ibson¹, Steve De Wilde¹, Tess Harris¹

¹St George's University of London, ²Queen Mary University of London, ³Norwegian School of Sport Sciences, ⁴Brunel University, ⁵University College London, ⁶King's College London

Background: Few trials have compared estimates of change in physical activity (PA) levels using self-reported and objective PA measures when evaluating trial outcomes. The PACE-UP trial offered this opportunity, using the self-administered International Physical Activity Questionnaire (IPAQ) and waist-worn accelerometry.

Methods: The PACE-UP trial (N = 1023) compared usual care (n = 338) with two pedometer-based walking interventions, by post (n = 339) or with nurse support (n = 346). Participants wore an accelerometer at baseline and 12 months and completed IPAQ for the same 7-day periods. Outcomes were minutes of: i) accelerometer moderate-to-vigorous PA (MVPA) in

≥10 minute bouts ii) IPAQ moderate+vigorous PA and iii) IPAQ walking. For each outcome, 12 month values were regressed on baseline to estimate change.

Results: Analyses were restricted to 655 (64%) participants with data on all outcomes at baseline and 12 months. Both intervention groups significantly increased accelerometry MVPA minutes/week compared with control: postal group 42 (95% CI 22, 61), nurse group 43 (95% CI 24, 63). IPAQ walking minutes/week also increased: postal 57 (95% CI 2, 112), nurse 43 (95% CI -11, 97) but IPAQ MVPA minutes/week showed non-significant decreases: postal -11 (95% CI -65, 42), nurse -34 (95% CI -87, 19).

Conclusions: Our results demonstrate the necessity of using a questionnaire focussing on the activities being altered, as with IPAQ-Walk. Even then, change in PA was estimated with far less precision than with accelerometry. Accelerometry is preferred to self-report measurement, minimising bias and improving precision when assessing effects of a walking intervention.

External funding details: National Institute of Health Research, HTA Programme

Moderate-to vigorous physical activity: Defined by cadence or activity counts?

Tiago Barreira¹, Jessica Redmond², Tom Brutsaert¹

¹Syracuse University, ²Utica College

Introduction: The link between cardiovascular health and objectively measured moderate-vigorous physical activity (MVPA) time has primarily been investigated using activity counts cut-points. Recent evidence demonstrated that cadence (steps/min) is strongly related to ambulatory intensity and 100 steps/min is a good heuristic indicator of MVPA. However, little is known about the relationship between cadence defined MVPA and cardiovascular health, and how the strength of these relationships compare to activity counts defined MVPA. Thus, the purpose of this study was to determine the relationship between cadence and activity counts defined MVPA with indicators of cardiovascular health (HDL, LDL, triglycerides, blood pressure, blood glucose, BMI, and waist circumference).

Methods: 85 men and women (18-36 yrs old) participated in this study. Time spent in MVPA was measured using an ActiGraph GT3X+ accelerometer worn at the waist (24 h/day for 7 consecutive days) attached by an elastic belt. Activity count MVPA was determined using the Troiano cut-point of 2020. Cadence based MVPA was defined as any minute ≥ 100 steps/min. Cardiovascular health variables were measured using standard procedures. Pearson Correlation was used to determine the relationship between variables.

Results: Mean cadence and activity counts defined MVPA time were 30 ±19 and 55±24 min/day. There were statistically significant correlations between cadence defined MVPA and waist circumference (-.22) fasting glucose (-.26), HDL, (.26), and LDL (-.23). Activity count defined MVPA was significantly correlated to diastolic blood pressure (-.26).

Conclusion: Cadence defined MVPA was significantly and more strongly correlated with cardiovascular health variables than activity count defined MVPA.

Physical activity and functional ability in care home residents

Theodoros Bampouras, Ashlea Atkinson, Lawrence Hayes, University of Cumbria

Physical activity (PA) recommendations exist for care home residents, yet few studies have examined functional ability to determine feasibility of

these guidelines. The present study compared functional ability of care home residents to community-dwelling adults. Eleven care home individuals and eleven community-dwelling individuals participated in the study. We assessed functional ability by means of handgrip, one-legged stance (1LS, maximum 45s duration), timed 8 foot up-and-go (TUG), back-scratch (BS), chair sit-and-reach (CSR), 30 s chair sit-to-stand (StoS) and daily step count (Step). When controlling for age, care home residents had poorer handgrip strength ($p=0.002$ left, $p=0.002$ right), 1LS ($p<0.001$), TUG ($p=0.001$), BS ($p=0.001$), CSR ($p=0.022$) and Step ($p=0.001$) performance, while performance in the StoS was similar ($p=0.088$). Care home residents demonstrated lower functional ability, raising concerns regarding their ability to meet PA recommendations. Perhaps most concerning is the low level of objectively measured PA (<10% that of community-dwelling participants). Present data support promotion of PA during earlier stages of the lifespan, to prevent functional decline and promote increased healthspan.

Physical activity questionnaires for pregnancy: A systematic review of measurement properties

Pavel Dietz¹, Matteo Sattler², Johannes Jaunig², Estelle Watson³, Lidwine Mokkink⁴, Caroline Terwee⁴, Mireille van Poppel²

¹Karlsruhe Institute of Technology, ²Institute of Sport Science, University of Graz, ³Centre for Exercise Science and Sports Medicine, School of Therapeutic Sciences, Faculty of Health Sciences, University of Witwatersrand, ⁴Department of Epidemiology and Biostatistics, VU University Medical Center, Amsterdam

Introduction: To assess physical activity (PA) in the target population, it is important to choose the instrument with the best measurement properties. The object was to systematically summarize, appraise and compare the measurement properties of all available self-administered questionnaires assessing PA in pregnancy.

Method: We searched PubMed, EMBASE and SportDiscus[®] with the following inclusion criteria (i) the study reported at least one measurement property (reliability, construct validity, criterion validity, responsiveness) of a self-administered questionnaire; (ii) the questionnaire intends to measure PA; (iii) the questionnaire was evaluated in healthy pregnant women; (iv) the study had to be published in English. We evaluated results and quality of the studies with a standardized checklist (Quality Assessment of Physical Activity Questionnaires [QAPAQ]), and the quality of evidence using the GRADE (Grading of Recommendation, Assessment, Development, and Evaluation) approach.

Results: Sixteen articles, reporting 17 studies on 11 different PA questionnaires (16 versions), were included. The level of evidence of measurement properties was very low to moderate for all included questionnaires. Many PA scores of most questionnaires revealed poor measurement properties. Only the French and Turkish version of the PPAQ provided low to moderate evidence for both good reliability and good construct validity.

Conclusion: The evidence regarding measurement properties of PA questionnaires for pregnancy is scant. Currently, we recommend the PPAQ to assess PA in pregnancy, although not all versions revealed good measurement properties. More research on the included questionnaires and comparison measures, such as accelerometers, is needed to allow concrete recommendations for one particular instrument.

Population levels and changes of physical activity and screen time among adults in Finland

Katja Borodulin¹, Pekka Jousilahti¹, Tomi Mäki-Opas², Satu Männistö¹, Heli Valkeinen¹, Heini Wennman¹

¹National Institute for Health and Welfare, ²University of Eastern Finland

Introduction: This study examined the population levels and their changes of physical activity and screentime among adults in Finland.

Methods: We used population-based Health 2011 (n = 5806) and Fin-Health 2017 (n = 6200) Studies to describe the changes in prevalence of leisure-time (LTPA), commuting (CPA) and occupational (OPA) physical activity and leisure-time screentime sitting (LTSS). Sample comprised men and women over 30 years of age with participation rates of 72% (2011) and 69% (2017). Analyses were weighted for non-participation and age-adjusted to represent the general population.

Results: Between 2011 and 2017, LTPA increased significantly from 68% to 75% in working-aged men, but not among older men (from 70% to 69%). In women, LTPA decreased significantly over time in older women from 63% to 59% and stayed stable in working-aged women (75%). CPA increased over time in men from 17% to 20%, but not in women (from 26% to 28%). Low OPA remained unchanged in men (from 44% to 45%) and in women (46%). In working-aged, high LTSS decreased over time from 32% to 26% in men and from 24% to 19% in women. LTSS increased in older women from 47% to 52%.

Conclusions: Public health programs require tailored approaches for gender and age, where favorable development has lately been shown in particular for younger men and for diminished screentime.

Relationship between intensities of physical activity and spiritual well-being in university students

Christopher A. Chandroo, Chelsea L. Orduno, Joel D. Reece, Brigham Young University Hawaii

Introduction: Although the health benefits of physical activity are widely documented, it is still uncertain how intensities of physical activity and sedentary behavior are associated with other dimensions of wellness (e.g., spiritual well-being). The purpose of this study was to determine if the amount of time spent in different intensities of physical activity and sedentary behavior is related to spiritual well-being in university students.

Methods: A convenience sample of students (N = 147) from an ethnically diverse religious institution, were recruited via electronic and vocal announcement to complete an online survey. The survey included questions regarding basic demographics, physical activity (International Physical Activity Questionnaire-Short), and spiritual well-being (Spiritual Well-Being Scale). Multiple Pearson product-moment correlation were run to determine relationships between intensity of physical activity and spiritual well-being.

Results: There was a significant weak positive correlation between total minutes of moderate to vigorous physical activity and spiritual well-being scores, ($r = .254$, $p = .002$). However, when intensity of physical activity was analyzed separately (moderate and vigorous), only moderate physical activity maintained this significant relationship with spiritual well-being ($r = .276$, $p = .002$). Neither walking time ($r = .061$, $p = .487$) nor sedentary time ($r = -.066$, $p = .457$) was significantly associated with spiritual well-being.

Conclusion: Although significant, the results of this study demonstrate only about 8% of moderate physical activity is explained by spiritual well-being (and/or vice versa) in university students. It remains unclear why only moderate intensity was associated with spiritual well-being and whether there is a similar relationship between moderate physical activity and religiosity.

Sedentary behaviour profiles of Irish children and youth: A follow up to the Children's Sport Participation and Physical Activity Study (CSPPA)

Cormac Powell¹, Catherine Woods¹, Jean Saunders¹, Sarahjane Belton², Wesley O'Brien³, Marie Murphy⁴

¹University of Limerick, ²Dublin City University, ³University College Cork, ⁴Ulster University

Introduction: The original Children's Sport Participation and Physical Activity Study (CSPPA) examined the levels of physical activity (PA), including sedentary behaviour, in Irish children and youth. Based on previously acquired subjective data from Irish children and youth (n = 5,397, 13.8 ($\pm$ 2) years), primary school children spent much less time sitting, than their post-primary school counterparts. The aim of this study is to employ a gold-standard objective measure of sedentary behaviour, specifically to determine if objectively measured sedentary time is linked to adverse health markers.

Methods: A sub-sample (n = 200-400) of the original schools will be revisited to obtain objective measures of sedentary behaviour and physical health (body mass index, blood pressure and cardiorespiratory fitness). Participants will wear an activPAL3 Micro for seven consecutive days to determine habitual sedentary behaviour. Linear regression analysis will be employed to examine the influence of sedentary behaviour and markers of physical health. Data collection will run from February 2018 – June 2018. Multiple linear regression analysis will be used to determine the association between objectively measured sedentary time and physical health measures, adjusting for appropriate confounding variables.

Conclusion: The subjective measures of sedentary behaviour from the original CSPPA will be further expanded, which will allow for investigation to determine if the difference between primary and post-primary school children exist when a gold standard of objective sedentary behaviour measurement is employed. In addition, the link between sedentary behaviour and markers of physical health in this cohort will also be explored.

External funding details: Sport Ireland, Healthy Ireland

Tuesday 16 October

Absolute and relative differences in objectively measured physical activity, sedentary behaviour and sleeping time in children from a low-income town in Chile.

Nicolas Aguilar-Farias, Damian Chandia-Poblete, Universidad de La Frontera

Introduction: Physical activity (PA), sedentary behaviour (SB) and sleeping time (ST) are variable, but little is known about them in Latin-American children. The aim was to describe these behaviours across days in Chilean children from a low-income town.

Methods: 256 children were recruited and wore an ActiGraph GT3X+ during 7 consecutive days. Absolute and relative (based on wearing time) differences were assessed for PA, SB and ST.

Results: 150 children (47.3% male, 10.2 $\pm$ 0.96 years) provided valid data. Median time spent in MVPA was 40.4 [28.3-58.3] min/day with boys being more active than girls (49.9 vs 33.6 min/day; $p < 0.001$). Participants were more active during week than weekend days (42.5 vs 28.0 min/day; $p > 0.001$). When comparing percentages of MVPA per day, boys showed no differences between week and weekend days (7.5% vs 6.4%; $p = 0.15$). MVPA was more variable on weekend days (79.5% vs 67.1%; $p = 0.03$). Overall, the participants spent 331.4 (95% CI 316.3-346.6) min/day in SB with no gender differences. However, when using relative estimates, girls were more sedentary than boys on average (48.0% vs 44.8%; $p = 0.03$) and weekends (48.8% vs 43.4%; $p = 0.01$). Children slept 552.5 [511.6-608.0] min/night. The participants slept 21.3 more minutes/night during weekend ($p = 0.02$). ST on an any day was more variable in girls than boys (16.5% vs 13.8%, $p = 0.036$), and more variable on week than weekend days (15.0% vs 12.9%, $p = 0.036$).

Conclusion: Some differences were found for the same behaviour when using absolute or relative estimates. Therefore when analyzing data is important to consider this aspect.

External funding details: FONDECYT(11160720) - UNETE(14-0008)

Association between age, sex and physical activity pattern among Thai population

Piyawat Katewongsa, Dyah Anantalia Widyastari, Panya Choolers, Chutima Yousomboon, Mahidol University

Introduction: Age and sex are the primary biological factors that may differ human's attitudes, experiences, and behaviors. This paper aims to examine the differences in age-sex specific physical activity rate of the Thai population.

Method: Longitudinal data from Thailand Physical Activity Surveillance System from 2012 to 2017 which jointly conducted by Institute for Population and Social Research Mahidol University and ThaiHealth were employed. A face-to-face interview was conducted using GPAQ v.2 to a total of 7,333 cases aged five years old and over who was drawn from the population by using the multi-stage stratified random sample.

Results: Surveillance data on Physical Activity from 2012 to 2017 explicitly confirmed that MVPA pattern of Thais formed a bell shape curve which implies a strong influence of age as the determinant factor. Multiple regression analysis showed that age has a stronger influence than sex factor (Beta = 0.262***, -0.041***). The study also confirmed that males have higher MVPA than the females, but showed a similarity in the patterns. Interestingly, after six years follow-up on the panel samples, age group behavior was found to have a stronger correlation ($r = .814^{***}$, $.554^{*}$) than the individual's behavior.

Conclusion: This study found that age determines the pattern of physical activity in the population and has a tendency to decline in the older generation. Considering that physical activity level can be elevated, physical activity promotion should be based on a life-course approach to encourage a healthy lifestyle appropriately.

External funding details: This project has been supported by Thai Health Promotion Foundation, Thailand

An observational study of spectators' step counts and reasons for attending a professional golf tournament in Scotland

Daryll Archibald¹, Andrew Murray², Kieran Turner², Chloe Schiphorst², Steffan Arthur Griffin³, Hilary Scott⁴, Roger Hawkes³, Paul Kelly², Liz Grant², Nanette Mutrie²

¹La Trobe University, ²University of Edinburgh, ³European Tour Golf, ⁴Robert Gordon University

Introduction: Spectators at several hundred golf tournaments on six continents worldwide may gain health-enhancing physical activity (HEPA) when attending an event. This study investigated spectators' reasons for attending and assessed spectator physical activity (PA) (measured by step count).

Methods: Spectators at the Paul Lawrie Matchplay event in Scotland were asked to complete a questionnaire with items assessing (1) demographics, (2) reasons for attendance and (3) baseline PA. In addition, participants were requested to wear a pedometer from time of entry to the venue until exit.

Results: A total of 339 spectators were recruited, out of which 329 (97.2%) returned step-count data. Spectators took a mean of 11 589 steps (SD 4531). 'Fresh air' (rated median 9 out of 10) then 'watching star players',

'exercise/physical activity', 'time with friends and family' and 'atmosphere' (all median 8 out of 10) were rated the most important reasons for attending.

Conclusion: This study is the first to assess spectator PA while watching golf (measured by step count). Obtaining exercise/PA is rated as an important reason for attending a tournament by many golf spectators. Spectating at a golf tournament can provide HEPA. 82.9% of spectators achieved the recommended daily step count while spectating. Further research assessing whether spectating may constitute a 'teachable moment', for increasing physical activity beyond the tournament itself, is merited. The study findings have prompted major golf events such as the Ryder Cup and Open Championship to plan programmes focusing on spectator PA.

External funding details: This work was supported by the World Golf Foundation.

Assessments of physical literacy in children aged 7-11 years: A series of systematic reviews

Cara Shearer, Hannah Goss, Elizabeth Durden-Myers, Dr Lynne Boddy, Prof Zoe Knowles, Dr Lawrence Fowweather, Liverpool John Moores University

Introduction: Physical literacy is the motivation, confidence, physical competence, knowledge and understanding to value and participate in physical activity for life. Currently, no instrument assesses physical literacy in accordance with Whitehead's philosophy. This study aims to systematically review the literature for assessments to measure physical literacy elements within children aged 7-11 years.

Methods: A systematic review was conducted in accordance with PRISMA-P guidelines. Search terms were defined during workshops with physical literacy experts before the following electronic databases were searched (12 May 2017- 4 November 2017) to identify relevant peer-reviewed journal articles published in English: (i) MEDLINE (ii) ScienceDirect (iii) SPORTDiscus, (iv) Education Research Complete (iv) Scopus, and (v) psycINFO. Two independent reviewers screened studies for inclusion and extracted data. Methodological quality of quantitative and qualitative assessment tools were appraised using COSMIN and National Institute for Health and Care Excellence checklists, respectively. The feasibility, interpretability, cost and ease of use of each instrument was assessed. The methodological quality and usefulness of existing tools to physical literacy assessment was summarised in a narrative synthesis.

Results: The initial search produced 7533 results, with 145 studies included in the final review (cognitive, $n = 4$; affective, $n = 61$; physical, $n = 75$).

Conclusion: This paper summarises the protocol and progress of a systematic review examining physical literacy related assessments. The included studies are currently undergoing quality appraisal, with the findings to be published in a series of systematic reviews examining the affective, cognitive or physical domain assessments. This research will inform the development of a holistic physical literacy assessment tool.

Comparison of two accelerometer generations in physical activity and sedentary behaviour surveillance among health care workers in free living environments

Shohei Yano¹, Mohammad Javad Koohsari², Ai Shibata³, Kaori Ishii¹, Koichiro Oka¹

¹Waseda University, ²Waseda University, Japan / Behavioural Epidemiology Laboratory, Baker Heart and Diabetes Institute, Australia/ Mary MacKillop Institute for Health Research, Australian Catholic University, Australia, ³University of Tsukuba

Introduction: Accurate measurement of physical activity (PA) and sedentary behavior (SB) is an important step in developing strategies to promote active lifestyle. Accelerometers have been commonly used to objectively measure PA and SB. The purpose of this study was to determine whether data collected by the new generation of tri-axial accelerometers are comparable with those of old generation among health care workers in free living environment.

Methods: Data were from 12 health care workers (28–54 years), who wore two types of Active style Pro accelerometers including HJA350IT (350IT) and HJA750C (750C) simultaneously on their hip for 7 consecutive days. The daily average time spent on SB (≤ 1.5 METs), light (LPA, >1.5 to <3.0 METs), moderate (MPA, >3.0 to <6.0 METs), and vigorous (VPA, ≥ 6.0 METs) were calculated. The difference and agreement between devices were analysed using paired t-test and Bland-Altman plots.

Result: There were no significant differences between the means of accelerometer wearing time between two devices (807.3 ± 80.7 , 809.9 ± 81.8). The 750C version measured more time of LPA and less time of MPA, and VPA than the 350IT one. There was no difference in SB. LPA had most significant differences (23.2 minutes, $p < 0.01$). Bland-Altman analysis displayed systematic bias in LPA ($r = 0.59$, $p < 0.05$).

Conclusions: The outputs of the new and old generations of tri-axial accelerometers were different in assessing free living PA, but not for measuring SB. Public health researchers and practitioners need to take into account these differences, when using different types of devices interchangeably for health care workers.

Exploring the impact of exercise referral schemes through the development and interrogation of UK multi-scheme database

Tim Williams¹, Matthew Wade¹, Nikita Price², James Steele¹, Robert Copeland³, Steven Mann⁴

¹ukactive, ²Coventry University, ³Sheffield Hallam University, ⁴Places for People Leisure

Introduction: In 2014 NICE called for development of a system to collate local data on exercise referral schemes (ERS) to inform future practice. This database would be used to investigate what factors encourage uptake of, and adherence to, an ERS; the effectiveness and cost effectiveness of different types of ERS; what factors encourage under-represented groups to participate in and complete an ERS; and the comparative effectiveness and cost effectiveness of ERS compared with other interventions to increase physical activity.

Method: Through collaboration between ukactive, ReferAll, a specialist in software solutions for exercise referral, and the National Centre for Sport and Exercise Medicine participant demographic, physiological, mental wellbeing, and physical activity data was collated from multiple UK based ERS to generate one of the largest databases of its kind.

Results: Collating data from 19 ERS on 24,086 individuals, a central database has been created containing pre and post referral data for metrics including; physical activity, blood pressure, BMI, resting heart rate, SWEMWBS scores, ESES scores, WHO5 scores and EQoL scores. Further, the database contains demographic information, reason for referral, medical conditions, and information on the referrer.

Conclusion: This database has now been created and the resource is available for researchers to interrogate. The findings of such interrogation will provide detailed answers to the questions posed by NICE (2014) and provide real world practical guidance as the appropriate use of exercise referral to increase the physical activity, and derive positive health, social and economic, of those most at need.

Facilitators and barriers associated with non-adherence to physical activity in people with chronic diseases in the hillside area of the city of Santiago de Cali - Colombia, 2017.

Carlos Andres Quiroz Mora¹, Diana Marcela Serrato Ramirez², Gustavo Bergonzoli Pelaez³

¹Escuela Nacional del Deporte, ²Universidad Santiago de Cali, ³Fundación para la producción y gestión del conocimiento

Purpose: Determine the facilitators and barriers associated with non-adherence to physical activity in people with chronic diseases such as diabetes, hypertension and obesity, in the hillside area of the city of Santiago de Cali - Colombia, 2017.

Methods: Case-control study with 268 adults, 134 cases and 134 controls with ages between 60 and 69 years, female predominance (84%). All people had to be 6 months in the program of chronic diseases of the health system of the hillside and to have received prescription of Physical Activity. Cases and controls were determined with the level of physical activity through the IPAQ instrument. Facilitators and barriers were considered through a survey of behavioral factors, health, quality of life (EQ-5D), cognitive, psychological, demographic, social, environmental, and health service. A Multivariate analysis was performed through logistic regression, Odds Ratio (OR) with 95% CI was estimated.

Results: Facilitators for adherence ($OR < 1$), perceive a good state of health, adequate spaces for physical activity, self-care of health, periodic physical activity. The barriers to adherence ($OR > 1$): living alone, considering the unimportant prescription, insecurity of the area.

Conclusion: Be Perceived with good quality of life, having physical activity programmed by the health system and adequate and safe environments, facilitate adherence; while not belonging to a family group, not considering the physical activity prescription important and to be in insecure areas, limit adhesion.

Leisure time physical activity is associated with better metabolic control in Chilean patients with type 1 and type 2 diabetes

Kabir Sadarangani¹, Astrid Von Oetinger¹, Nestor Soto², David Martínez-Gómez³

¹Universidad San Sebastián, ²Hospital San Borja Arriarán, ³Universidad Autónoma de Madrid

Introduction/Background: Evidence sustains, that diabetes mellitus (DM) treatment requires a concerned dietary intake, physical activity (PA) participation and pharmacological adherence to preserve an adequate metabolic control.

Methods: A cross-sectional study was conducted at a complex care hospital (Santiago, Chile) with 101 Type-1 DM (34.4 ± 12.3 years) and 100 Type-2 DM (57.8 ± 5.2 years) outpatients adults. Fresh glycosylated hemoglobin level (HbA1c) was obtained, and PA levels was estimated through the GPAQ. Participants were classified according to WHO recommendations as: no Leisure Time Physical Activity (LTPA) (0 min/week of MVPA), insufficient LTPA (<150 min/week MVPA) and active LTPA (≥ 150 min/week MVPA). Age, sex, educational level, body mass index, blood pressure, waist circumference, travel and occupational PA were also assessed.

Multiple linear regression models were fitted to evaluate the independent effect of LTPA and covariates on metabolic control.

Results: 41.6% and 69.0% participants reported no LTPA (HbA1c $8.8 \pm 1.5\%$ and HbA1c $9.2 \pm 1.4\%$), while 35.6% and 8% were classified as

active (HbA1c: $8.0 \pm 1.6\%$ and $8.1 \pm 1.4\%$) for Type-1 DM and Type-2 DM, respectively.

Regression analysis showed that HbA1c levels were negatively associated with Type-1 DM ($p = 0.04$, 95%CI: -1.38 to -0.03 , $b = -0.23$) and Type-2 DM active participants ($p < 0.04$, 95%CI: -2.58 to -0.08 , $b = -0.23$).

Conclusion: The present study shows that Type-1 DM and Type-2 DM active participants exhibit an 8.8% and 15.4% decrease in their HbA1c indexes, respectively, in comparison with those who do not engage into any LTPA. In this context, LTPA may be considered as an efficient and inexpensive non-pharmacological tool for DM treatment.

Physical activity and sedentary behaviour in residential aged care facilities

Sharon Parry¹, Marilyn Chow¹, Frances Batchelor², Robyn Fary¹

¹Curtin University, ²National Ageing Research Institute

Introduction: Participation in physical activity and reduction of sedentary behaviour for older people has physiological, psychological and social benefits. However, there is limited evidence about physical activity levels and sedentary behaviour of residents of aged care facilities. The aim of the study was to evaluate levels of physical activity and sedentary behaviour in independently mobile older adults with and without dementia who were living in residential aged care. A secondary aim was to determine the relationship between functional performance and the variables of physical activity level and sedentary behavior.

Methods: Participants (mean age 84 years $\pm$ 8 years, 30% with dementia) were 37 residents of an aged care facility in Perth, Western Australia. Physical activity levels and sedentary behaviour were measured using an accelerometer worn during waking hours for at least five days, and physical function was measured using the Short Physical Performance Battery test.

Results: Participants with valid accelerometer data ($n = 28$) spent, on average, 85% of the time sedentary, 11.5% of time in low intensity activity, 2.5% in light and 1% in moderate-to-vigorous physical activity. Physical activity at all levels of intensity was performed in bouts of less than 10 minutes. Over half of sedentary time was accumulated in bouts of greater than 30 minutes. There was no relationship between functional performance and the variables of physical activity and sedentary behaviour.

Conclusions: Residents were inactive and highly sedentary. The study highlights the need to develop innovative ways of encouraging physical activity and limiting sedentary behaviour in residential aged care.

Number of days required to estimate physical activity during pregnancy using wrist-worn accelerometry: The 2015 Pelotas (Brazil) Birth Cohort Study

Shana Ginar da Silva¹, Kelly R Evenson², Inácio Crochemore M da Silva¹, Gloria Isabel Niño Cruz¹, Márcio de Almeida Mendes¹, Bruna Gonçalves Cordeiro da Silva¹, Ulf Ekelund³, Marlos Rodrigues Domingues⁴, Pedro Curi Hallal¹

¹Postgraduate Program in Epidemiology, Federal University of Pelotas, Brazil, ²University of North Carolina, Chapel Hill, Gillings School of Global Public Health, Department of Epidemiology, Chapel Hill, North Carolina, United States, ³Department of Sport Medicine, Norwegian School of Sport Sciences, Oslo, Norway, ⁴Postgraduate Program in Physical Education, Federal University of Pelotas, Brazil

Objective: We assessed the optimal number of days needed to obtain reliable estimates of overall physical activity (PA) and moderate-to-vigorous physical activity (MVPA) during pregnancy using the raw output from a triaxial wrist-worn accelerometer.

Methods: Cross-sectional analyses were carried out in the antenatal wave of the 2015 Pelotas (Brazil) Birth Cohort Study. Participants wore the wrist ActiGraph GT3X accelerometer for seven consecutive days around 16 and at 24 weeks of gestation. The daily average acceleration, which indicates overall PA, was measured as milli-g (mg), and time spent in MVPA (min/d) was analyzed in ≥ 5 -minute bouts. ANOVA and Kruskal-Wallis tests were used to compare variability across days of the week. Bland-Altman plots and the Spearman-Brown Prophecy Formula were applied to determine the reliability coefficient associated with one to seven days of measurement.

Results: Among 2,082 pregnant women who wore the accelerometer for seven complete days, overall PA and MVPA were lower on Sundays compared to other days of the week. A reliability coefficient of ≥ 0.80 to evaluate overall PA was reached with at least three monitoring days, whereas six days were needed to estimate the same reliability coefficient for MVPA.

Conclusion: Because of the marked differences between week and weekend days, both Saturday and Sunday should be monitored.

External funding details: The study was funded by the Wellcome Trust (grant 095582/z/11/z), the Brazilian National Research Council, and the Coordination for the Improvement of Higher Education Personnel.

Participation in physical education classes and physical activity and sitting time in Brazilian adolescents

Diego Augusto Santos Silva¹, Jean-Philippe Chaput², Mark Tremblay²

¹Federal University of Santa Catarina, ²Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute

Introduction/Background: To examine physical activity (PA) and sitting time levels of adolescents from Brazil who have Physical Education (PE) classes compared with those who do not have PE classes. We also examined the association between participation frequency in PE classes and PA and sitting time in adolescents according to the economic development level of the region of residence.

Method: A cross-sectional study representative of Brazil was carried out in 2015 with 12,220 Brazilian students aged 11-19 years. Participation frequency in PE classes, PA during PE classes, active commuting, PA outside of school hours, total accumulated PA, moderate to vigorous PA (MVPA), time sitting in front of the TV and total sitting time were assessed using a self-administered questionnaire. Multilevel modeling analyses were used.

Results: Students who reported having PE classes were more likely to meet MVPA recommendations, spent more time in PA outside of school hours, and accumulated more PA than students who reported not having PE classes. Adolescents from regions with higher Human Development Index (HDI) who took PE classes at least 1-2 times/week were more likely to have higher levels of PA and shorter time spent sitting. For regions with lower HDI, adolescents who took PE classes ≥ 3 times/week were more likely to have higher levels of PA.

Conclusion: Adolescents who take PE classes have better PA indicators. Having PE classes is associated with a higher level of PA and lower level of sitting time in adolescents from regions with higher HDI.

Phase angle as an indicator of health and fitness in participants entering an exercise referral scheme

James Steele¹, Matthew Wade¹, Steven Mann²

¹ukactive, ²Places for People Leisure

Introduction: Phase angle is derived from bioelectrical impedance and is becoming widely accepted as an indicator of cellular health. Indeed, research suggests phase angle may be a simple measure associated with

a range of health and fitness variables. Considering the simplicity of this non-invasive measure, this study examined relationships between phase angle, and a range of health and fitness measures in participants recommended for exercise referral by their General Practitioner.

Method: One hundred and forty-six participants (females = 92, males = 54; age 49±14 years) were recruited across 3 sites participating in an exercise referral scheme. Upon entry to the scheme participants body mass, body mass index (BMI), body composition, resting blood pressure, resting heart rate, predicted aerobic capacity, and muscular strength were measured. Phase angle was also measured using bioelectrical impedance. Relationships between these variables and phase angle were examined using Pearson's or Spearman's correlations dependent upon distribution. Results are presented as correlation coefficients and 95% confidence intervals.

Results: Phase angle was found to be significantly correlated with age ($r = -0.392$; -0.240 to -0.525), body mass ($r = 0.205$; 0.038 to 0.361), lean mass ($r = 0.353$; 0.197 to 0.492), and muscular strength ($r = 0.368$; 0.186 to 0.525).

Conclusion: Phase angle was associated with age as well as other indicators of health and fitness. These were primarily related to muscular health (i.e. lean mass and muscular strength). Considering its ease of administration, phase angle might be considered as a simple indicator of cellular and overall muscular health.

Physical activity in youth with cystic fibrosis: A brief review

Alexandra Valencia-Peris, Jorge Lizandra, Joan Úbeda-Colomer, Miquel Pans, University of Valencia

Introduction: Regular physical activity (PA) has become increasingly important and widely accepted as part of the therapy and rehabilitation programs in cystic fibrosis (CF) management. However, to date it is still unclear the current levels of PA, intensities and accumulation in youth with CF.

Method: Electronic searches for PA studies in youth with CF were performed in Scopus, Pubmed, Medline, Web of Science and Google Scholar until January 2018. Inclusion criteria were including sample <18 years of age and measurement of PA. Relevant studies were graded according to the Oxford Levels of Evidence.

Results: 269 search results were screened. After careful reviewing, only 15 studies met the inclusion criteria for this review. Several methods were used to determine PA levels: accelerometers (5), self-reported questionnaires (6), indirect calorimetry (1), doubly labelled water (1), activity monitors (1) and pedometers (1). PA levels of CF participants were compared with healthy controls in 60% of the studies, although results were inconsistent. A broad range of participants with CF who accomplished PA guidelines was found (2.1-90%) and only 3 studies reported daily time engaged in moderate to-vigorous PA (44-267 min/day).

Conclusion: Evidence from studies reviewed suggests inconsistency in measurement of PA levels in youth with CF. Further studies should be addressed in: 1) monitoring PA using objective measures, accelerometry preferably, to obtain valuable information on usual PA levels in children with CF; and 2) determining to what extent this special population comply with current PA guidelines.

External funding details: This study was supported by Universitat de València (UV-INV-AE17-698217).

Reliability of a questionnaire to assess the mode and frequency of commuting to and from school: The PACO project.

Jos Manuel Segura-Díaz¹, Álvaro Rojas Jiménez¹, Irene Esteban-Cornejo², Emilio Villa-González¹, Yahira Barranco-Ruiz¹, Manuel Herrador-

Colmenero¹, Berta Murillo Pardo³, Romina Gisele Saucedo¹, María Jesús Aranda-Balboa¹, Palma Chillón¹

¹PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, ²PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada. Center for Cognitive and Brain Health, Department of Psychology, Northeastern University, Boston, MA., ³Department of Musical, Plastic and Corporal Expression, University of Zaragoza, Zaragoza

Introduction: Active commuting to/from school is an opportunity to increase the daily physical activity levels in young people. However, there is no a reliable questionnaire to measure mode and frequency of commuting to school in Spanish-youth. Thus, we aimed to examine the reliability of a questionnaire to assess the mode and frequency of commuting to/from school in Spanish youth.

Method: A total of 414 children (5-11 y) and 298 adolescents (from 12-18 y) completed twice a questionnaire separated by 15-days. The Mode and Frequency of Commuting to School Questionnaire included the usual and weekly modes of commuting to/from the school. Additionally, both distance between home-school and time spent on each trip were included. Reliability was analysed using the Kappa and Weighted Kappa Coefficient (κ) in a test-retest study.

Results: The usual mode of commuting to/from school showed a very good reliability for children (κ : 0.81-0.84) and adolescents (κ : 0.90-0.94). The weekly count mode of commuting to/from the school displayed from moderate-to-very good reliability in children (κ : 0.54-0.85) and adolescents (κ : 0.55 - 1). The distance and time questions presented from moderate-to-good reliability in children (κ : 0.50-0.72) and good-to-very good in adolescents (κ : 0.77-0.87).

Conclusion: The Mode and Frequency of Commuting to and From School Questionnaire, and both questions of distance and time spent on trips, are a reliable tool for Spanish youth. Future studies may use this tool for having a standard measurement of the mode of commuting to school.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R (MINECO/FEDER, UE)]. "I+D+i research staff contract, within the framework of the national youth guarantee system" funded by the Junta de Andalucía and the European Social Fund of the European Union.

Step-count mean absolute percent errors during treadmill walking: Setting an acceptable tolerance-for-error

Christopher Moore¹, Elroy Aguiar¹, Scott Ducharme¹, Stuart Chipkin¹, John Schuna², Tiago Barreira³, John Staudenmayer¹, Catrine Tudor-Locke¹

¹University of Massachusetts Amherst, ²Oregon State University, ³Syracuse University

The emergence of physical activity (PA) monitors has enabled the development of objective-based PA guidelines and improved evaluations of PA interventions. These monitors commonly utilize steps as a simple and communicable output. Still, there is a need to develop validation standards for such devices, including setting acceptable tolerances-for-error.

Purpose: To evaluate the mean absolute percent error (MAPE) of multiple step-counting devices at various treadmill walking speeds, and aggregate results to determine an empirically-based tolerance-for-error.

Methods: Eighty adults (mean±SD; age = 50.2±5.9 years; BMI = 26.0 ±4.0 kg/m²) performed 5-minute treadmill walking bouts, beginning at 0.22 m/s (0.5 mph) and increasing in 0.22 m/s increments until a maximum speed of 2.24 m/s (5.0mph). Participants concurrently wore ten step-counting devices: five waist (ActiGraph GT9X, Actical, Digiwalker SW-200, NL-1000, Fitbit One), three wrist (Apple Watch Series 1, Samsung GearFit 2, Garmin VivoFit 3), one thigh (ActivPAL), and one ankle (StepWatch). Directly-observed steps served as the criterion measure. MAPE was calculated for each device at each speed, and device MAPEs were averaged at each speed.

Results: Step-count accuracy was highest between walking speeds of 1.10 ±1.54 m/s (2.5-3.5mph), evidenced by the lowest average MAPE values (<3%). Average MAPEs from 0.88±1.76 m/s (2.0-4.0 mph) were consistently ≤5.2%. Very slow walking speeds (≤0.66 m/s; 1.5 mph) had the highest average MAPEs (16.3±80.4%).

Conclusion: For moderately-slow to fast walking speeds (0.88±1.76 m/s), current PA monitors attain an MAPE below 5%, with an MAPE below 3% at normal walking speeds (1.10-1.54 m/s). Newly-developed devices should be validated with a tolerance-for-error that meets or improves upon this current standard.

External funding details: NIH/NIA Grant 5R01AG049024-CADENCE-Adults study

South African preschool-aged children's screen time and sleep: Compliance with guidelines

Simone Tomaz¹, Trina Hinkley², Rachel Jones³, Estelle Watson⁴, Rhian Twine⁴, Kathleen Kahn⁴, Shane Norris⁴, Catherine Draper⁴

¹University of Cape Town, ²Deakin University, ³University of Wollongong, ⁴University of the Witwatersrand

Introduction: There has been a shift towards integrated 24-hour movement guidelines for pre-schoolers for physical activity (>3 hr/d, including 1 hr of 'energetic play'), sedentary behaviour (<1 hr/d of screen time [ST]) and sleep (10-13 hrs/d). A few studies have assessed physical activity, but not compliance with ST and sleep guidelines in South African pre-schoolers. This study aimed to establish compliance with ST and sleep guidelines among pre-schoolers from varying income settings in South Africa.

Methods: Parents (n=265) from rural low-income (RL), urban low-income (UL), and urban high-income (UH) settings reported their pre-schooler's ST and sleep. ST and sleep question results were summed to establish daily averages, after which compliance with ST and sleep guidelines were determined. Between-setting differences were assessed using Kruskal-Wallis and Chi² analyses.

Results: ST was significantly higher in UH (1.71±1.18 hrs/d) than UL (0.77±0.90 hrs/d, p=0.000) and RL (0.45±0.37 hrs/d, p=0.000) children. Overall, 81.9% met the ST guideline. However, 33.3% UH children met the guideline, versus 74.0% and 96.5% of UL and RL children, respectively. Children slept 11.6±1.3 hrs/d. Overall, 73.7% met the sleep guideline. Few children (8.7%) slept <10 hrs/d, and 9.4% slept >13 hr/d. Only UL (16.1%) and RL (7.1%) children exceeded the sleep guideline. Compliance with both guidelines was significantly higher in RL (82.3%), versus UL (58.0%) and UH (33.3%) children (p=0.000).

Conclusion: ST was most concerning among UH children, while excess sleep was as prevalent as insufficient sleep. Future research should identify ways to reduce ST, particularly in UH children, and explore the effects of excess sleep on pre-schoolers, particularly UL children.

The Portuguese Physical Activity Barometer: Perceptions, attitudes, motivation and knowledge

Catarina S. Silva¹, Adilson Marques², Romeu Mendes³, Marlene N. Silva⁴, Rita Tomás¹, Pedro J. Teixeira⁵

¹Directorate-General of Health; University of Lisbon, FMH, ²Directorate-General of Health; University of Lisbon, FMH, CIPER; ENSP, CISP, ³Directorate-General of Health; ACES Douro I ± Marão e Douro Norte; UTAD; EPIUnit-ISPUP, ⁴Directorate-General of Health; University of Lisbon, FMH, CIPER; Lusófona University, ⁵Directorate-General of Health; University of Lisbon, FMH, CIPER

Introduction: To adjust policies aiming to mobilize populations to be active, it is important to monitor changes in attitudes, perceptions, motivation, and knowledge about physical activity (PA). We present selected baseline results from the first Portuguese survey regarding these indicators.

Methods: A specialists' panel from the National Physical Activity Promotion Program developed the "PA Barometer". A probabilistic sampling method and sex and age quotas were used. A cross-sectional nationwide survey was performed during 2017, through telephone interviews. 1084 adults participated (18-65 years; 542 women).

Results: Most participants agreed that PA levels (92%) and promotion campaigns (94%) are increasing. For 74%, PA promotion is a priority for the health authorities. For 76%, PA is an important health behavior, but only 2% knew the WHO PA recommendations, while 43% recognized daily activities as PA. Positive attitudes towards PA were identified: 93% found important to increase public transportation or daily bicycle use and 100% considered that regular PA improves quality of life. Almost 90% state they "like" being active, but 15% feel unable to do it. From those who had a medical appointment (last two years), 62% were asked about PA practice and 41% were advised to increase PA by their physician.

Conclusion: Although the majority of the sample was unaware of the PA recommendations, results indicate generally positive perceptions and attitudes towards PA. Transport and daily activities are still misperceived by many as not related to PA. Portugal should continue to invest in population literacy and PA promotion in the healthcare system.

Time trends 2000-2017 of pedometer determined physical activity in Swedish schoolchildren

Anders Raustorp, Andreas Fröberg, University of Gothenburg

Introduction: Consensus guidelines urge youth to be engaged in moderate to vigorous physical activity (MVPA) for 60 minutes or more per day. Data for PA levels and trends are needed to effectively implement interventions. In a pilot study on elementary schoolchildren in Sweden, pedometer determined PA has been reported stable between 2000 and 2013 with the exception of 5th grade boys. The aim of this study was to explore time trends from 2000 to 2017 of pedometer determined PA, in 2nd, 5th and 8th graders aged 8, 11 and 14 respectively.

Methods: In autumn 2000, data were collected during four consecutive schooldays on 332 2nd, 5th and 8th graders (179 boys) in five schools in south east Sweden, all middle-class communities. In 2017 data from 561 (271 boys) from matched classes at the same five schools were gathered. The same protocol and identical procedures and instruments (sealed Yamax SW 200) as in 2000 was applied for data collection, including height and weight measures.

Results: A significant decrease in daily mean steps was seen in 8th grade (boys 30.2%, p<0.001, girls 23.7% p<0.001) and 5th grade (boys 11.4% p=0.008, girls 7.3% p=0.007). In 2nd grade an increase was seen (boys 9.3% p=0.037, girls 3.3% non sig).

Conclusions: Time trends of PA differ between different grades. PA decreased with more than a quarter in 8th grade and around one tenth in 5th grade. However 2nd graders PA seems stable.

Variation of physical activity and sleep by gender and age among the general adult population in Finland

Heini Wennman¹, Arto Pietilä¹, Harri Rissanen¹, Heli Valkeinen¹, Seppo Koskinen¹, Tomi Mäki-Opas², Katja Borodulin¹

¹National Institute for Health and Welfare, ²University of Eastern Finland

Introduction: Assessing physical activity over 24-h in large-scale population-based studies increases our understanding of people's activity profiles. We examined gender and age variation in objectively assessed physical activity and sleep among adults in Finland.

Methods: In the FinHealth 2017 Study, 940 participants aged 25-93 years wore an accelerometer (Actigraph GT9X Link) on the non-dominant wrist for 7 days. Physical activity information was extracted as vector magnitude counts per minute (VMcpm), divided into three levels, after excluding periods of sleep and non-wear. Sleep periods were based on wrist acceleration and diary information. Sufficient wear-time (≥ 10 hours) was found for 6 days or more in 95% of participants and data over 7 nights in 88%.

Results: Women accumulated more high VMcpm than men. Dividing overall wear-time into low, moderate and intensive activity levels, the distribution in women was 68%, 25% and 7% and in men 74%, 22%, and 5%. In the age groups of 65-74 and 75+ the gender differences disappeared and the VMcpm were overall lower than in younger participants. The mean sleep period lengths showed little variation in the population. The longest sleep periods were observed in women aged 25-34 years (7.2 hours) and the shortest (6.5 hours) in men aged 45-54 and 75+ years.

Conclusions: These results mirror previous large-scale observations using wrist-accelerometry. Whether the gender and age variation in activity output represent true differences in activity intensities and if it is reflected on health warrant further studying.

External funding details: Funding: Ministry of Culture and Education (OKM/72/626/2017).

Theme: Mental Health

Monday 15 October

24 hour movement behaviours in children with ADHD

Pooja Tandon¹, Tyler Sasser², Erin Gonzalez², Kathryn Whitlock³, Dimitri Christakis⁴, Mark Stein²

¹Univeristy of Washington /Seattle Children's, ²Seattle Childrens, ³Seattle Children's, ⁴Univeristy of WA / Seattle Childrens

Objectives: Studies have documented the benefits of physical activity for children with ADHD, yet these children are at increased risk for obesity and suboptimal movement behaviors. We sought to describe 24 hour movement behaviors in children with ADHD, determine risk factors, and compare outcomes to children with other neurodevelopmental or medical conditions.

Methods: 24 hour movement behaviors of children with ADHD (ages 6 to 18 years) were obtained using 2011 parent-reported data from the National Survey of Child Health, a cross-sectional, U.S. population-based sample, and compared to children with Autism Spectrum Disorder, asthma, and a normative group. Movement behaviors included physical activity (PA), sports participation, sleep, and screen time.

Results: Approximately 1/3 of children with ADHD participated in daily PA and half in sports in the past year. Older children with ADHD were less likely

to engage in daily PA, get enough sleep, and limit screen time to < 2 hours/day. Girls with ADHD had lower odds of daily PA and enough sleep. Children who were obese, poor, or with severe ADHD, had lower odds of sports. Children with ADHD displayed 50% lower odds of sports participation than children with asthma, but seven times greater odds than children with autism.

Conclusions: Children with ADHD did not engage in recommended amounts of PA, sleep and screen time. Children with ADHD who are older, female, poor, obese and/or with more severe symptoms are at higher risk for suboptimal 24 hour movement behaviors. These domains represent novel treatment targets in ADHD.

Does relocation to a neighbourhood built on active design principles improve self-rated mental health, well-being and neighbourhood perceptions? Evaluation of a natural experiment

Bina Ram¹, Alicja Rudnicka¹, Aparna Shankar¹, Claire Nightingale¹, Elizabeth Limb¹, Steven Cummins², Daniel Lewis², Billie Giles-Corti³, Anne Ellaway⁴, Ashley Cooper⁵, Angie Page⁵, Peter Whincup¹, Derek Cook¹, Christopher Owen¹

¹St. George's, University of London, ²London School of Hygiene and Tropical Medicine, ³RMIT University, ⁴University of Glasgow, ⁵University of Bristol

Introduction: Evidence suggests that active living has potential benefits for mental health as well as physical health, especially in disadvantaged populations. The Examining Neighbourhood Activities in Built Living Environments in London study, a natural experiment, aimed to establish whether relocating to East Village - a new urban neighbourhood built on active design principles - improved adult physical, mental health and well-being.

Methods: 1278 adults seeking social, intermediate (affordable) and market-rent accommodation in East Village were recruited in 2013-2015, and followed up after 2 years. Self-reported mental-health, subjective well-being and neighbourhood perceptions were assessed by questionnaire. Multilevel linear regression models examined change in these outcomes adjusted for age, sex, ethnicity and household (random effect).

Results: 877 (69%) adults were followed up after 2 years; half (50%) had moved to East Village. There were marginally lower levels of depression and anxiety amongst those who moved to East Village compared with those who did not, but differences were not statically significant. Overall there were higher levels of life satisfaction, worthwhile and happiness, but differences were only statistically significant for life satisfaction amongst the intermediate sector ($P = 0.01$). Marked improvements in neighbourhood perceptions were observed for all housing sectors (all $P < 0.01$). There was a suggestion that less perceived crime was stronger in social and intermediate sectors compared with market-rent.

Conclusion: East Village, designed to encourage healthy active living, showed co-benefits for mental health, well-being and neighbourhood perceptions, which could plausibly affect physical activity.

External funding details: MRC National Prevention Research Initiative (MR/J000345/1) and National Institute for Health Research (12/211/69).

Ecological momentary assessment of affect and physical activity in people with depression

Laura Hollands¹, Jeffrey Lambert², Lisa Price², Colin Greaves²

¹University of Exeter Medical School, ²University of Exeter

Introduction: Evidence suggests that physical activity is effective at improving mood; however the optimum dose, including intensity,

frequency and duration to accrue these benefits are unclear. Examining temporal changes in affect in response to physical activity may help elucidate the dose-response relationship and inform future guidelines to improve mental health.

Method: Participants were asked to wear a GENEActiv accelerometer for a period of seven days. Ecological Momentary assessment was used to measure participant affect (1-10 scale) during the same period as physical activity measurement. Multilevel regression models were used to determine the relationship between the physical activity (moderate-vigorous, light and total (light plus moderate-vigorous) in the one and three hours prior to affect measurement and the subsequent affect scores.

Results: No association was present between total minutes of moderate-vigorous physical activity and the affect score one hour later. Exploratory analyses found a significant relationship between affect and total physical activity in the previous hour (β 1 coefficient=0.02, $p=0.033$) and the previous three hours (β 1 coefficient=0.01, $p=0.044$).

Conclusion: Few studies have examined the temporal relationship between physical activity and affect in people with depression. Whilst no association was found between affect and MVPA in the hour preceding the measurement, total activity was significantly associated with subsequent improved affect. The results indicate that undertaking any activity, irrespective of intensity may be appropriate to gain small, acute improvements in affect.

External funding details: The work was part of a PhD studentship funded by the Economic and Social Research Council.

LDPAQ: physical activity questionnaire for people with learning disability

Amir H Pakravan¹, Marjan Ghazirad², Bethany Fuller², Ayesha Taj², Jessica Crawshaw², Alison Grewat², Farshad Shaddel²

¹European College of Sport and Exercise Physicians (ECOSEP), ²Berkshire Healthcare NHS Foundation Trust

Introduction: It is widely acknowledged that mental illness sufferers have significantly poorer physical health than the general population; with sedentary behaviour being a major contributing factor. Extensive evidence supports the role of physical activity (PA) in improving physical and mental health as well as better management of symptoms. In the UK, 2-3% of population have a learning disability (LD). People with Learning Disability (PWLD) are at higher risk of developing mental illnesses. Here a novel adaptation of IPAQ-SF, specifically designed and tested for PWLD, is introduced.

Methods: An easy-read version of IPAQ-SF was designed by the Speech and Language Therapy team. This was approved for use and disseminated between 11 service users with different levels of disability. The form was self-administered with carer support, and specific feedback was collected from the participants.

Results: Of the participants, 8 had mild, 2 moderate and 1 severe LD. Participants with mild and moderate LD liked the easy-read version of the questionnaire and appreciated the opportunity to measure their physical activity. Further feedback included suggestions such as adding options for less mobile and wheelchair-bound users, further clarification of vigorous activities and options for activities with less than weekly frequency.

Conclusion: Use of a LD-friendly questionnaire can significantly improve the quality of PA research in this population. This project was the first step in that direction and the proposed LDPAQ proved a beneficial and easy-to-use tool. More research with higher participant numbers can further help evolve and establish its use in PWLD.

Physical activity and sedentary behavior in people with major depressive disorder: A systematic review and meta-analysis

Felipe Schuch¹, Natalia Bagatini², Davy Vancampfort³, Joseph Firth⁴, Philip Ward⁵, Thaís Reichert², Roberta Bgeginski², Brendon Stubbs⁶

¹Unilasalle, ²UFRGS, ³KU leuven, ⁴University of Manchester, ⁵UNSW, ⁶Kings College London

Background: Low levels of physical activity (PA) and sedentary behavior (SB) are independent risk factors for cardiovascular disease and premature mortality in people with major depressive disorder (MDD).

Aims: Investigate levels of PA and SB and their predictors in people with MDD.

Methods: Electronic databases were searched from inception till 04/2016 for articles measuring PA and SB with a self-report questionnaire (SRQ) or objective measure (e.g. accelerometer) in people with MDD. Random-effects meta-analyses and meta-regression analyses were conducted.

Results: Twenty-four eligible studies were identified including 2901 people with MDD (78.4% female, mean age=54 years; range: 21-77 years). People with MDD spent 126.0 min (95%CI=91.9-160.1) per day engaging in all types of PA and spent 8.5hours (95%CI=7.51-9.62) during their waking day being sedentary. Compared to controls, people with MDD spent less time in total PA (SMD=-0.25, 95%CI=-0.03 to 0.15) and moderate to vigorous PA (SMD=-0.30, 95%CI=-0.40 to 0.21) and engaged in higher levels of SB (SMD=0.09, 95%CI=0.01-0.18). The proportion of people with MDD not meeting the recommended PA guidelines was 67.8% (n=13 studies), which was higher in studies relying on objective versus self-report measures (85.7% v 62.1%, $p=0.04$). People with MDD were less likely than controls to meet recommended PA guidelines (OR=-1.50, 95%CI=-1.10 to -2.10).

Conclusion: Adults with MDD engage in low levels of PA and high levels of SB. PA and SB are independent predictors of mortality, therefore, future lifestyle interventions targeting both the prevention of SB and adoption and maintenance of PA are warranted

Relationship between the combination of social relationship and physical activity and difficulty initiation sleep in older people

Jaehoon Seol¹, Kazuya Furu¹, Takumi Abe², Yuya Fujii¹, Keisuke Fujii¹, Taiki Inoue¹, Tomohiro Okura¹

¹University of Tsukuba, ²University of Tsukuba, Japan Society for the Promotion of Science

Purpose: To examine the relationships between social relationships (SR), physical activity (PA), a combination of the two, and difficulty initiating sleep (DIS) in older individuals.

Methods: The participants were 781 older Japanese adults (73.2±5.4 years). We conducted two questionnaire surveys. SR was assessed using the Lubben Social Network Scale, and PA was measured using the Physical Activity Scale for the Elderly (PASE). We categorized people who took more than 30 min to fall asleep into the DIS group. The PASE consists of questions about leisure time, household, and work-related activities. We used logistic regression analyses to examine the associations between PA (inactive and active), SR (Good SR (GSR) and Poor SR (PSR)), a combination of these two variables, and DIS.

Results: After adjusting for confounding factors, in men, as compared with those with inactive leisure time and PSR, men with active leisure time and GSR were at low risk (OR: 0.19, 95% CI: 0.08±0.46) for DIS. In women,

as compared with those with inactive leisure time and PSR, women with active leisure time and GSR (OR: 0.48, 95% CI: 0.28±0.83), active leisure time and PSR (OR: 0.55, 95% CI: 0.31±0.98), and inactive leisure time and GSR (OR: 0.50, 95% CI: 0.28±0.90) were at low risk for DIS. However, there was no significant association between DIS and the combination of household or work-related activities and SR.

Conclusions: Engaging in leisure time activities, along with SR, may effectively improve problem with falling asleep.

Sports activity in childhood is related to lower risk of symptoms of depression in junior high school boys: Two-year follow-up study

Mayumi Nagano¹, Minoru Adachi²

¹Fukuoka Women's University, ²Graduate school of education, Okayama University

Introduction: There is very few objective and longitudinal data showing how sports activities during childhood relates to the incidence of symptoms of depression later in their junior high school life. We therefore conducted a longitudinal study to examine the above subject in junior high school students in a local city in Japan.

Method: The subjects in the present study were 285 boys enrolled in a local national university-affiliated junior high school. In addition to childhood sports activities, participation in sports clubs, lifestyle behavior and psychological characteristics in junior high were assessed each year using questionnaires. Their fitness data was submitted by the school. Baseline characteristics were compared between two groups, divided by the presence or absence of childhood sports. Furthermore, odds ratios for the incidences of symptoms of depression in 2nd and 3rd school year were calculated using logistic regression models in the above two groups, excluding those who had symptoms of depression on their 1st year.

Results / Conclusion: Lack of childhood sports activities was significantly related to a higher incidence of symptoms of depression on their 2nd year. On the 3rd year, the significance of childhood sports activities had disappeared. However, higher fitness was significantly related to a lower incidence of symptoms. It was speculated that childhood sports experiences might have facilitated their participation in sports club activities later on, which led to higher fitness and better friendships, resulting in favorable physical and mental conditions which helped in preventing such symptoms.

External funding details: This study was supported by the Sasagawa Sports Foundation in 2014 and 2016.

The effectiveness of ALBA: A psychological intervention, at increasing adherence to physical activity in mental health populations

Nicola Peddie¹, Tony Westbury¹, Austyn Snowden²

¹Edinburgh Napier University, ²Edinburgh Napier

Background: Physical activity has been shown beneficial for physical and mental wellbeing, and has been positively linked to reducing symptoms in a broad range of mental health conditions. However, there is evidence to indicate people with mental illnesses are significantly less active than the general population. SAMH, Scotland's largest mental health charity, has developed a behaviour change intervention, ALBA, which has been designed to specifically target individuals with mental health conditions to increase motivation and adherence to physical activity. The aim of the research is to evaluate the implementation and effectiveness of a behaviour change intervention aimed at increasing adherence to physical activity.

Method: Participants have been recruited through the existing exercise referral schemes in 3 areas of Scotland. Participants complete baseline and

are given activity trackers, which they are asked to wear for the duration of the 16-week intervention. The intervention involves participants engaging in 1:1 cognitive behavioural sessions with their local behaviour change practitioners, prior to and throughout the intervention period. At the end of the 16 weeks, participants completed the post intervention measures and were offered the opportunity to opt into the long term study, where the measures were repeated at 6, 12 and 18 months post intervention. Qualitative data on participants' experience of taking part and the acceptability of the intervention will be collected.

Results: Data collection is on-going, at present, 100 participants have been recruited. Preliminary results will be presented and discussed.

External funding details: SAMH funded this work as part of a PhD scholarship.

The relation of objectively-determined sedentary behavior and physical activity to fluid intelligence in college students.

Mireia Felez-Nobrega¹, Charles H. Hillman², Kieran P. Dowd³, Anna Puig-Ribera⁴

¹University of Vic-Central University of Catalonia, ²Department of Psychology and Department of Physical Therapy, Movement, & Rehabilitation Sciences, Northeastern University, Boston, MA., ³Department of Sport and Health Sciences, Athlone Institute of Technology, Athlone, Co. Westmeath., ⁴Sport and Physical Activity Research Group and the Centre for Health and Social Care Research, Department of Physical Activity and Sport Sciences, University of Vic-Central University of Catalonia, Barcelona.

Introduction: Previous evidence has demonstrated a link between sedentary behavior (SB) and physical activity (PA) with specific cognitive processes (i.e. inhibition, working memory) across different populations. However, there is little evidence regarding how these lifestyle behaviors influence more general cognitive domains such as fluid intelligence (Gf). Given that Gf is closely related to professional and educational success, this study investigated the association between objectively-determined SB and PA with Gf in a young adult university student sample.

Method: Descriptive cross-sectional study. Spanish undergraduates (n = 111; 21 years ± 3 years, 52.9% female) wore an activPALTM for 7 days (24hours) on their right thigh to determine total sedentary time, total number of sedentary breaks, standing time and moderate-to-vigorous intensity physical activity (MVPA). These variables were computed separately for weekdays and weekend days. The Raven's Advanced Progressive matrices and Number Series were used as a measure of Gf. Separate hierarchical regression analyses adjusted for gender and academic major were performed to examine these associations.

Results: Total number of sedentary breaks for both weekdays and weekend days were inversely associated with Gf. No associations were identified for total sedentary time, total standing time and MVPA.

Conclusion: The current findings suggest that, while total sedentary time and MVPA are not related to reasoning abilities, transitions in sit-stand positions may have a negative influence on Gf during young adulthood. Future research is needed to confirm these results, and future studies should determine which characteristics of sedentary breaks are related to decreases in Gf.

Vulnerability to physical inactivity in Australian older adults

Michelle Jongenelis¹, Simone Pettigrew¹, Robert Newton², Ben Jackson³, Jennifer Warburton⁴

¹Curtin University, ²Edith Cowan University, ³The University of Western Australia, ⁴La Trobe University

Introduction: Despite physical activity being a crucial component of healthy ageing, older adults tend to engage in lower levels of physical activity relative to other population segments. To identify those seniors who may be particularly vulnerable to physical inactivity, we examined how physical activity engagement differs according to various demographic and psychological factors.

Methods: Over 800 Australians aged 60+ completed a battery of measures that assessed various indicators of self-reported psychological well-being, physical health, and engagement in moderate to vigorous physical activity (MVPA).

Results: Males, those with higher socioeconomic status, those who were married, and those who lived with a partner reported engaging in significantly more MVPA than females, those with lower socioeconomic status, those who were divorced, widowed, or single, and those who lived alone. Engagement in MVPA was positively associated with self-reported health, quality of life, psychological well-being, and satisfaction with life, and negatively associated with depressive symptoms.

Conclusion: As the relationship between physical activity and mental health is likely to be reciprocal in nature, efforts should be made to promote physical activity in older adults to foster healthy ageing. Females, those who do not have a partner and/or live alone, and those from low socioeconomic status backgrounds appear to be particularly vulnerable to physical inactivity and targeted efforts may be needed to ensure these population segments engage in adequate amounts of exercise.

External funding details: This work was supported by the Australian Research Council [DP140100365].

Theme: Physical Activity in Clinical Care Settings

Tuesday 16 October

Association between cardiovascular diseases and chronic musculoskeletal pain: A systematic review with meta-analysis.

Crystian Oliveira¹, Marcia Franco¹, Fernanda Silva¹, Tatiana Damato¹, Bruna Azevedo¹, Diego Christofaro¹, Priscila Morelhão¹, Giulia Araujo¹, Cynthia Gobbi¹, Rafael Pinto²

¹Sao Paulo State University, ²Universidade Federal de Minas Gerais (UFMG)

Introduction: Chronic musculoskeletal pain imposes a substantial economic burden on society in recent times. However, this condition may contribute to even worse consequences to the health care systems and individuals. According to a model proposed, functional limitations in association with psychological distress of pain might induce physical inactivity in people with chronic musculoskeletal pain which increases the risk of cardiovascular disease. Therefore, the aim of this systematic review will be to investigate the association between cardiovascular diseases and chronic musculoskeletal pain.

Methods: Population-based studies reporting the prevalence of cardiovascular comorbidities in adults with chronic musculoskeletal pain were considered eligible. A comprehensive literature search was performed in five electronic databases. Two independent reviewers assessed the records according to the inclusion criteria, extracted the data, and evaluated the risk of bias. The pooled estimates of risk ratios were calculated using random effect models.

Results: We included fifteen studies in this review. The included studies were mostly conducted in North America and Europe. Four studies were judged as having low risk of bias and eleven studies were judged as having moderate risk of bias. Pooled estimates revealed that individuals with

chronic musculoskeletal pain have an increased risk of having any cardiovascular diseases, congestive heart failure, and heart attack.

Conclusion: Our findings reveal an association between cardiovascular diseases and chronic musculoskeletal pain. Future policies should stimulate preventive and management strategies focusing on the promotion of physical activity that also addresses cardiovascular diseases and associated risk factors in patients with chronic musculoskeletal pain.

Evaluating physical activity prescriptions in rural health-care clinics

Courtney Schultz, Jason Bocarro, Aaron Hipp, NC State University

Background: Despite evidence that health behavior counseling promotes physical activity (PA), it is not widely practiced in clinical settings. While medical providers are interested in providing PA counseling to help patients more effectively manage their chronic diseases they repeatedly cite the same barriers: lack of time, knowledge, and resources.

Study Purpose: This study examined medical providers' engagement with low-income rural patients to develop negotiated, tailored, and achievable prescriptions to realize chronic disease management goals through increased PA levels.

Methods: The study utilizes a web-based app designed for health providers in four Federally Qualified Health Centers in two low income rural counties in North Carolina, USA, to generate tailored PA prescription interventions. Study participants (n = 150) with or at risk for diabetes and hypertension were enrolled into a population-based primary care 3-month intervention beginning February 2018. The study assesses how patients' participation in the intervention impacts their overall PA levels (measured via a Fitbit Flex 2), self-reported weekly participation in prescribed sessions via SMS, and an assessment of the patients' biometric vitals before and after the intervention period.

Results: Findings from the study will be presented including descriptive and intent-to-treat analysis of pre-post intervention changes in body mass index, systolic and diastolic blood pressure, glucose measures, PQH9 depression score, daily step count, average active minutes, and self-reported prescription adherence.

Conclusion: In contrast to much work that has emphasized generalized physical activity interventions, this research demonstrates the effect of a tailored health behavior intervention.

Evaluation of the 'Live Active' exercise referral scheme: Long term outcomes

Faye Prior, Margaret Coffey, Penny Cook, Anna Robins, University of Salford

Introduction: Exercise referral schemes (ERSs) aim to increase the physical activity (PA) levels of people with chronic health conditions. To date, the efficacy of ERSs has been inconclusive, due to the variable nature of schemes and limited data on long-term outcomes. The aim of this current study was to evaluate the long-term (12 months) impact of participation in an ERS.

Methods: Secondary data analysis was conducted for participants referred between July 2015 and July 2017. ERS duration was 6 months, with a follow-up at week 52. The primary outcomes were stage of change (transtheoretical model), PA (IPAQ), sitting time (IPAQ), body mass index (BMI), blood pressure (BP), generic health status (EQ-5D-3L and EQ-5D VAS), mental wellbeing (Warwick-Edinburgh mental well-being scale), smoking status, and alcohol consumption (frequency, units). Outcomes were analysed using appropriate statistical tests.

Results: In total 2104 people were referred to the ERS (117 waiting list, 515 participating, 623 completed (month 6), 471 dropped-out, 378 non-uptake). Of 623 who completed, 273 attended a week 52 appointment (further 20 declined, 98 lost to follow up, 2 died). Between weeks 1 and 52 there were significant improvements in the primary outcomes ($p < 0.05$), with the exception of diastolic BP, smoking status, and frequency of alcohol consumption.

Conclusion: Referral to the 'Live Active' ERS improved PA, health and mental wellbeing in the long-term. Therefore, healthcare professionals should consider the referral of inactive persons with chronic health conditions to an ERS.

External funding details: The authors thank Sport England and Thameside Public Health for funding this evaluation.

Identifying behavioral profiles of cancer survivors based on objectively assessed physical activity and sedentary behaviour

Maike Sweegers¹, Terry Boyle², Jeff Vallance³, Brigid Lynch⁴, Adrijana D'Silva⁵, Mai Chin A Paw¹, Johannes Brug⁶, Teatske Altenburg¹, Laurien Buffart¹

¹VU University Medical Center, ²University of South Australia, ³Athabasca University, ⁴University of Melbourne, ⁵University of Calgary, ⁶University of Amsterdam

Background: Emerging evidence suggests that the combination of sedentary behavior and physical activity (PA) may be important for physical health and quality of life in cancer survivors. As such, it is important to investigate behavioral profiles of daily activity in cancer survivors. In this study we identified distinct profiles based on physical activity and sedentary time, and examined whether these profiles differ by age or sex.

Method: Accelerometer data from seven international studies ($n = 1150$ participants) were pooled. Latent profile analysis was conducted to identify behavioral profiles, based on total sedentary time, sedentary time accumulated in bouts of 20+minutes, total time in light PA (LPA), the 75th-percentile of total counts/minute in LPA, total time in moderate-to-vigorous PA (MVPA) and MVPA time accumulated in bouts of 10+minutes.

Results: Preliminary analyses ($n = 564$ participants, mean age: 62 yrs, 77% female) identified five behavioral profiles. Profile 1 was characterized as 'very active' with the highest MVPA and low sedentary time (mean age: 62 yrs, 77% female), Profile 2 as 'active' with the lowest sedentary time and high MVPA and 75th LPA percentile (age: 58 yrs, 85% female), Profile 3 as 'average' with average sedentary time, LPA and MVPA (age: 62 yrs, 89% female), Profile 4 as 'sedentary and inactive' with the highest sedentary time and lowest MVPA (age: 66 yrs, 56% female) and Profile 5 as 'sedentary' with lower sedentary time and higher MVPA compared to Profile 4 (age: 63 yrs, 70% female).

Conclusion: The behavioral profiles identified can be used to tailor interventions to improve health behaviors in cancer survivors.

Interviewing stroke survivors three months after their stroke to inform the development of an intervention to reduce/break up sedentary behaviours

Claire Fitzsimons¹, Sarah Nicholson², Jacqui Morris³, Sebastien Chastin⁴, Gillian Mead², Ailsa Niven²

¹Dr, ²University of Edinburgh, ³University of Dundee, ⁴Glasgow Caledonian University

Introduction: Stroke survivors are highly sedentary, increasing risk of poor health. Guided by the COM-B framework for understanding

behaviour ('Capability', 'Opportunity', 'Motivation' to change a 'Behaviour') and wider Behaviour Change Wheel this study qualitatively explores the potential to reduce/break up sedentary behaviours (SBs) after stroke.

Method: Independently mobile Scottish stroke survivors were interviewed in their own homes three months post stroke. Interviews were audio-recorded, transcribed verbatim and analysed using the Framework Method.

Results: Thirty one participants were interviewed (mean age = 66.8, SD = 14.6 years; 16 male; 10 walking aid). Participants discussed a range of sedentary activities (e.g. screen time, reading, socialising, motorised transport). In relation to capability, participants reported an increased need to sit, mainly due to physical tiredness or pain. Knowledge about health consequences of SBs ranged from a general lack of knowledge to some understanding of the association between SBs and specific health conditions (back pain, circulation, stroke). The majority identified opportunities to reduce SBs (household tasks; walking; going out with family/friends) but motivation was influenced by perceptions of negative consequences of being active (fear of falling/pain; fatigue; too much activity may cause another stroke) and the benefits of SBs (recovery; enjoyment).

Conclusion: Ongoing analysis will further our understanding of SBs after stroke. Guided by the Behaviour Change Wheel, this information will be used to select appropriate intervention options and ultimately inform the design of a comprehensive intervention strategy with appropriate behaviour change techniques.

External funding details: Funded by Chief Scientist Office, Scottish Government (CZH/4/1091); supported by the NRS Stroke Research Network.

Moving medicine: A clinician facing resource to support physical activity consultation across specific disease areas

Hamish Reid¹, Hamish Reid², Natasha Jones², Ralph Smith³, Moving Medicine Working Group⁴

¹Oxford University Hospitals NHS Trust, ²Faculty of Sport and Exercise Medicine (UK&I), ³Oxford University Hospitals NHS Foundation Trust, ⁴Faculty of Sport and Exercise Medicine

Introduction: Knowledge, skills, time and confidence are common barriers to physical activity promotion in healthcare environments. This is the case despite overwhelming evidence supporting the role of physical activity in prevention and treatment of chronic disease. A lack of education amongst healthcare professionals and easily accessible resources propagate this situation.

Method: The project 'Moving Medicine' is a partnership between the Faculty of Sport and Exercise Medicine and Public Health England to develop a unifying physical resource for healthcare professionals in the UK, developed in partnership with a wide range of professional and charitable organisations. Using a knowledge into action framework we have developed an interactive digital tool to support physical activity brief intervention in healthcare. Nine working groups have undertaken narrative reviews looking at the benefits of physical activity across nine major disease areas. Using a COM-B model of behavioural change we have developed a framework to deliver this information to the busy clinician. Further testing of the content and structure of each individual resource has been done through workshops, delphi and online consultation with doctors, allied health professionals, academics and patients.

Conclusion: Still in its development phase this resource will be live by August 2018 to further inform the content of this presentation.

External funding details: This project is funded by Sport England and the National Lottery

Physical activity during pregnancy: Beliefs of healthcare professionals of a primary care centre. Qualitative study

Sonia Roa-Alcaino, Sonia Roa-Alcaino, Bárbara Lobos, Camila Avendaño, Jaime Leppe, Universidad del Desarrollo

Primary Health Care in Chile does not have a structured system to promote physical activity (PA) during pregnancy. The objective is to i) know the beliefs and perceptions of a group of healthcare professionals about PA during pregnancy and ii) to explore their appraisal about the instrument “Flow chart of prescribing physical activity in pregnant” designed for professional use.

Methods: In this qualitative study semi-structured interviews were conducted with the healthcare professionals belongs to a primary care centre (midwife, nutritionist, physiotherapist and physician). The transcribed interviews were analyzed following Grounded Theory paradigm and using triangulation process.

Results: Healthcare professionals perceive fear and lack of interest of the pregnant woman to do PA. They mainly believe PA is a means to control the increase in gestational weight and perceive they do not have enough time during prenatal control to advice about it. Some professionals express fear of prescribe PA due to the belief of potential risks in inactive women.

Regarding the “flowchart” they consider it understandable, easy to use, it takes little time, and a help for prescribing PA in pregnant women. They consider that there must be training prior to its use and it must be available as a poster in each service box.

Conclusion: Healthcare professionals associate PA mainly with weight control, there is fear to prescribe PA in all pregnant and consider the “flow chart” as a clinical aid for prescribing PA in Primary Health Care.

Physical activity promotion among oncologists in France

Fabienne d'Arripe-Longueville, Isabelle Mabboux, Jean-Marie Garbarino, Valérie Moralès, Charléne Falzon, Laura Schuft, Université Côte d'Azur

Introduction: Although barriers to physical activity (PA) for cancer patients have been well identified, attitudes and practices of health care providers towards PA have been less explored specifically in France. The purposes of this study were to qualitatively examine oncologists' practices and their perceived facilitators and barriers for promotion of PA; and to identify psychosocial correlates of intention to recommend PA to patients.

Method: 22 oncologists took part in semi-structured interviews. 146 out of 502 contacted oncologists participated in an online survey.

Results: According to the qualitative content analysis, 70% of oncologists reported PA promotion practices, which varied depending on patients' clinical and social profiles. The main facilitators and barriers for adherence to the French PA prescription law referred to economic (costs) and institutional (hierarchy support) factors, and to the oncologists' and patients' characteristics (knowledge; beliefs; motivation for PA). The regression analyses showed that perceived benefits of PA, self-efficacy and subjective norms respectively explained 23%, 11% and 4% of the variance of intention to recommend PA.

Discussion: The identified facilitators and barriers to PA promotion provide both support to the model of determinants of innovation (Chaudoir et al., 2013) and to the Theory of Planned Behavior predictions. Barriers related to the lack of knowledge and training of oncologists, and to the lack of motivation of patients, suggest directing promotion toward these targets (Keogh et al. 2017). Determining whether or not PA recommendations effectively changes patient behavior remains an important research area.

External funding details: This study was financially supported by the Cancerôle PACA.

Reducing sedentary behaviour in people with rheumatoid arthritis: A mixed methods study based on questionnaires and focus group interviews

Mette Aadahl¹, Tanja Thomsen², Maria Rothgart Petersen³, Bente Appel Esbensen²

¹Centre for Clinical Research and Prevention, Bispebjerg and Frederiksberg Hospitals, Frederiksberg, ²Centre for Head and Orthopedics, Rigshospitalet, Glostrup, Copenhagen Center for Arthritis Research, Center for Rheumatology and Spine Diseases, Glostrup, ³Department of Rehabilitation, Copenhagen University Hospital, Herlev Gentofte Hospital, Herlev

Introduction: People with rheumatoid arthritis (RA) spend a high proportion of their waking time in sedentary behavior (SB). An RCT study investigated the efficacy of a 16-week individually tailored, theory-based behavioral intervention on objectively measured daily sitting time (ActivPAL®), pain, fatigue, HQOL and cardiometabolic biomarkers in people with RA. The intervention comprised three motivational counseling sessions and tailored SMS reminders. The intervention was effective for reducing sitting time, improving patient reported outcomes and total cholesterol in the interventions group (n = 75) compared to a control group (n = 75). However, it is relevant to evaluate participants' perspective on the intervention before implementation.

Method: A mixed methods study with convergent parallel design including quantitative and qualitative data. Information on participants' experiences with the intervention was collected by questionnaire (n = 69) and in three focus group interviews (n = 18) involving evaluation of the intervention through dialogue. Quantitative and qualitative data were analyzed and reported separately, then merged.

Results: Participants were generally satisfied with the content and course of the intervention, in particular with the individual tailoring and feedback. Participants indicated that 1) they had changed their SB habits as a direct result of the intervention 2) they had managed to maintain changes and 3) their participation had indirectly affected their family, friends and colleagues, who gained knowledge on SB and changed their SB habits, especially at work.

Conclusions: Intervention participants in an RCT study on reduction of SB were satisfied with the content and delivery of the intervention and had managed to change their SB behavior.

They took me this far but I've gotta do it on my own now: How can self-determination theory explain patients' uptake and adherence of physical activity-based cardiac and pulmonary rehabilitation?

Eleanor Whittaker¹, Andrew Levy¹, Adrian Midgley¹, Bashir Matata²

¹Edge Hill University, ²Liverpool Heart and Chest Hospital NHS Foundation Trust

Background: Less than 50% of adults meet the minimum recommended levels of PA, with this figure even further reduced amongst patient groups. Despite being recognised as a goal-standard non-pharmacological treatment for CVD and COPD patients, completion rates of cardiac and pulmonary rehabilitation programmes, where PA is a central component, remain low.

Aims: To investigate perceived facilitators of cardiac and pulmonary rehabilitation patients' engagement with PA-based rehabilitation programmes.

Method: Semi-structured interviews were conducted with a purposive sample of 19 cardiac and pulmonary rehabilitation patients and staff. Data were analysed using both inductive and deductive thematic analysis.

Results: In line with self-determination theory, patients reported that staff provided an environment that facilitated the development of feelings of relatedness and autonomy, which in turn drove the development of competence. The development of these three factors allowed patients to feel more comfortable in the rehabilitation environment, in turn driving their intention to engage with PA following programme completion. Specifically, for older patients, relatedness was a particularly salient factor influencing their adherence to rehabilitation. Further, staff reported that the most salient factor driving patients' rehabilitation adherence was patients' development of autonomy and the subsequent ability to effectively self-initiate PA.

Conclusions: Future interventions aiming to increase patients' levels of PA should consider contextually-relevant factors that influence patients' uptake and adherence of PA. By taking this approach to intervention development, and aligning with the features of the context, the likelihood of interventions' effects washing out of a context is mitigated.

Theme: Policy

Monday 15 October

A blueprint to tackle physical inactivity: A collaborative approach in Cheshire and Warrington sub-region

Anne Boyd, Active Cheshire

This abstract examines how Active Cheshire adopted a "whole system approach" to co-design a "blueprint" (strategy) to embed physical activity into all aspects of everyday life. In Cheshire and Warrington sub-region, 22.1% of the population aged 16+ are active for less than 30 minutes per week, directly resulting in an estimated £17.5 million annual cost to the sub-region. Despite large investments over the last decade, participation figures published by Sport England since 2006 have shown to be flatlining. It is evident that a different approach is needed to tackle physical inactivity.

Active Cheshire created a Physical Activity Task Force (PATF) to explore how the levels of inactivity can be addressed locally, thus, improving health, wellbeing and prosperity. The group, made up of local stakeholders was brought together in early 2017 to produce a collaborative strategy to tackle physical inactivity. The strategy aims to affect sustainable change based on consumers insight. Therefore, behavioural insight research was conducted to understand what makes people inactive with findings used to inform the development of the strategy, which has five key pillars;

- Active Kids
- Active Design
- Active Workplace
- Activators
- Active Minds

The creation of the PATF has provided strategic direction for the sub-region to tackle physical inactivity. The co-designed plan, which will be co-delivered by local stakeholders, focuses on the whole system approach that will embed physical activity into all aspects of everyday life. The key feature underpinning the strategy is to affect sustainable change through understanding the needs, demands and lifestyles of the consumers.

A systematic review of barriers and facilitators to the implementation of physical activity policies in schools

Nicole Nathan¹, Ben Elton², Mark Babic², Nicole McCarthy², Rachel Sutherland², Justin Presseau³, Kirsty Seward¹, Rebecca Hodder⁴, Debbie Booth¹, Sze Lin Yoong¹, Luke Wolfenden¹

¹The University of Newcastle, ²Hunter New England Population Health, ³Clinical Epidemiology Program, Ottawa Hospital Research Institute, ⁴Hunter New England Population Health

Background: Research consistently indicates that schools fail to implement mandatory physical activity (PA) policies. This review aimed to describe factors (barriers and facilitators) that may influence the implementation of school PA policies which specify the time or intensity that PA should be implemented and to map these factors to a theoretical framework.

Methods: A systematic search was undertaken in six databases for quantitative or qualitative studies published between 1995-March 2016 that examined teachers', principals' or school administrators' barriers and/or facilitators to implementing mandated school PA policies. Two independent reviewers screened texts, extracted and coded data from identified articles using the Theoretical Domains Framework (TDF).

Results: Of the 10,346 articles identified, 17 studies met the inclusion criteria (eight quantitative, nine qualitative). Barriers and facilitators identified in qualitative studies covered nine and 10 TDF domains respectively. Barriers and facilitators reported in quantitative studies covered eight TDF domains each. The most common domains identified were: 'environmental context and resources' (e.g., availability of equipment, time or staff), 'goals' (e.g., the perceived priority of the policy in the school), 'social influences' (e.g., support from school boards), 'skills' (e.g., teachers' ability to implement the policy).

Conclusion: Implementation support strategies that target these factors may represent promising means to improve implementation of PA policies and increase PA among school-aged children. Future studies assessing factors that influence school implementation of PA policies would benefit from using a comprehensive framework to help identify if any domains have been overlooked in the current literature.

External funding details: Hunter Cancer Research Alliance, HMRI, HNEPH

Do not try to do it alone! The networks behind a successful national programme Finnish Schools on the Move

Annaleena Aira¹, Tapio Kuure², Kaarlo Laine¹, Antti Blom³, Tuija Tammelin¹, Eino Havas¹

¹LIKES Research Centre for Physical Activity and Health, ²University of Tampere, ³Finnish National Agency for Education

Successful collaboration is essential in physical activity promotion, leading to better results than competition and working alone. However, coordinating large, nationwide networks is not an easy task, nor is collaborating with different organizations and even former competitors. We will discuss critical factors in networking and lessons learned from the Finnish Schools on the Move (FSM) programme. The results are based on network analysis, interviews with network members, and documented experiences in the programme since 2010. The Ministry of Education and Culture, Finnish National Agency for Education, and LIKES Research Centre for Physical Activity and Health lead the FSM programme. The core of its network comprises 84% of all Finnish schools and 90% of municipalities, which have voluntarily registered in the network. The national network supporting schools is exceptionally large and still growing. The organization of FSM activities emphasizes the role of local administration. Local coordinators form a tight interpersonal network, socially supporting each other, and play key roles in coordination and promotion of the programme at the local level. In efficient operating models, the local-level network includes representatives of the third sector, in addition to the sector heads of different administrative branches.

Efficient operating models at the school level have a committed headmaster, a team and student participation. Successful collaboration in nationwide networks results from shared meanings and goals, trust building and functioning communication practices. Public reporting of research results has been an essential to the widespread uptake of the programme.

External funding details: Ministry of Education and Culture, Finland

Encouraging “active learning”: Assessing implementation of Head Start’s physical activity requirements within the teaching and learning environment

Sandy Slater¹, Anmol Sanghera¹, Yadira Herrera¹, Jamie Chiqui¹, Amy Eyster²

¹University of Illinois at Chicago, ²Washington University in St. Louis

Introduction: This study examined how regional and state-level head start offices facilitated the implementation of the recently updated physical activity (PA) requirement within the teaching and learning environment Head Start program performance standard (1302.31) with the aim of informing ongoing implementation efforts of the PA requirement in Head Start programs.

Methods: We are conducting semi-structured interviews (target n=63) with Head Start regional training and technical assistance coordinators (6 of 12 completed) and state-level collaboration office officials (33 of 51 completed). Questions explore how the provision of training, technical assistance and other resources has facilitated the implementation of the PA requirement, as well as what challenges programs experience. Transcripts are coded and organized in Atlas.ti v8 qualitative software. Four analysts will conduct constant comparative analysis and creation of theme matrices.

Results: Interviewees mentioned that, although the Standards around PA were revised, current practices that incorporate PA into the teaching and learning environment would experience little change because interviewees felt programs were already in compliance with the new standard as movement is already embedded in daily activities. However, there was also sentiment that it is challenging to embed movement in the half-day head start programs. When asked about challenges to implementation, interviewees noted the need for frequent professional development opportunities given staff turnover and lack of PA competency.

Conclusion: These findings can help identify existing or potential strategies that could be adopted more widely or developed to assist Head Start programs into incorporating PA into daily activities.

External funding details: The Robert Wood Johnson Foundation

The future of sport in the Netherlands: challenges and opportunities for sport policy

Robert Vonk, Wanda Vos, National Institute for Public Health and the Environment (RIVM)

Introduction: The world of sport is continuously changing. At the moment, a third of the Dutch population is member of a local sport club. Yet, individual types of sport are gaining more interest as well. A healthy lifestyle is the main motive to become and stay active. But will this deliver new elite sportsmen in the future? And what about the often overlooked stakeholder: the supporters of sports?

Methods: In order to understand the challenges and opportunities for sport in the years to come, we conducted a sport foresight study: a long-term planning tool for anticipating and preparing for possible, probable and desired futures. Quantitative data, expert consultations, scenario planning and backcasting were used to investigate possible, probable and desired futures of sports. The aim of this Sport Foresight Study is to

provide input for the national governmental sport policy from 2018 onward.

Results: The Dutch sports sector faces four main challenges: an increasing gap between between elite sport and recreational sport; increasing pressure on local sports clubs due to decreasing membership numbers; insufficient physical activity and less international success. In order to provide insight into the desirable future of sport, we have constructed four perspectives on sport: idea-specific future images, intended to raise awareness about sports and to clarify discussions.

Conclusion: Discussions on the future of sports often revolve around ‘sport as a goal’ and ‘sport as a means’. This contribution shows how sport foresight studies can inform this discussion and can lead to more robust future policy objectives.

Implementing physical activity policies in Danish primary schools: A four step modified Delphi study

Danielle Nørager Johansen, Thomas Skovgaard, University of Southern Denmark

Introduction: In 2014 a reform of the Danish public-school system made it mandatory that physical activity (PA) form part of the syllabus for all year-groups corresponding to 45 minutes per day. The aim is to promote health and well-being among children and youth and to support motivation and learning in school subjects. However, there is an implementation gap between stated activity goals of the reform and prevailing practice.

Purpose: Using Søren Winters integrated model of policy implementation, the purpose of this study was to identify and examine important factors for sustainable implementation (SI) of school-based PA in Denmark.

Method: A modified Delphi study, containing of four rounds, was conducted: 1) Identifying factors for SI in the scientific/grey literature; 2) Requesting a selected group of national experts (NE) to comment and prioritize factors for SI identified in the literature using a web-based questionnaire; 3) Interviews with NE’s, based on questionnaire responses, to examine outliers; 4) Condensing the SI-factors to the ones of greatest importance at a final workshop including the NE group.

Results: Nine overall SI-categories were identified and prioritized: Leadership, Co-workers, Resources, Policy, Organisation/culture, Pupils, Physical environment, Intervention context, and External factors.

Conclusion: All categories are important for SI. However, Leadership stands out as the single most important factor for SI in relation to school-based PA.

External funding details: The project had financial support from the non-profit foundation TrygFonden, Denmark. The funding body has no role or authority in the conduct of the research project, except acceptance of adjustments to the research plan.

More physically active and pleasant school days: Student surveys and physical activity monitoring in the Finnish schools on the Move Programme

Tuija Tammelin¹, Henna Haapala¹, Jouni Kallio¹, Sami Kokko², Kaarlo Laine¹

¹LIKES Research Centre for Physical Activity and Health, ²University of Jyväskylä

Student-level surveys and physical activity (PA) monitoring have been essential in research on the Finnish Schools on the Move (FSM) programme launched in 2010. The results have informed the development of FSM, created realistic, concrete programme goals, and provided feedback for schools and local projects. Since 2016, follow-up to the FSM

programme has been integrated into national-level surveys and monitoring. Based on surveys and objective PA monitoring around one third of students in Finnish comprehensive school achieve the recommended minimum of at least one hour of moderate-to-vigorous PA (MVPA) per day. More students at primary schools involved in FSM reach this goal than other schools. PA during the school day has the greatest importance for the least physically active students. On average, students accumulate one third of their daily MVPA at school, but this rises to 42% for the most inactive students. Positive, student-level changes at the student level based on repeated measures have been observed at FSM schools: increased PA during recess and throughout the school day, more outdoor recess time, more active commuting to school during the winter and greater student involvement in planning school activities. During a two-year follow-up, more favourable changes occurred in objectively measured school day MVPA and sedentary time among students at primary schools involved in FSM than other schools. More effective promotion actions are needed to increase PA and decrease sedentary behavior in both primary and lower-secondary schools during the school day and leisure time.

External funding details: Ministry of Education and Culture, Finland

Moving at scale: Promising practice and practical guidance on evaluation of physical activity programmes in the UK

Justin Varney¹, Rachel Lawson², Tim Williams², Robert Copeland³, Mike Brannan¹, Andy Lane⁴, Lynne Kennedy⁵, Chris Beedie⁶, Greg Whyte⁷, Alfonso Jimenez⁸, Gavin Sandercock⁹, Darcy Hare¹⁰, Matthew Wade², Alex Lucas², Lizzie Broughton², Steven Mann¹¹

¹Public Health England, ²ukactive, ³Sheffield Hallam University, ⁴University of Wolverhampton, ⁵University of Chester, ⁶Canterbury Christ Church University, ⁷Liverpool John Moores University, ⁸Coventry University, ⁹University of Essex, ¹⁰Sport England, ¹¹Places for People Leisure

Purpose: To develop effective physical activity (PA) frameworks policy makers require an understanding of which interventions increase PA at population level. This investigation identified PA interventions in the UK; considered key challenges in evaluating interventions; and provided guidance to inform and support effective evaluation. It followed from a 2014 investigation that identified and benchmarked PA interventions in England.

Methods: An open call for examples of good and promising practice was made to organisations, groups, and individuals delivering PA interventions in the UK. Participants completed a questionnaire based upon elements of the Standard Evaluation Framework for Physical Activity Programmes. Nesta Standards of Evidence were interpreted and used to score projects and programmes based on an assessment of the evaluation method used.

Results: A total of 302 completed submissions were assessed; 17 interventions used a control or comparison group; 12 were evaluated by an external evaluator; 55% of interventions collected pre/post measures; 22% engaged between 1,000 and 5,000 participants with 8% including >25,000 participants; 27% had been on-going for 2-5 years; 55% were delivered in a local authority leisure facility; 40% received funding from local authorities and 32% from private funders.

Conclusions: The quality of monitoring, data collection, and evaluation processes embedded into programme delivery has improved since the 2014 review, which is encouraging. Non-inclusion of control or comparison groups (although not always appropriate) remains a barrier in demonstrating the causal impact of programmes. Few studies reported independent evaluation. Inadequate or incomplete submissions also impacted assessment.

User's experiences on the Global Observatory Physical Activity (GoPA!) Country Cards

Katja Siefken¹, Andrea Ramirez Varela², Deborah Salvo³, Michael Pratt⁴, Karen Milton⁵, Adrian Bauman⁶, Harold W. Kohl⁷, I-Min Lee⁸, Gregory Heath⁹, Charlie Foster¹⁰, Kenneth Powell¹¹

¹University of South Australia, ²Federal University of Pelotas, ³The University of Texas Health Science Center at Houston (UTHealth), ⁴University of California, ⁵University of East Anglia, ⁶University of Sydney, ⁷The University of Texas, ⁸Harvard Medical School, ⁹University of Tennessee, ¹⁰University of Bristol, ¹¹Atlanta

Introduction: The Global Observatory for Physical Activity (GoPA!) developed standardized country-specific physical activity profiles ("Country Cards") with comparable indicators for surveillance, policy and research data. The aim of this process evaluation was to assess the experience of Country Card users and to explore the public audience's reaction to the cards.

Methods: Cross sectional internet-based survey conducted between August-October 2016 with physical activity leaders and advocates in academia, government and practice from the GoPA! countries. Open-ended questions explored the experience of the users to better understand the utility of the Country Cards.

Results: 86 respondents from 55 countries completed the open-ended questions. An imbalance by country income groups was identified. Whilst 56 responses came from high-income countries, 4 responses came from low-income countries. Participants mainly used these cards for advocacy/media (N = 16), at governmental level (N = 14) and for research (N = 10). Thirteen (N = 13) participants were not aware of the cards prior to the process evaluation. 21 (N = 21) participants indicate the cards stimulate interest in global physical activity inequality and research. Eleven (N = 11) participants noted limited impact of the Country Cards whilst six participants (N = 6) valued the facilitation of country comparisons. Data inaccuracy was mentioned by four (N = 4) participants.

Conclusion: The Country Cards are used as advocacy tools, to stimulate discussion on physical activity surveillance and research and to guide policy as intended. GoPA! needs to conduct repeated evaluations and target specifically lower income countries to enhance generalizability of the findings. The planned refinement of the cards will help resolve concerns regarding data inaccuracy.

External funding details: Funding was provided by Wellcome Trust

Theme: Settings-based Interventions

Monday 15 October

A pragmatic assessment of treatment fidelity, in a community based physical activity intervention for COPD

Gabbi Frith¹, Lindsey Reece², Rebecca Jones³, Simon Nichols¹, Heather McKee³

¹Sheffield Hallam University, ²University of Sydney, ³British Lung Foundation

Background: Chronic pulmonary disease (COPD) is a progressive disease associated with reduced physical activity (PA). 'Keep Active Keep Well' (KAKW) is a theoretically underpinned, PA behaviour change programme. This programme uses motivational interviewing (MI) techniques to promote PA maintenance in COPD patients. Treatment Fidelity (TF) refers to methodological strategies that enhance reliability and validity of

behavioural interventions and are rarely incorporated in community based programmes.

Methods: To ensure a robust TF criterion, the Behaviour Change Consortium (BCC) TF framework was adhered to and mapped against a checklist. This was embedded into the programme from the outset, allowing for complete independent assessment from design through to treatment delivery. Intervention design, provider training, intervention delivery, intervention receipt and patient enactment were all assessed. Two commissioned prototype sites were observed delivering the KAKW programme. The patient's receipt of the intervention was assessed, using the Client Experience of Motivational Interviewing (CEMI). This was given to patients and used to rate instructor compliance to MI.

Results: Both sites adhered highly to the TF checklist criteria (>80%). The mean CEMI score for site 1 was 54.42 (SD = 7.32); mean CEMI score for site 2 was 55.28 (SD = 5.70).

Conclusion: There is paucity across the literature in reporting methods of TF in community based PA programmes. The following programme embeds TF and offers a useful insight into the pragmatic assessment of TF in community based settings.

External funding details: Sheffield Hallam University are commissioned by the BLF as the evaluation partner for the KAKW programme.

Acute relationships between light-intensity physical activity and postprandial glucose under free-living conditions in prediabetic working adults

Meynard Toledo¹, Sarah Mullane¹, Paddy Dempsey², Sarah Rydell³, David Dunstan², Neville Owen², Glenn Gaesser¹, Mark Pereira³, Matthew Buman¹

¹Arizona State University, ²Baker Heart and Diabetes Institute, ³University of Minnesota

Introduction: This study aimed to evaluate the acute association between light-intensity physical activity (LPA)s and continuously measured postprandial glucose in prediabetic adults during normal work conditions.

Methods: Pre-diabetic individuals (fasting glucose >100 mg/dl) were recruited from a larger cluster randomized work-based trial. Participants simultaneously wore an activPAL (PAL Technologies LTD, UK) and an iPro2 device (Medtronic Inc, MN) to measure LPA and glucose, respectively, over three consecutive work days in their normal work environments. Standardized lunch meals were provided. activPAL and glucose data were time- and date-matched at 5-min intervals and time-lagged at 15-min and 30-min intervals so LPA time preceded measured glucose. Multilevel models (SAS Proc Mixed, glucose nested within day nested within person) were used to evaluate the relationship between postprandial glucose and preceding 15-min and 30-min LPA. All models were controlled for linear and quadratic time (postprandial response), age, sex, race, BMI, moderate-vigorous physical activity, and preprandial glucose.

Results: Twenty-one participants (age = 49.5 ± 11.5 yrs; 74.8% female; 74.8% white; BMI = 31.9 ± 7.6 kg/m², preprandial glucose = 102.8 ± 10.8 mg-h-dL⁻¹) were included. Higher LPA was predictive of subsequent lower glucose for the 15- and 30-min intervals, b(95%CI) = -3.7 (-5.0, -2.5) mg-h-dL⁻¹ and -8.7 (-10.8, -6.7) mg-h-dL⁻¹, respectively.

Conclusion: Light-intensity physical activity acutely improves postprandial glucose in free-living, office-based work conditions. Future studies should explore the association of glucose with other metrics of sedentary and active behaviors (e.g., standing, prolonged sitting).

External funding details: Funded by the NIH [R01CA198971].

Does engaging in a gender-sensitised community-based physical activity reduce the risks associated with cardiovascular disease?

Liam Kelly¹, Noel Richardson², Paula Carroll³, Michael Harrison³, Alex Donohoe³, Aisling Keohane³, Steve Robertson⁴

¹Institute of Technology Carlow, ²National Centre for Men's Health, Institute of Technology Carlow, Ireland, ³Centre for Health Behaviour Research, Waterford Institute of Technology, Ireland., ⁴Leeds Beckett University, Leeds, UK.

Background: Cardiovascular diseases (CVDs) are the leading cause of death globally, and are particularly prevalent in middle-aged men in Ireland. Most CVDs can be prevented by addressing behavioural risk factors. However, creating suitable physical activity (PA) interventions in the right environments that can attract and support men in changing health practices has proved difficult. Evidence suggests that gender-specific strategies related to community-engagement are necessary in creating sustainable health-promotion programmes that appeal to men. This study reports on the impact of a community-based PA intervention (Men on the Move) on the CVD profile of participants.

Methods: Inactive males (n = 927) were recruited across 8 counties (4 intervention [n = 501]; 4 comparison-in-waiting [n = 426]). Self-administered questionnaires combined with recorded outcome measures were used to gather data on participants' at baseline, 12, 26 and 52 weeks. Data were computed in accordance with defined protocols, with descriptive and comparative means analysed.

Results: Based on international guidelines, six self-reported CVD risk factors were identified; <3 days PA per week, WC >102 cm, a smoker, alcohol consumption >14 units, blood-pressure medication, and cholesterol medication. Comparative data examining incidence/prevalence of CVD risk factors at each time-point will be presented (data analysis in progress). At baseline, the majority (85.5%) of participants' presented with at least one risk factor, with 53.1% presenting with two or more.

Conclusions: Baseline findings indicate that the programme succeeded in reaching a 'high-risk' population group, and that there is an urgent need for more targeted gender-specific programmes that support service providers to effectively engage inactive men in PA.

Effectiveness of workplace interventions for reducing occupational sedentary behaviour: an update of a Cochrane systematic review

Nipun Shrestha¹, Katriina Kukkonen-Harjula², Jos Verbeek³, Sharea Ijaz⁴, Veerle Hermans⁵, Zeljko Pedisic⁶

¹Victoria University, ²Rehabilitation, South Karelia Social and Health Care District (Eksote), ³Cochrane Work, Finnish Institute of Occupational Health, ⁴NIHR CLAHRC West, Population Health Sciences, Bristol Medical School, University of Bristol, ⁵Vrije Universiteit Brussel, ⁶Institute for Health and Sport

Introduction/Background: Reducing and breaking up occupational sitting time may positively affect health. No recent reviews have summarised results of studies on the effectiveness of interventions to reduce occupational sedentary behaviour. We aimed to evaluate the effects of workplace interventions on reducing sitting at work compared to no intervention or alternative interventions.

Method: We conducted systematic searches of six electronic databases and two trial registries. We included RCTs, cluster RCTs, and controlled before-and-after studies (CBA). Two authors independently screened studies for eligibility and performed data extraction and risk of bias assessment.

Results: We included 34 studies, including 19 RCTs, seven cluster RCTs, and eight CBAs. We found low quality evidence suggesting that using sit-stand desks reduces occupational sitting time by on average 100 minutes/day (95% CI: -115 to -84) in the short term (up to 3 months after the intervention) and 57 minutes/day (95% CI: -99 to -15) in the medium term (3 to 12 months). We also found low quality evidence that counselling may lead to a modest reduction in occupational sitting time in the medium-term (pooled mean difference -28 minutes/day; 95% CI: -51 to -5). Evidence on the effects of policy changes, providing information, and counselling on sitting time at work was inconsistent.

Conclusion: Low quality evidence suggests that using sit-stand desks may result in small-to-moderate reductions in occupational sitting time in the short or medium term, but there is no evidence for long-term effects. More studies are needed on the effectiveness of the other types of workplace interventions.

From evidence-based research to practice-based evidence: Effort, cost and uptake of disseminating a web-based computer-tailored workplace sitting intervention through a health promotion organisation

Katrien De Cocker¹, Ilse De Bourdeaudhuij², Femke De Meester³, Greet Cardon², Corneel Vandelanotte⁴

¹University of Southern Queensland, ²Ghent University, ³Vlaams Instituut Gezond Leven, ⁴Central Queensland University

Background: Prolonged sitting may result in adverse health outcomes; therefore, we developed and examined a web-based computer-tailored workplace sitting intervention. As this intervention has shown to be effective, the next stage was to conduct a dissemination study. As such, this study reports on the dissemination efforts of a health promotion organisation, associated costs, reach achieved, and attributes of the website users.

Methods: The health organisation (Flemish Institute for Healthy Living) systematically registered all the time and resources invested to promote the intervention (October 2016-February 2018) among Flanders (northern part of Belgium). Website usage statistics (reach of the intervention) and descriptive statistics (attributes of the website users) were also assessed.

Results: Online strategies (promoting the website on their homepage; sending e-mails, newsletters, Twitter, Facebook and LinkedIn posts to professional partners) were the main dissemination methods used by the health promotion organisation. The time investment was 25.6 hours in total, which costs approximately 845 EUR in salaries (33 EUR/hour). After sixteen months, 1599 adults had visited the website and 1499 (93.7%) completed the survey to get personalized sitting advice. This sample was middle-aged (38.3±11.0 years), mainly female (76.9%), college or university educated (89.0%), highly sedentary (88.7% sat over 8 hours/day) and reported on average 342±121 minutes/day sitting at work.

Conclusion: Given the limited time and money investment (approximately 1 minute and 0.56 EUR per person accessing the advice), this web-based computer-tailored intervention has potential for wide-scale dissemination. However, more efforts are needed to reach male and non-college/university educated employees.

Getting the best start in East Sussex: A whole systems transformation approach to tackling childhood obesity through physical activity in education settings and across the community

Nicola Blake, David Bishop, Ross Boseley, Anna Card, East Sussex County Council

Introduction: An ambitious childhood obesity prevention programme delivered at scale and pace invested over £7m public health and CCG funds

as part of place-based whole-systems transformation programmes East Sussex Better Together and Connecting4You.

Method: Based on evidence of need, over 323 participating nurseries, schools and further education settings were supported to develop whole-settings transformation plans focusing on physical activity. Schools received £10,000 grants and nurseries £5,000 grants to invest in evidence-based interventions to improve the health of children and families. This included training, equipment, initiatives promoting active play and playground development, daily physical activity, parental engagement and development of organisational policies. A seven-week mass participation intervention ± Beat the Street ± then sought to engage entire communities in physical activity.

Results: Feedback was extremely positive, with schools recognising additional benefits, including improved pupil behaviour and engagement in lessons. Analysing 131 baseline and follow-up nursery audits found enhancements in policy and practice, with training/ questionnaire data, Ofsted reports and case studies demonstrating a significant impact on knowledge, skills, and confidence of staff and on quality of provision. The mass participation intervention resulted in the proportion of children reporting lowest levels of activity decreasing from 22% beforehand to just 5% immediately afterwards.

Conclusion: This innovative, multi-component transformation programme benefited 58,000 children and their families, with over 42,000 people also engaged in mass participation ± making it the largest Beat the Street game played in the world. Learning and outcomes are informing the programme's final year and will support settings to sustain enhanced physical activity provision.

Health and physical activity promotion through sports club setting: Sports based health promotion activity across community clubs in Ireland

Aoife Lane¹, David Callaghan², Niamh Murphy², Aoife O'Brien³

¹Athlone Institute of Technology, ²Waterford Institute of Technology, ³Gaelic Athletic Organisation

Introduction: The GAA Healthy Club Project includes 60 sports clubs across Ireland working to deliver health promotion activities to members and surrounding communities. Lane et al., (2016) confirmed that these clubs are generally oriented towards this type of work but require some support to deliver impactful initiatives. This evaluation looks at health promotion activity across 30 clubs.

Method: Clubs self reported on their overall activity at the end of the 18 month project phase. Six clubs also took part in two initiatives delivered in partnership with specialist agencies. Participants, club representatives and partners were engaged in the evaluation to determine the impact on physical activity (PA) and eating behaviours, using objective and self report measures.

Results: Over 300 initiatives were delivered across 30 clubs with most activity focused on PA, healthy eating and mental fitness. The PA initiative included the delivery of a Men on the Move programme with participants reporting an average 2 kg weight loss and improvement in cardiorespiratory fitness that was maintained up to 26 weeks. The Healthy Eating initiative incorporated a skills development programme with adolescents, which led to an improvement in knowledge and interest in nutrition.

Conclusions: The GAA club displays an affiliation and commitment to health promotion that identifies it as an ideal setting for delivering health interventions. Specialist agencies should be encouraged and supported to partner with these sports clubs to ensure the delivery of evidence based, effective initiatives.

External funding details: Gaelic Athletic Association

Healthwalks shown to improve health and wellbeing, including for those with long-term health conditions

Corinna Edwards-Colledge, Kathleen Cuming, Natalie Johnson, Jan Sutherland, Public Health, Brighton & Hove City Council

Introduction: Healthwalks has been providing free, volunteer-led walks across Brighton & Hove for 16 years. Bi-annual evaluations aim to quantify the health and wellbeing benefits gained by participants. Notably, a mean of 57% of local participants have a long-term health condition, compared to 33% of Healthwalkers nationally.

Method: 'Evaluation Weeks' gather evidence and feedback via snapshot surveys from Healthwalkers. 70% of the average number of walkers per week responded.

Results: Percentage of Healthwalkers responding "Strongly agree" or "Agree" April–September 2017. (n = 112)

More physically active: 75%

Improvement in mental health: 80%

More independent walking: 62%

Eating better: 50%

Trying other forms of exercise: 41%

Learnt new skills: 47%

Made new friends: 74%

Percentage of Healthwalkers reporting changes in sedentary behaviours and physical activity April–September 2017. (n = 112):

Reduction in sedentary behaviours (sitting 5+ hours a day) 10%

Those moving from insufficient to sufficient physical activity levels 12%

Conclusion: Healthwalkers are significantly likely to agree or strongly agree that Healthwalks has led to an increase in physical activity levels, independent walking; making new friends and improved mental health. Our unique questions on eating better and trying other forms of exercise suggest Healthwalks also encourages other healthy lifestyle behaviours. The significance of these results is enhanced when considered alongside the high proportion of participants with long-term health conditions. These results are also supported by studies that link led walking with improved quality of life; and which demonstrate how physical activity and mental wellbeing are interrelated, producing multiple benefits within the individual.

How do workplace step counting challenges generate their outcomes, for whom and in what contexts? A case study of building a realist programme theory

Mary Allison, Ruth Jepson, Ailsa Niven, University of Edinburgh

Introduction: The value of walking for health is established and is acknowledged in health policy (WHO, Dec 2017). To promote walking in the workplace there has been growth in 'step count' challenges; however there is limited evidence of effectiveness from RCT studies (Freak-Poli et al. 2011). This study adopts a realist research approach, with a focus on explaining how such challenges might work, for whom and why. It uses Scotland's 'Step Count Challenge' as its focus.

Method: In line with RAMESES standards (2014) for realist reviews, the first stage generated initial rough programme theories (IRPTs). The IRPTs were shaped iteratively from: content analysis of programme documentation (2010–2017); stakeholder workshop; and interviews with programme coordinators. These IRPTs were re-conceptualised by reviewing primary literature from classes of programmes relevant to IRPTs. In keeping with

realist approaches, included literature is multi-disciplinary and does not follow a methodological hierarchy.

Results: Initial results, based on the content analysis, generated a number of proposed programme theories including: diversion, re-conditioning, mindfulness, team-work, confidence to compete and confidence to change. Each of these are now undergoing further iteration. Full results will be available in July 2018 and will be discussed at the conference.

Conclusion: Realist programme theory is relatively absent in physical activity research but is of value to understanding how programmes work to achieve their results. This detailed explanation of the method and findings may help others to consider the approach.

External funding details: This research is an ESRC-funded Collaborative PhD Scholarship, generously supported by Paths for All.

How physically active are boys and girls are during play-times in primary school?

Kristy Howells, Canterbury Christ Church University

Children spend 20% of their whole school day in England during playtimes, within the literature, the school setting is described as a diverse place that may or may not have a contributory effect to physical activity levels. Ridgers et al. (2006) stated that "playtime can contribute between 5–40% of the recommended daily physical activity levels when no interventions have been utilised" (p. 359). Whilst Pate et al. (1996), suggested that "children best accumulate physical activity during playtime where they are free to interact with their peers" (p. 96).

This paper compares boys and girls and infants (6–7 years) and juniors (9–10 years) physical activity levels. Data were collected within a case study school setting over one school year. 20 children wore Actigraph accelerometers to record physical activity intensity levels. A repeated measures 3 factor ANOVA was used to analyse the effects of factors, P values of <0.05 were taken as the value for statistical significance. Statistical analysis was completed using SPSS 17.0.

Significant findings were found for boys being most active during play-times. Junior boys were active at a moderate to vigorous level (MVPA) for 38% of the time whilst infant girls were only MVPA for 18% of the time. Children were static for between 33 and 46% of the time and that infants were static for the longest. The paper proposes opportunities for improving MVPA of infants, including supporting infants who have not yet mastered the fine and gross motor skills involved in cutting up their lunch (Gallahue, 1996).

Implementation outcomes in a large workplace sedentary behaviour cluster randomised trial

Matthew Buman¹, Sarah Mullane², Sarah Rydell³, Meynard Toledo¹, Paul Estabrooks⁴, Mark Pereira³

¹College of Health Solutions, Arizona State University, ²School of Nutrition and Health Promotion, Arizona State University, ³School of Public Health, University of Minnesota, ⁴College of Public Health, University of Nebraska Medical School

Introduction: Interventions to reduce sedentary time in the worksite have emerged as an important public health priority. Multi-level approaches (i.e., individual, social, environmental, and policy level strategies), along with the provision of sit-stand workstations, have been efficacious for reducing sedentary time. However, factors related to real-world implementation of these approaches are not well established.

Methods: We conducted Stand & Move at Work, a worksite intervention targeting reductions in sitting through the provision of sit-stand

workstations and the delivery of a 12-month multi-level behavioral intervention. This large-scale cluster randomized trial was completed in 24 worksites across two large US metropolitan regions and in three worksite sectors: government, academic, and healthcare/industry. The implementation outcomes of the study included metrics of reach, implementation, and maintenance and how these outcomes impacted behavioral changes at the worksite level (i.e., effectiveness). Implementation outcomes were drawn from worksite environmental- and policy-level audits, employee and leader surveys, and qualitative interviews.

Results: In total, worksite reach of the intervention was 52%; however, this varied widely between worksites. Implementation fidelity approached 100% among primary interventions components (i.e., e-newsletter delivery, sit-stand workstation installation, leader support emails); however, secondary intervention components (e.g., competitions/contests, standing/walking meetings, waste and recycle bin removals) varied considerably in their implementation, as did maintenance (> 12 months) of intervention components. Differences in implementation factors by worksite sector and other characteristics will be discussed.

Conclusion: This work has direct implications for scaling up efficacious worksite interventions for maximal population health impact.

External funding details: US National Institutes of Health (R01CA198971)

Move More, Sit Less: Using the MRC framework to develop a multi-level workplace intervention within a contact centre setting

Abigail Morris¹, Rebecca Murphy², Sam Shepherd², Genevieve Healy³, Charlotte Edwardson⁴, Lee Graves²

¹Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, ²Physical Activity Exchange, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, ³School of Public Health, The University of Queensland, Brisbane, Australia, ⁴Diabetes Research Centre, University of Leicester, Leicester, UK

Introduction: Contact centre call agents spend ~90% of their working day seated, which can negatively impact cardiovascular and metabolic health, presenteeism and productivity. Studies were conducted to investigate multi-stakeholder perspectives of factors influencing call agents' workplace physical activity and sedentary behaviour (Study 1), and explore the acceptability and feasibility of a subsequent 8-week intervention to support call agents to move more and sit less at work (Study 2).

Methods: Semi-structured interviews and focus groups with 43 participants (agents $n=20$, team leaders $n=11$, senior staff $n=12$) across four contact centres were analysed thematically (Study 1) to inform the design and implementation of an 8-week multi-component, non-randomised pre-post intervention (Study 2). Process evaluation including quantitative and qualitative methods identified pragmatic considerations for intervention recruitment, assessments and implementation.

Results: Limited call agent knowledge and motivation, sedentary working cultures, ergonomic set up and organisational support contributed to high sitting and low physical activity at work in call agents (Study 1). Thirteen call agents (69% female, 37.3±16.6 years) completed pre and post assessments (study 2). High workload influenced agent and team leader recruitment to the intervention. Call agent's perceived the intervention assessments as acceptable, though strategies are needed to enhance internal validity. Height-adjustable workstations, weekly emails and education sessions were considered effective interventions components, however hot-desks were unfeasible.

Conclusion: This is the first project to engage multi-level stakeholders from the contact centre setting in intervention development. The findings

have informed the design and implementation of a currently running effectiveness trial (Study 3).

Multi-level workplace intervention to improve cardiovascular outcomes in contact centre call agents: Study protocol

David Gavin¹, Abigail Millard², Madeleine Cochrane², Nicola Hopkins², David Low², Rebecca Murphy², Sam Shepherd², Paula Watson², Hannah Timpson³, Lisa Jones³, Alan Haycox⁴, Brendan Collins⁵, Genevieve Healy⁶, Charlotte Edwardson⁷, David Dunstan⁸, Lee Graves²

¹Liverpool John Moores University, ²Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, ³Public Health Institute, Liverpool John Moores University, ⁴Management School, University of Liverpool, ⁵Department of Public Health and Policy, University of Liverpool, ⁶School of Public Health, The University of Queensland, ⁷Diabetes Research Centre, University of Leicester, ⁸Baker IDI Heart and Diabetes Institute

Introduction: Highly active adults have lower rates of adverse health outcomes, including all-cause mortality, coronary heart disease, diabetes and stroke. In addition to meeting the physical activity guidelines, reducing total and prolonged periods of sedentary behaviour appear important for health. Contact centres are a key setting to target these behaviours, as call agents predominantly sit at work and have low autonomy over working practices. This study aims to evaluate the effect of a participant-informed workplace physical activity and sedentary behaviour intervention on cardiovascular risk parameters at 9-months post-baseline, in highly sedentary call agents.

Methods/Design: A two-arm 9-month pilot cluster randomised controlled trial will be implemented in one contact centre in the North West of England. Treatment arms include a multi-level workplace intervention group and a control group. Assessments will occur at three-time points, being baseline, and 3 and 9 months after the intervention starts. The intervention group will receive support and resources to move more and sit less across a 9-month intervention period. The 9-month intervention period includes an intensive (months 0-3) and maintenance phase (months 4-9). Assessments will include flow mediated dilation, intima media thickness and blood pressure variability.

Discussion: This study will be the first to explore the short- and medium-term effects of a move more, sit less intervention on cardiovascular outcomes in contact centre call agents. Strengths include the objective measurement of traditional and novel cardiovascular risk markers and activity outcomes. Findings will inform health and well-being policy and practice in contact centres.

RE-AIM evaluation of a community-wide physical activity intervention based on the Japanese guideline in adults: the Fujisawa +10 project

Yoshinobu Saito¹, Ayumi Tanaka², Takakyuki Tajima¹, Yayoi Kibayashi¹, Motohiko Miyachi³, Yuko Oguma¹

¹Keio University, ²Fujisawa City Health and Medical Foundation, ³National Institute of Health and Nutrition, NIBIOHN

Introduction: This study aimed to evaluate the public health impact of a community-wide intervention (CWI) based on the Japanese physical activity (PA) guideline (Active Guide).

Methods: This study was a non-randomized controlled trial. Four districts from Fujisawa city, Kanagawa, Japan were allocated into the intervention group (IG) and nine into the control group (CG). The 2013–2015 CWI, comprising of information, education, and delivery of community support, was used to promote PA in adults; its public health impact was evaluated

using the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework obtained from implementation record files and questionnaires. The primary outcome was a change in PA engagement.

Results: *Adoption:* This study was adopted by the administration and all intervention districts (100%). *Implementation:* There were 20 collaborating organizations. The population coverage rates of Active Guide distribution and educational activities were 5.3% and 3.5%, respectively. Exercise workshops (community support) were conducted 11 times for the IG. *Reach:* IG participants were more aware of the CWI (33.8%) than were CG participants (25.2%) two years post-implementation (odds ratio = 1.44 [95% confidence interval (CI): 1.06–1.95]). *Effectiveness:* Median PA durations did not differ between the two groups after adjusting for potential confounders (adjusted inter-group difference = -0.02 minutes/day [95% CI: -0.11–0.10]). However, participants' PA guideline knowledge significantly differed (adjusted inter-group difference = 0.82% [95% CI: 0.33–1.31]). *Maintenance:* These findings are reflected in Fujisawa city's health measures, and PA is being continuously promoted throughout the city.

Conclusion: Important information for intervention content, amount, and maintenance is necessary for continuous PA promotion.

External funding details: This study was partly supported by JSPS KAKENHI Grant Numbers JP17K01795, JP17H06151, and Keio Gijuku Academic Development Funds.

Reduce Your Sit and Be More Fit: Reducing sedentary time and increasing energy expenditure in the Workplace

Joel D. Reece¹, Saori I. Braun², Vaughn W. Barry³, Dana K. Fuller³, Jennifer L. Caputo³

¹Brigham Young University Hawaii, ²University of Wisconsin-Eau Claire,

³Middle Tennessee State University

Introduction: The aim of this study was to evaluate the feasibility of behavioral strategies in the workplace to improve occupational sedentary time, light activity time, average energy expenditure, and average MET levels.

Methods: Physical activity intensity and sedentary measurements were obtained using the SenseWearTM armband. Sedentary female office workers ($N=32$), 30 to 65 years-old, were randomized into a control ($n=16$) or intervention ($n=16$) group. Following baseline measurements, participants in the intervention group received the workplace behavioral strategy program titled, *Reduce Your Sit and Be More Fit*.

Results: Interaction effects revealed significant differences in change over time between groups (Control vs Experimental). The intervention group had a greater decrease in the percentage of time spent in sedentary behavior (-3.1% vs 1.9%; *Wilks'* $F(1, 30)=5.73, p=.023, \eta^2=.16$), a greater increase in the percentage of time spent in light physical activity (2.3% vs -0.7%; *Wilks'* $F(1, 30)=5.41, p=.027, \eta^2=.15$), a greater increase in average occupational energy expenditure (0.06 vs -0.05 kcal/min; *Wilks'* $F(1, 30)=5.09, p=.032, \eta^2=.15$), and a greater increase in average occupational MET level (0.07 vs -0.05 MET; *Wilks'* $F(1, 30)=4.82, p=.036, \eta^2=.14$).

Conclusion: These results demonstrate the feasibility of the Reduce Your Sit and Be More Fit program to reduce sedentary time and improve physical activity in the workplace. This program includes a unique individual approach designed to change individual health culture without spending money to upgrade offices with standing desks or other exercise equipment. Future research should evaluate the influence of this and other programs on worksite health culture.

Scaling up of a workplace program to get Australian desk-based workers to sit less and move more at work

David Dunstan¹, Genevieve Healy², Ana Goode²

¹Baker Heart and Diabetes Institute, ²School of Public Health, The University of Queensland

Introduction: The Stand Up Australia program of research has shown that interventions targeting sitting less and moving more at work are both feasible and highly acceptable to both workers and organisations. The BeUpstandingTM Champion Toolkit initiative is currently live in a "soft launch" phase, prior to the commencement of a national implementation trial in late 2018 and provides employers with the support and resources to translate this research evidence into practice. Key learnings and challenges from this phase will be presented.

Methods: The free, web-based BeUpstanding toolkit uses a "train the champion" approach to support workplaces to create a dynamic workplace where standing up, sitting less, and moving more is the norm. Workplace champions are provided with an evidence-informed, step-by-step guide with accompanying resources to assist in getting management on board and run and evaluate the intervention within their own work team. The toolkit is promoted and supported by key policy and practice partners, and the priority sectors targeted include: small business, call centre workers, rural/regional workplaces, and blue-collar workers.

Results & Conclusions: To date, over 50 work teams have signed-up to the BeUpstanding toolkit in this phase. The primary focus of this soft launch phase is understanding: (1) who is using the toolkit, including the characteristics of both the work teams and the champions; (2) how it is being implemented, including adaptations of materials; and, (3) the associated barriers and facilitators. This practice-based evidence generated will be used to inform the national implementation trial.

Scaling up a workplace sitting reduction programme in the UK - SMARt Work (Stand More AT Work)

Charlotte Edwardson¹, Thomas Yates¹, Stuart Biddle², Melanie Davies¹, David Dunstan³, Dale Esliger⁴, Laura Gray⁵, Ben Jackson⁴, Sophie O'Connell⁶, Ghazala Waheed¹, Fehmidah Munir⁴

¹Diabetes Research Centre, University of Leicester, ²Institute for Resilient Regions, University of Southern Queensland, ³Baker IDI Heart and Diabetes Institute, ⁴School of Sport, Exercise and Health Sciences, Loughborough University, ⁵Health Sciences, University of Leicester, ⁶Leicester Diabetes Centre, University Hospitals of Leicester

Introduction: SMARt Work is a multi-component programme designed to reduce workplace sitting. SMARt Work was tested in a cluster randomised controlled trial and shown to be effective in reducing sitting and improving many work-related outcomes such as self-reported job performance, work engagement, occupational fatigue and presenteeism. SMARt Work is currently being 'scaled up' for real world implementation and evaluation.

Methods: The main components of SMARt Work were: 1) a group-based face-to-face educational workshop, which included action planning, barrier identification and solving, goal setting, 2) feedback on sitting and physical activity behaviour from the activPAL device at 3 time points, 3) provision of a height-adjustable workstation (electric or platform), 4) educational/motivational leaflets and posters, 5) self-monitoring using a sitting tracker cushion for the office chair which provided real time feedback on sitting time and provided user defined prompts to break up sitting, and 6) one-to-one brief coaching/progress sessions every 3 months. This was mainly a researcher delivered intervention. SMARt Work was shown to be effective and cost-effective so the next step is to translate this programme into a scalable solution for implementation into the real world.

Results & Conclusion: The process of scaling up SMARt Work will be presented e.g., how process evaluation of SMARt Work and working with stakeholders fed into the translation. Adaptations of the programme will be presented along with key learnings and challenges experienced during this 'scaling up' process.

External funding details: The evaluation of SMARt Work was funded by the Department of Health Policy Research Programme (project number PR-R5-0213-25004)

Swimming for health: Using insight to create health promoting pools

Elaine McNish, Swim England

In 2017, Swim England published a report on the Health and Wellbeing benefits of swimming. A key finding was that aquatic activity was conducive for people with health conditions and a recommendation was made that water-based exercise prescription should be a key consideration for health care clinicians and commissioners.

Swim England has developed a Three Frontier model using customer insight that takes a whole systems approach to swimming participation. This model has been applied in developing opportunities for people with disabilities and dementia. The insight from Swim England's monthly survey has revealed that people with health conditions swim less often, are less able swimmers, want to swim to benefit their health but health can limit participation. Identified barriers included a lack of awareness of the benefits to health conditions, water confidence, and a lack of social support, alongside environmental factors including access, information and staff knowledge.

Swim England has used this insight and the Frontiers model to develop a whole-pool approach with support from partners including Arthritis Research UK, Mind and the Aquatic Therapy Association of Chartered Physiotherapists. The project will include:

- Targeted marketing materials and advice on recruitment pathways.
- Peer support from charity volunteers.
- An environmental checklist to assess accessibility.
- Training for pool staff.
- Training for fitness instructors to deliver aquatic exercise referral programmes.
- Tailored exercise classes using tablets.
- Targeted learn to swim opportunities.

A pilot will commence with 15 sites in June 2018 and run for six months to test how to a sustainable England wide model.

West Cheshire Smile for a Mile: A summary of a daily physical activity intervention for primary-aged children

Anne Boyd, Eloise Glithero, Duncan Settrington, Active Cheshire

The Chief Medical Officer recommends children reach 60-minutes of moderate physical activity [PA] daily to maintain good health. While PE and active play provides some contribution to those 60 minutes, according to the NHS, in 2015 only 22% of children aged 5-15 met PA guidelines.

Research suggests that PA (and indeed inactivity) habits are set early in childhood. According to a report in 2013, PA levels decline in children from age 7. Although responsibility does not lie solely with schools, schools are commonly acknowledged as primary institutions with responsibility for promoting activity in children, with school staff playing significant parts in children's secondary socialization.

Smile for a Mile is a successful PA intervention, based upon Daily Mile principles, where every child in a primary school or nursery setting will run or walk for 15 minutes in the school day, every day.

In April 2015 Active Cheshire launched Smile for a Mile in West Cheshire. Together with Cheshire West and Chester Local Authority Public Health Team, and NHS West Cheshire Clinical Commissioning Group, Active Cheshire have led on encouraging uptake of Smile for a Mile. Currently, 39 schools have implemented Smile for a Mile for every pupil, every day: this constitutes 910 new and unique activity sessions taking place in schools every week. These represent over a quarter of the West Cheshire primary schools that the partnership aims to reach within the three-year funding period. So far, the programme has been positively received by schools.

Who is responsible for activity-promoting workplaces? Australian management perspectives from multiple industries

Josephine Y Chau¹, Lina Engelen¹, Tracy Kolbe-Alexander², Sarah Young³, Heidi Olsen⁴, Nicola Burton⁴, Nicholas Gilson⁴, Adrian Bauman¹, Wendy Brown⁴

¹University of Sydney, ²University of Southern Queensland, ³University of Newcastle, ⁴University of Queensland

Introduction: Workplaces have become increasingly sedentary and less active, a trend that is likely to continue. To develop effective solutions for promoting physical activity at work, it is important to understand the attitudes and practices of managers from different industries who look after the health of their workforce.

Method: We conducted structured interviews with upper/middle managers from 12 organisations representing diverse industries, such as education, healthcare, manufacturing, construction, insurance, and mining. Interview questions focused on workplace culture and environment relating to health and wellness, responsibility for employee sedentary/activity patterns at work, and enablers of /barriers to active, less sedentary workplaces.

Results: Managers emphasised the importance of a holistic approach to workplace health policy and practice in order to create activity promoting cultures. Despite this, most managers said their organisations prioritised safety and risk management, mental health, and injury prevention as key health issues. Managers showed consensus that health was a shared responsibility when discussing issues that were not regulated by health and safety standards; they highlighted that their organisations should educate, encourage and provide opportunities for more physical activity, and mentioned the importance of leadership and role modelling. However, employees were viewed as ultimately being responsible for their own physical activity; there was concern about "overstepping" boundaries between employees' work and personal lives.

Conclusion: Leveraging the synergistic benefits of promoting physical activity with key health issues of interest may simplify managers' occupational health portfolio and facilitate the creation of activity-promoting workplaces.

External funding details: National Heart Foundation of Australia Focus Grant.

Tuesday 16 October

A mixed methods evaluation of an intervention to reduce and break up sitting time in primary school classrooms in the UK: The CLASS PAL (Physically Active Learning) Programme

Lauren Sherar¹, Stuart Biddle², Lorraine Cale¹, Stacy Clemes³, Charlotte Edwardson⁴, Chris Glazebrook⁵, Deidre Harrington⁴, Kamlesh Khunti⁴, Natalie Pearson¹, Jo Salmon⁶, Ash Routen¹

¹School of Sport, Exercise and Health Sciences, Loughborough University, ²Institute for Resilient Regions, University of Southern Queensland, ³School of Sport, Exercise and Health Sciences Loughborough University,

⁴*Diabetes Research Centre, University of Leicester,* ⁵*School of Community Health Sciences, Division of Psychiatry, University of Nottingham,* ⁶*Institute for Physical Activity and Nutrition, Deakin University*

Introduction: Informed by the Transform-US! intervention, CLASS PAL was developed to provide teachers with a flexible tool to support delivery of classroom physical activity. The evaluation was designed to help address the second translational gap, by understanding processes of implementation and factors that drive it. Results and learning from a 9-month implementation evaluation will be presented.

Methods and analysis: CLASS PAL provided teachers with a one-day professional development workshop and website based teaching resources (www.classpal.org.uk) to equip teachers to use a variety of strategies to fit the needs of their class at a given time. A single group, before-and-after design with multiple interim measurements was used with six UK primary schools (10 teachers; 7 classes; 247 pupils; 49% girls, 9-10 years). Data on schools (e.g. classroom layout, size), teachers (e.g. competence in delivery) and pupils (e.g. accelerometry, cognitive functioning, classroom engagement) were collected at baseline (October 2016) and at the end of the school year (July 2017). Data on implementation were collected throughout the school year through teacher interviews, pupil focus groups, classroom observations, website analytics and teacher logs.

Results: Results on processes used to implement active learning (participant responsiveness and adaptation); and individual and school characteristics associated with degree of implementation (fidelity, dose and quality) will be presented.

Conclusions: Results will inform the implementation of future classroom physical activity interventions, and add to the growing literature addressing the second translational gap in school physical activity research.

External funding details: NIHR Collaboration for Leadership in Applied Health Research and Care East Midlands.

Associations between education outside the classroom and academic performance moderated by physical activity, social relations, and school well-being

Mikkel Bo Schneller¹, Mads Bølling², Peter Bocz Bentsen¹, Erik Mygind², Camilla Roed Otte², Glen Nielsen², Jasper Jan Schipperijn³, Peter Elsborg¹

¹*Steno Diabetes Center Copenhagen,* ²*University of Copenhagen,* ³*University of Southern Denmark*

Introduction: Many school intervention studies focus on one relevant school outcome, e.g. physical activity, mental health or motivation, without relating associations to the school's core objective, academic learning/performance. In this study, we want to investigate how education outside the classroom (EOtC) impacts academic performance through interrelations with social relations and cooperation, physical activity, and school well-being.

Methods: We used data from the Danish TEACHOUT study, in which we investigated associations between EOtC and physical activity, academic learning, social relations, and school well-being on the same group of children and teachers. In TEACHOUT, we published a study protocol with a figure presenting assumed interrelations between main outcomes. We want to test a model with these proposed associations and another model using hierarchical structural equation modelling (SEM) and assess competing models using model fit indices, such as goodness-of-fit chi-square. We attempt to make simple models with one meaningful measure used as an indicator of an outcome, or using a maximum of two measures to create an outcome-specific construct.

Results: We are currently performing statistical analyses. Expected results include data from approx. 350 children in 30 classes across Denmark. We

will present SEM-derived relationships between outcomes within models, compare model fit between models, and emphasize significant and meaningful paths.

Conclusion: The analyses of interrelations between EOtC and academic performance across a number of highly important school-based outcomes makes this study of relevant for health and educational researchers, practitioners, and policy makers alike.

External funding details: TrygFonden (Danish non-profit foundation).

Effect of a community-based physical activity program using the Internet of Things

Hyunok Yun¹, Eun Young Lee²

¹*Graduate School of Public Health, Hanyang University,* ²*Institute for Health & Society, Hanyang University, Seoul, Korea*

This study aims to evaluate the effects of a community-based physical activity (PA) program using the Internet of Things (IoT) technology.

Using the IoT, a community-based PA program provided information related to PA and health, organized a walking competition event and online communities for walking together, and provided food or beverage coupons available within the community as a reward when the participants reached PA goals.

In a pilot evaluation, 114 adults (54.4% female, 34.2% 50-60 years old) voluntarily involved in this program and pre- and post-test. As a Control group, 60 adults (46.7% female, 45.0% 50-60 years old) who did not participate in this program in the same communities provided PA and health information and participated in pre- and post-test. At follow-up after 6 months, the participants of the community-based PA program were more active than the prior self-report ($p=0.027$), while there was no significant difference in the control group ($p=0.689$). Additionally, there were no statistically significant difference in metabolic indicators including blood pressure, blood sugar, High-Density Lipoprotein, Triglycerides, and abdominal obesity.

The pilot results suggest that a community-based PA program using IoT can be a catalyst for promoting PA as populations based approach. There is also a need for further study to related for long-term evaluation.

External funding details: This work was supported by a grant from the National Research Foundation of Korea (NRF), funded by the Korean Government (Ministry of Science, ICT & Future Planning) (No. 2015R1C1A2A01054052).

Competing interests: The authors declare they have no conflicts of interests for this research

Encouraging blue-collar industries to adopt active workplaces: Management perspectives from a national survey

Tracy Kolbe-Alexander¹, Josephine Y Chau², Lina Engelen², Heidi Olsen³, Sarah Burks-Young², Nicola Burton³, Nicolas Gilson³, Adrian E Bauman², Wendy J Brown³

¹*University of Southern Queensland,* ²*Prevention Research Collaboration, School of Public Health, Sydney Medical School, Charles Perkins Centre, University of Sydney, Sydney, Australia,* ³*School of Human Movement and Nutrition Sciences, The University of Queensland*

Introduction: This study assessed managers' perceptions of the importance of activity-promoting workplace health promotion programs (WHPPs) and whether these have been implemented in Australian workplaces employing blue collar workers.

Methods: Managers of small-medium and large enterprises were invited to complete a national on-line survey. Respondents reported on the importance of various WHPPs and the types of WHPPs being implemented.

Results: 553 managers completed the survey; 329 were from industries that employed blue collar workers (construction, agriculture, manufacturing, mining, utilities, trade and transport). Managers ranked WHPPs that addressed safety, injury prevention, illicit drug use and mental health as extremely important. The manufacturing and construction industries placed significantly greater importance on programs that focused on safety ($c^2 = 81.54$; $P < 0.01$), manual handling ($c^2 = 52.75$; $P = 0.01$) and responsible alcohol use ($c^2 = 47.35$; $P = 0.04$), than the other sectors. Programs promoting physical activity (PA) and weight management were perceived to be least important. There were no significant differences in the types of WHPPs currently being implemented across the sectors. Nearly a third (32%) reported that their workplace implemented educational interventions, encouraging employees to sit less and move more; 27% had physical activity-based interventions; and 23% were creating supportive environments to support these behaviours. Managers were not interested in subsidising gym membership or active transport interventions.

Conclusion: Future WHPPs that aim to increase PA and reduce sitting should target outcomes related to safety and injury prevention. This might increase managers' willingness to implement these WHPPs and employee participation.

External funding details: Australian Heart Foundation Focus Grant

From randomised controlled trials to compatible, adaptable and scalable school development research - an innovative research design for school based physical activity

Lise Sohl Jeppesen¹, Søren Smedegaard¹, Louise Stjerne Knudsen¹, Lisbeth Runge Larsen², Thomas Skovgaard¹, Lars Breum Christiansen¹

¹University of Southern Denmark, ²University College Lillebælt

Introduction: Introduced in 2014, Danish public schools are obliged to ensure that all pupils are physically active at least 45 minutes on average per day. Research shows that many schools have incorporated more physical activities, but it is challenging to include all children and ensuring sufficient quality of activities. The purpose of this presentation is to outline the preparation of an intervention with the aim of supporting schools and teachers implementing a physical active school day for everyone.

Methods: Randomised controlled trials are recognised as the most valid design to obtain knowledge on ways to promote new approaches in different settings. However, this design can be criticised for not taking enough consideration of the complexity of the setting. Furthermore, many scientific school interventions are too detached from practice, which makes the value for society small. The design of the current research intervention is based on theoretical concepts of implementation, innovation and psychosocial well-being and will adopt a compatible, adaptable and scalable approach to school based physical activity promotion.

Results: Research results will be targeted practical actions and applicable to in-class activity, activity breaks and PE. It will include outcomes on students' physical activity, motivation, well-being and learning ability as well as outcomes relevant to school management and development of teaching practices.

Conclusion: It is crucial to consider the complex reality of school settings when conducting real-life interventions, and innovative study designs must be developed to maximize the return to society.

If you provide it, they still do not go: The reality of attendance frequency within a Scottish exercise referral scheme

Colin Shore¹, Stuart Galloway¹, Gill Hubbard², Trish Gorely²

¹University of Stirling, ²University of the Highlands and Islands

Introduction: Exercise Referral Schemes (ERS) are a common method of tackling physical activity (PA) levels and lifestyle associated non-communicable disease at the individual level. However, attendance frequency is a problematic with many participants dropping out early from the prescribed programme. Demographic characteristics, referral reason, leisure site and delay time in commencing exercise referral were investigated in relation to attendance frequency.

Methods: Retrospective cross-sectional analysis was undertaken of a Scottish exercise referral scheme. ERS data from 2016 to 2017 were retrieved for analysis. Chi-squared analysis investigated differences between referral characteristics, and logistic regression investigated increased attendance from predictors.

Results: 405 participants registered onto an ERS, undertaking a minimum of one session. Females (58%) presented a larger proportion, with cardiovascular disease being the most referred condition (32%). Median and mode attendance was four and one sessions respectively. 37% of participants presented at the leisure facility for their first session within seven days of membership commencement. No significant differences overserved within: SIMD ($\chi^2(4) = 2.442$, $p = .655$), grouped age ($\chi^2(6) = 5.273$, $p = .509$), grouped site ($\chi^2(3) = 1.587$, $p = .662$), grouped referral reason ($\chi^2(5) = 9.270$, $p = .099$) or gender ($\chi^2(1) = 0.150$, $p = .699$). Logistic model showed increased attendance was only predicted by age related referral ($p = .007$, 95% CI = 0.21-0.78).

Conclusion: In spite of age related referral predicting increased session frequency, session frequency remains low. Simply providing a service such as ERS does not address the complex factors associated with attendance.

Increasing the capacity of workplaces to address chronic disease risk factors

Trevor Shilton, Heart Foundation WA

Introduction: Healthier Workplace WA (HWWA) provides free support, tools, resources and training to Western Australian workplaces with the aim to increase their capacity to address chronic disease risk factors (smoking, nutrition, alcohol, and physical activity) using a best practice health promotion approach. The paper will discuss program components and recent evaluation results from the program's Engaged Workplaces Survey (EWS).

Method: Workplace representatives were invited to complete the online EWS survey six months following their initial engagement in the program. The survey sought to assess attitudes towards workplace health and wellbeing, HWWA services accessed and what (if any) changes were made in the workplace as a result of engaging in the program.

Results: In total, 176 people responded to the EWS between June 2016 and July 2017. Results show a positive relationship between the number of HWWA services accessed and the number of changes implemented in the workplace. 64% of respondents reported that they had created a policy, 70% had made changes to their physical work environment and 57% had hosted education sessions to address smoking, nutrition, alcohol and physical activity in the workplace.

Conclusion: HWWA's multi-faceted approach has enabled workplaces from different industries and of varying sizes and locations to implement changes to promote healthy lifestyle behaviours. Evaluation results

highlight HWWA's success in increasing workplace capacity to implement best practice strategies including policy development, environmental change and education to address chronic disease risk factors in WA workplaces.

External funding details: Healthier Workplace WA is funded by the Department of Health (Western Australia).

Lessons learned from a community-based EPODE-approach tackling childhood overweight in the Netherlands

Jorien Slot-Heijs¹, Dorine Collard¹, Lideke Middelbeek², Bente Steenvoort²

¹Mulier Instituut, ²Jongeren Op Gezond Gewicht

The EPODE-approach is a centrally coordinated, community-based approach involving a broad range of stakeholders and settings in order to reduce childhood overweight and obesity. In 2010 the Netherlands started to implement a Dutch EPODE-approach (called JOGG-approach), with currently 133 communities engaging. The JOGG-approach is coordinated at a national level by a central organisation and comprises five critical components: political commitment, public and private partnerships, social marketing, monitoring and evaluation, linking prevention and healthcare. The Netherlands is internationally considered as a precursor in implementing an EPODE-based approach. Therefore, the aim of this study was to investigate the progress of implementation of the JOGG-approach.

In this study 82 local program managers (response rate 67%) completed an online survey with mainly closed-ended questions about progress on the five components. Results show that communities make effort and progress on all components. Main facilitators were high political commitment, collaboration with public and private partners from several settings (like schools and supermarkets) and monitoring data about overweight. Barriers were the lack of structural budget, political intersectoral collaboration and getting insight in the target group.

In general, communities succeed in implementing the JOGG-approach in multiple settings where children reside in order to enhance a structural healthy environment. Communities need support in overcoming barriers by exchanging successful experiences and centrally coordinated training. The results of this study contribute to foster implementation of the community-based EPODE-approach in the Netherlands as well as worldwide. Further research should determine the concrete effects on reduction of overweight among children.

Stand Up for Health: Using 6 SQuID to develop a sedentary behaviour intervention in call centres

Laura Tirman¹, Hannah Biggs², Ruth Jepson²

¹University of Edinburgh, ²Scottish Collaboration for Public Health Research and Policy

Introduction: Sedentary behaviour (SB) can lead to musculoskeletal discomfort, chronic disease, and poor mental wellbeing. Call centres foster SB due to the nature of the work. To address the determinants of SB in call centres, a SB intervention called Stand Up for Health was developed using the 6 Steps in Quality Intervention Development (6 SQuID) framework.

Methods: Steps 1 (define problem) and 2 (identify modifiable factors) involved focus groups with call centre staff to identify the causal factors of SB in their centre. The qualitative data was used in steps 3&4 (develop theory of change and action) to develop intervention activities to interrupt the factors at four levels of the workplace (individual, social, environmental, organisational). Step 5 (test and refine) involved piloting activities in the call centre. Step 6 (evaluate) used qualitative methods to evaluate the intervention.

Results: Thirty-four staff participated in the intervention development process. During steps 1&2, participants identified several factors leading to SB, for example nature of the work and pressure to be profitable. Participants identified activities (theories of change) to reduce SB in the workplace (steps 3&4). Participants believed activities such as goal setting (individual), competitions (social), stand-up desks (environmental), and development of a wellness committee (organisational) were suitable to their context. Activities were piloted for 6 months. The evaluation found staff to be receptive to activities.

Conclusion: Due to its consideration of the wider setting, the 6 SQuID framework helped develop a SB intervention that was acceptable to call centre staff.

The National Exercise Referral Scheme in Wales: Exploring scheme implementation over the past 10 years

Kelly Morgan, Graham Moore, Cardiff University

Introduction: Primary care is recognised as a key setting for the promotion of physical activity and one of the most popular approaches is through exercise referral schemes. In 2012, a standardized National Exercise Referral scheme (NERS) was rolled out across all 22 local authorities in Wales. While an earlier evaluation of NERS revealed promising impacts upon self-reported physical activity and mental health outcomes, the ongoing fidelity of implementation is unknown. This study explored experiences of programme implementation both within- and across local authorities since the national roll out.

Methods: Semi-structured interviews were carried out with the NERS national coordinator (n = 1) and each local authority coordinator (n = 21). Interviews explored coordinators' opinions of how scheme implementation has changed over time, views on how protocols work, and any issues, which make the scheme particularly easy or difficult to implement in their area.

Results: Findings demonstrate the variability of implementation across local authorities, with instances of both programme innovation and programme drift. The results will be presented in relation to i) the quality of NERS implementation, ii) barriers and facilitators of implementation, iii) the role of the exercise coordinator in scheme adaptation and iv) local context and patient opportunities for physical activity upon scheme completion.

Conclusion: These results will provide evidence about post-trial implementation of NERS in different local authorities and help programme developers to understand what kinds of changes can be made to NERS to meet the needs of local stakeholders.

External funding details: Health and Care Research Wales.

Theme: Social Environment

Tuesday 16 October

ACTION for men: Community capacity building for health enhancing physical activity promotion among men aged 50 plus

Helmut Strobl¹, Julika Loss², Alexandra Sauter², Boris Metz², Janina Curbach², Susanne Tittlbach¹

¹University of Bayreuth, ²University of Regensburg

Introduction: The participation of men aged 50 and older in interventions to promote health-enhancing physical activity (HEPA) is low. Research shows that gender-sensitized interventions that consider the living and working context (setting-approach) are effective in increasing engagement

of men in HEPA. To build up corresponding capacities of local policy makers and professionals, interactive knowledge-to-action (IK2A) approaches are promising. ACTION for men aims to develop capacities for HEPA promotion addressing men 50 plus in two rural communities in Bavaria.

Methods: To enable IK2A processes, co-operative planning groups involving different community stakeholders were established and facilitated in both communities. All meetings were documented using standardized field notes. Conducting a qualitative content analysis of standardized field notes (so far n = 15) provided insights into the development of key domains of community capacity building.

Results: Resource mobilization worked well in both communities. However, only one community was successful in developing and implementing an innovative HEPA approach for men 50 plus. This seems to be due to both a better development of local leadership and an improved relationship with external agents.

Conclusion: Cooperative planning groups are potentially effective in building up capacities in rural communities with regard to the development and implementation of HEPA promotion interventions addressing men 50 plus. However, crucial key domains need to be considered.

External funding details: ACTION for men is part of the Capital4Health consortium funded by the German Federal Ministry of Education and Research.

Adolescent girl's perceptions of physical activity: A systematic review of qualitative studies

Meabh Corr¹, Jennifer McSharry², Elaine Murtagh³

¹Mary Immaculate College, Limerick, ²NUIG, ³Mary Immaculate College

Objective: To synthesise evidence from qualitative studies relating to adolescent girl's perceptions of physical activity participation.

Methods: Four electronic databases (PubMed, Sports Discus, Academic Search Complete and Education Resources Information Centre-ERIC) were searched for journal articles published in English between 2001-2016. Studies reporting qualitative data that explored the views/opinions/perceptions of adolescent girls (>12 and <18 years old) were included. Data was synthesised using a thematic network and managed using NVivo (QSR International's NVivo 10 software). The validity of the included studies was assessed using the "Critical Appraisal Skills Programme" checklist. The ENTREQ statement was followed when reporting this qualitative synthesis.

Results: 24 studies (1,266 participants) were identified for inclusion. Global themes were identified using a thematic network. These themes were "Sport is for boys"; "Don't bother trying, you'll never get picked"; "When you succeed you want to keep going"; "There's absolutely no room for anything else" and "You won't be active if you want to fit in".

Conclusions: The results of this review provide vital insights into adolescent girl's views on physical activity. A lack of support, feelings of incompetence, competing priorities during adolescence and a dislike of competitive sports deter a lot of girls from participating in physical activity. Future physical activity programmes should focus on providing autonomy to participants and aim to involve them in programme design to ensure the activities are tailored to their interests.

Ageing in place: Combined GPS, GIS and accelerometer data to explore physical activity and behavior settings

Ruth Hunter¹, Claudia Alberico², Akira Hino³, Ruth Hunter¹, Claire Cleland¹, Geraint Ellis¹, Rodrigo Reis⁴

¹Queen's University Belfast, ²North Carolina State University, ³Pontiff Catholic University of Parana, ⁴Washington University in St Louis

Introduction: Older adults represent the least active population group yet being the one to benefit greatly from increased activity levels. Preference for shorter walking distances or choice of the most aesthetic route are often associated with this population, seen as having the most time to spend outside. However, it is unknown what behavior settings older adults are spending their time in, as well as their levels of physical activity (PA) and sedentary behavior (SB) in those places. This study aims to assess relationships between PA and SB in older adults with settings where such behavior occurs.

Methods: Older adults (≥60 years) were recruited in the UK and Brazil (n = 300 per country). Recruitment was stratified by walkability and socioeconomic status (SES), allowing the creation of four quadrants: 1) low-SES/low-walkability; 2) low-SES/high-walkability; 3) high-SES/high-walkability; 4) high-SES/low-walkability. Accelerometers (GT3X) and GPS (QStarz BT-Q1000XT) were worn for seven days, followed by a survey.

Results: This study will allow for an investigation using accelerometry and GPS data of older adults PA and SB in distinct behavioral settings in order to identify potential for interventions. Expected settings include home, work, transportation and public open spaces. Results will respond to what the state of PA and SB are in older populations, as well as where such behavior occurs. Moreover, we expect to understand what are older adults' use of space to better tailor programs to promote PA, social interaction, and integral use of spaces.

Associations of social cohesion in neighborhood and school with compliance to physical activity recommendations among Japanese adolescents

Minoru Takakura¹, Masaya Miyagi¹, Masaru Ueji², Minoru Kobayashi¹, Atsushi Kurihara³, Akira Kyan¹

¹University of the Ryukyus, ²Ibaraki University, ³Saga University

Introduction: Many adolescents do not comply with the recommended 60 minutes per day of moderate-to-vigorous physical activity (MVPA). The social environments in various contexts such as neighborhoods or schools are recognized as determinants of youth health. Social cohesion is one concept of the social environments that may play a role in promoting physical activity. However, the association between neighborhood and school social cohesion with adolescent MVPA levels has not been established. This study examined the relative associations of social cohesion in neighborhood and school contexts with compliance with physical activity recommendations among Japanese adolescents.

Method: A cross-sectional survey was conducted in two prefectures in Japan in 2016. Participants were 3,344 students, grades 10 to 12 (aged 15-18 years), cross-nested in 51 public high schools and 108 neighborhoods. Physical activity was assessed by the Patient-centered Assessment and Counseling for Exercise plus Nutrition (PACE+) questionnaire. Social cohesion was measured by scales of mutual trust and reciprocity. Contextual-level social cohesion was measured by aggregated neighborhood- and school-level individual responses.

Results: In cross-classified multilevel models adjusted for covariates, school social cohesion at the individual and contextual levels were positively associated with physical activity. Only neighborhood social cohesion at the individual level was associated with physical activity.

Conclusion: Social cohesion in schools, and not neighborhoods, may be a more important factor in promoting adolescent MVPA.

External funding details: This study was supported by JSPS KAKENHI Grant Number 15H03087.

Building capabilities for physical activity in childcare centers: Experiences from the QueB project

Christina Müller¹, Verena Popp², Ulrike Ungerer-Röhrich², Holger Hassel¹

¹Coburg University of Applied Sciences and Arts, ²University of Bayreuth

Introduction: The QueB subproject of Capital4Health operates in a childcare setting (n = 12 centers) and aims at increasing children's (n = 1035) and staff's (n = 163) capabilities for physical activity through a participatory organizational development process that builds on an innovative approach to quality certification.

Methods: The organizational development process was guided by in-house coaching, three inter-institutional workshops and self-evaluation tools (Kita-Check-App, Goal Attainment Scaling). Changes in physical activity levels were assessed via pedometers in a pre-post-design. In addition, questionnaires and interviews were used to evaluate the effectiveness, acceptability and feasibility of the intervention.

Results: Children's step count increased significantly from baseline to the first follow-up after the start of the intervention. There was no significant change in step count of educational staff. In all childcare centers, staff reported improvements at the organizational level, mainly in activity offers, indoor and outdoor space and childcare center culture.

Conclusions: The capability approach can be used to explain the effects of the intervention. Changes at the organizational level can be interpreted as capability inputs that provide capability sets for individuals. Based on the documented capability inputs and the achieved functionings (higher step counts), it can be concluded that the intervention was successful in increasing capabilities for physical activity in children. A second project phase based on the results of the first one is planned, which will aim to reach additional childcare centers and enhance the participation of children and parents.

External funding details: QueB is part of the Capital4Health Consortium, funded by the German Federal Ministry of Education and Research.

Can new technologies disentangle the relationship between people, place and physical activity?

Melvyn Hillsdon, Sport and Health Sciences, Exeter University

Physical activity (PA) is typically undertaken in frequent short bouts of varying intensities and patterns across the day and week. The reasons for undertaking PA include domestic chores, work, transport, sport, recreation/play or simply moving from one location to another for routine tasks. It can be done alone or with others. The environments in which PA takes place vary (e.g., home, workplace, shopping centre, leisure centre, green space etc) as does the distance from the home neighbourhood where PA is performed. Over 50% of recorded activity takes place away from the home neighbourhood and is related to socioeconomic position, urban/rural location and access to cars.

The complex relationship people, place and purpose on specific patterns and volumes of PA is poorly understood, largely as a result of relying on self-reports of PA and its determinants that are recalled and summarised over days and weeks. The aggregated PA data plus the tendency for misclassification of self-reports have hindered developments in understanding how people accumulate their activity. Consequently, public health recommendations are limited to a one-size-fits-all model that few people actually achieve.

A better understanding of how people acquire their PA, with whom and in what settings and locations may open up the possibility of more tailored recommendations that may in turn be more easily incorporated into modern lifestyles.

This presentation will examine the opportunities and challenges presented by new technologies that permit more precise monitoring of lifestyles as well as the built and social environments in which they are taking place.

Evaluation of wearable technology in integrated rehabilitation therapy: Somerset CCG/Frome Integrated Rehabilitation Team

Angela Lloyd, Frome Community Hospital, NHS

Rehabilitation is crucial to improving independence and quality of life, and to reduce admission / re-admission rates. Improving muscle and bone strength reduces risk of falls. Somerset Partnership NHS Foundation Trust provide an integrated rehabilitation service for adults. Patients attend the Balance and Safety Group for 1.5 hours a week, 1 hour of which is exercise-based, for 8 weeks. NICE guidelines recommend 50 hours of balance and strength training exercises a month to build bone and muscle strength. Patients are expected to continue their exercises at home.

This project has introduced the use of the Activinsights Band as an objective measure of activity to compare against traditional diaries. The wrist-worn device collects lifestyle data, is waterproof and has 12-month battery life. No patient identifying information is held on the device and data is transferred to a secure network.

The initial pilot showed both improved patient Tinetti score and reported falls. The Activinsights Band recorded number of minutes activity per day. Reports provided an accurate measure of the patients' activity, including time exercising, sleep patterns and week-on-week comparisons and stimulated active discussion. The reports also showed decline in activity due to poor health. Diaries were less accurate as the patients declined to complete them if they were wearing the band device.

The wrist devices have been enthusiastically received and provide a more accurate picture of a patient's overall activity. Pre- and post-group questionnaire did not provide useful information and requires review. Objective monitoring provides accurate lifestyle data and reduces patient admin burden.

Individual social capital benefits older adults' health and well-being: Does physical exercise mediate?

Filip Boen, Johan Pelssers, Katrien Fransen, KU Leuven

It is assumed that social capital enhances the physical health and well-being of older adults both directly as well as indirectly by promoting physical activity. The present study aims to assess the mediating role of physical activity in the relation between individual social capital (i.e., their personal connectedness to society and the community, including social identification) on the one hand, and experienced physical health and well-being on the other hand. A survey study with a cross-sectional (baseline survey – Time 1) and longitudinal (3-year follow-up survey – Time 2) design was conducted. A sample (n = 1,298) of adults (age ≥ 55 years) was invited for participation. Mediation analyses revealed that specific indicators of social capital were positively related to self-rated physical health and well-being at Time 1 and, less pronounced, at Time 2. However, for only one indicator – i.e., experienced safety in society – there was sufficient evidence for a mediating role of physical activity at Time 1 and Time 2. These findings suggest that a mediating role of physical activity in the relation between individual social capital and physical health and well-being exists but in a limited way.

Parkrun, activity and health: The public health potential of parkrun

Clare Stevenson¹, Mary Hickson²

¹Loughborough University, ²Plymouth University

The public health potential of parkrun (free, weekly, 5 km runs in public parks) was explored through three related studies. The first was a cross-sectional analysis of 7308 adult participants that examined participant characteristics and perceived outcomes of parkrun involvement. Results suggested that females, middle-aged and older adults, overweight individuals, and those with disabilities, were well represented in comparison with national physical activity statistics. Perceived benefits included fitness, confidence, health, weight balance, wellbeing, and sense of community, and were all associated with regularity of attendance. A nested qualitative study involving interviews with 48 participants explored the factors contributing towards initial and sustained engagement. Specific features of the parkrun experience that encouraged participation were the accessible, inclusive ethos, achievement opportunities, and inherent social support, along with the outdoor natural settings, and integrated volunteer system. Finally, a prospective study assessed change in self-reported physical activity, weight, and wellbeing outcomes in 354 new registrants over 12 months. Overall physical activity levels were high at baseline, but significantly increased over the first 6 months, before declining. Among those who were inactive at registration, there were marked and sustained increases in physical activity. Small significant reductions in body mass index were observed over 12 months, particularly among overweight and obese participants. Modest increases in happiness, and decreases in perceived stress were recorded, and run times suggested a 12% improvement in fitness. Collectively these findings strengthen the case for parkrun having meaningful public health benefit.

The impact of the built environment on physical activity and sedentary behaviour in older adults: a comparative review between high and low-middle income countries

Ruth Hunter¹, Claire Cleland¹, Rogério César Fermino², Hermes Koller de Paiva³, Bruno Czechtuch³, Adriano Akira Ferreira Hino³, Rodrigo Siqueira Reis⁴, Geraint Ellis¹

¹Queen's University Belfast, ²Federal University of Technology – Parana, ³Pontifical Catholic University of Parana, ⁴Washington University in St Louis

Introduction: Global populations are rapidly ageing with the world's 'oldest old' increasing threefold over the next thirty years. This demographic shift has the potential to detrimentally challenge healthcare services in both high and low-middle income countries (LMIC). Consequently, 'Healthy Urban Ageing' is a priority to ensure older adults stay healthy, perform physical activity (PA) and remain at home 'Ageing in Place' to reduce the societal burden. Therefore, the built environment (BE) and its attributes require further investigation to determine the role they have on older adults PA, sedentary behaviour (SB) and ultimately their ability to 'Age in Place'. Despite the growth of this field a comprehensive review of high and LMIC has not been performed to determine the impact of BE attributes on PA and SB of older adults (>60 years).

Methods: Eight databases were searched using MeSH relating BE, PA and SB in older adults (English, Spanish and Portuguese) (1990-2016).

Results: Sixty papers were included in the review showing that the attributes that should be focused on to improve PA and reduce SB improving the ability to 'Age in Place' in high income countries are walkability, land use mix, street pattern and street lighting; whilst in LMIC walkability, access to recreation, land use mix, population density, amenities facilities and street pattern should be key priorities.

Conclusions: Results highlight the need for research, policy and practice to focus on country-level recommendations to ensure they are transferable and applicable as results were found to differ between high and LMIC.

External funding details: ESRC-Newton Fund

Theme: Technology

Monday 15 October

A technology-based inspiratory muscle training intervention to promote physical activity and lung function in those with Cystic Fibrosis

Melitta McNarry, Jessica McCreery, Kelly Mackintosh, Swansea University

Cystic Fibrosis (CF) is the most common inherited life-shortening disease amongst Caucasians: physical activity (PA) and fitness are key determinants of lung function and, thus, prognosis. No cure is available so interventions seeking to promote PA and fitness, and slow the decline in lung function remain a clinical priority. One potential strategy is Inspiratory Muscle Training (IMT) but evidence is currently inconclusive due, in part, to concerns regarding intervention fidelity.

Children and adults with CF and age- and sex-matched controls completed an 8-week, three times per week IMT programme. Up to six sets of six inspirations at 80% sustained maximal inspiratory pressure were completed per session, with each block associated with a decreased rest period between inspirations. Visual targets were provided via the software to sustain inspiratory effort. Each IMT session was automatically uploaded to a cloud, allowing intervention fidelity to be assessed.

Preliminary results suggest that the IMT intervention was associated with an increase in lung function and total PA, although on the days of IMT completion daily PA decreased. Intervention compliance was mediated by disease severity but its effects were similar, suggesting a lower intervention dose may still be influential in later disease stages.

This study highlights the utility of technology-based IMT intervention as a non-pharmacological tool for improving lung function and PA in CF. Given the importance of these factors for disease prognosis in those with CF, such interventions may represent a significant advance in treatment strategies.

Case study of the OpenActive Programme: Using data to help people get active with theory of change and benefits realisation framework

Chris Pett¹, Philip Horgan¹, Allison Savich²

¹Open Data Institute, ²Sport England

The OpenActive programme, managed by the Open Data Institute, helps people get active, by making data about physical activity opportunities more openly available.

The current Phase 2 of the programme runs from August 2017 to October 2018. In this presentation, we propose to outline our understanding of how change happens to make physical activity data open and build data services which help people get active, and share our lessons learnt through the course of the programme.

The OpenActive programme aims to create the following benefits:

- Society benefits from a more active, healthier population
- The sector recognises the value of open data
- Openly publishing opportunity data becomes the norm for the sector
- A range of people create many innovative tools for a wide range of consumers

The ODI has undertaken a number of initiatives to realise these benefits, including:

- Increasing the number of activity providers working to openly publish their opportunity data
- Expanding the technical work around standards and tools to include discoverability and usability of data, and booking
- Connecting startups, investors and supporters through a startup accelerator programme
- Developing a peer-network of champions to communicate the value of open opportunity data
- Developing evidence of the benefits of open activity data and new services

Our research aims to quantify and qualify the benefits accrued for different stakeholders; to test the programme's theory of change, particularly the underlying assumptions; and to generate insights into work needed to support the long term sustainability of the initiative.

External funding details: Sport England National Lottery Funding

Characterizing the activity-friendly built environment using space syntax: Associations of space syntax measures, street-design attributes and land-use characteristics on pedestrian flows

Ayşe Ozbil¹, Tugce Gurleyen², Ezgi Zumbuloglu², Demet Yesiltepe¹

¹Northumbria University, ²Istanbul Technical University

Introduction: Research has sufficiently documented the street-level correlates of walking. However, evidence is limited in investigating the comparative associations of street network configuration, street design and land use with pedestrian movement. This study explores the relative association of street design ±local qualities of street environment-, street network configuration ±spatial structure of the urban grid-, and land use patterns with the distribution of pedestrian flows.

Method: Pedestrian counts were collected on street segments in Istanbul. Same segments were characterized through detailed field-surveys in terms of sidewalk design, pedestrian crossings/traffic lights and ground floor uses. Street network configuration within the areas were evaluated using a standard space syntax measure, angular segment Integration, and a more recent segment-based syntactic measure, Directional Reach. Linear models were developed to investigate the relationships among street design, street configuration, land use and walking behaviour.

Results: The models indicate that the overall spatial configuration of street network proves to be a stronger correlate of walking than local street-level attributes. Both Directional Reach and Integration are positively and significantly associated with pedestrian movement (95%CI and 99%CI respectively) while only average sidewalk width appears to be a significant correlate of walking (95%CI) among the street-design measures.

Conclusions: This study contributes to the literature by offering insights into the comparative roles of urban design qualities of the street environment and street network layout on pedestrian movement. It also provides practical implications. The findings offer evidence-based strategies to inform specific urban design and urban master planning decisions in creating lively, walkable environments.

INDARES mapping application: An effective and feasible online tool for identification of travel routes

Lukáš Rubín¹, Jan Dygryn², Michal Vorlíček², Frantisek Chmelík², Jaroslav Burian², Josef Mitas², Jasper Schipperijn³

¹Palacký University Olomouc, ²Palacký University Olomouc, ³University of Southern Denmark

Active commuting to school or work can have a significant effect on the overall level of physical activity and consequently on human health. To promote active commuting, previous research studies have attempted to identify the common environmental characteristics of travel routes mostly using GPS receivers. Although it is becoming easier to obtain travel information from GPS devices, there are still practical issues associated with GPS data collection (signal discrepancies, memory limitations, battery life, etc.). Therefore, the aim of this contribution is to introduce and verify the feasibility of the INDARES mapping application.

The research sample consisted of 112 adolescents aged 12±18 years. Each participant used the interactive mapping module in the INDARES system (user-friendly free web-based system with several modules) that enables easily draw lines of travel routes. The feasibility of this application has been verified by a spatial agreement between self-reported drawn routes to school and objectively assessed routes using the GPS unit Holux RCV-3000.

In total, 58 participants fulfilled inclusion criteria. Travel routes were on average 7,798 meters long and 67% of them can be described as multimodal trips (a combination of at least two different means of transport). On average, 81% of the INDARES drawn routes length fell within a 50-meter buffer from the GPS measured routes. Compared with GPS data collection, the INDARES mapping method is more cost-effective, time-efficient, error-resistant and offers immediate data export.

According to our study, the INDARES mapping application is an effective and feasible tool for the travel behavior data collection.

Novel metrics for characterising detailed patterns of physical activity

Melvyn Hillsdon, Brad Metcalf, Joshua Twaites, Rhod Taylor, University of Exeter

Introduction: Little is known about how this activity should be taken despite evidence that different patterns of PA are required to reduce the risk of different diseases. The increasing use of accelerometers, that continuously record activity every second of every day for weeks at a time, mean that detailed characterisation of patterns of PA is now possible. Despite this most users of accelerometers still only derive measures of weekly volumes of PA in broad intensity categories.

Methods: Methods will be presented that segment accelerometer data into clinically meaningful PA classifications according to type, frequency, duration, intensity and volume of every bout of recorded activity. In addition, metrics for characterising within and between day patterns of PA will be presented.

Results: Associations between 'traditional' volume measures of PA and fitness will be presented and contrasted with associations between different patterns of acquiring of the same volume of PA and fitness in heart failure patients.

Conclusions: It is now possible to characterise detailed patterns of PA that go well beyond aggregate measures of weekly volumes and may provide new insights into the relationship between PA and health/disease.

External funding details: The work was partly funded via a PhD studentship from Activinsights.

Preferences for a technology-supported physical activity promotion intervention among breast cancer survivors: Findings from a mixed methods study

Siobhan Phillips, Whitney Welch, Kara Gavin, Alison Cottrell, Anne Nielsen, Northwestern University Feinberg School of Medicine

Introduction: Despite the benefits of physical activity (PA) for breast cancer survivors, the majority remain insufficiently active. Remotely-delivered, technology-supported PA interventions may be a more scalable strategy to increase PA among breast cancer survivors. However, little is known about breast cancer survivors' preferences for intervention features. This study explored survivors' preferences for these features.

Methods: Survivors [N=96; Mage=55.8 (SD=10.2)] self-reported demographic and disease characteristics, PA, and interests in and preferences for intervention features via an online survey. A subset (n=28) also completed a semi-structured phone interview. Quantitative data were analyzed using descriptive statistics. Transcribed interviews were evaluated using a thematic content analysis approach and consensus review.

Results: Quantitative data indicated the highest ranked features were: daily and weekly progress feedback (87.5%), newsfeed (86.6%), PA challenges (81.3%) and scheduling tool (79.2%). Survivors were interested in receiving progress feedback (80.2%), motivational (78.1%) and reminder (75.0%) messages. Participants varied in the type of wearable device they were interested in with 45.8% preferring a wrist worn monitor and 36.5% preferring the option to wear on the wrist or underneath/attached to clothing. Five themes emerged from interview data: (1) ease of use; (2) relevant to survivors; (3) level of structure and personalization; (4) integration with wearables and (4) provides a sense of accomplishment.

Conclusions: Preferences for technology-supported physical activity intervention features varied among breast cancer survivors. Engaging survivors in developing and implementing remotely-delivered, technology-supported interventions may enhance their effectiveness.

External funding details: National Cancer Institute (K07CA196840) and the Robert H. Lurie Comprehensive Cancer Center.

Time-use in screen-based devices among children and adolescents: A systematic scoping review of large population-based studies published since 2000

George Thomas, Jason Bennie, Katrien De Cocker, Stuart Biddle, University of Southern Queensland

Background: The availability of different types of screen-based devices (e.g., smartphones, tablets) has increased considerably in recent years. However, there is limited understanding on the time-use of these newer screen-based devices among young people, in addition to whether they contribute towards 'excessive' total screen time (>2 h/day). The aim of this study is to conduct a systematic scoping review to examine the published literature on current time-use in screen-based devices among young people (5-18 years).

Methods: Seven online databases were systematically searched. Inclusion criteria were: (i) population-based studies (minimum sample size $n \geq 5000$); (ii) participants aged 5-18 years; (iii) studies reporting time-use data on ≥ 1 screen time devices; and (iv) studies published since 2000. Screening and data extraction were conducted in duplicate.

Results: 130 studies were included in the review. Most studies (78%) reported prevalence on a variety of screen-time behaviours. TV viewing (64%) was the most common measure of screen time whilst time-use in newer screen-based devices, such as cell phones (5%) and active gaming consoles (1%), received much less scholarly attention. On average, 52.3% of participants ($k=19$ studies) exceeded the screen time guideline of two-hours per day, while time-use in newer screen-based devices such as cell phones ($k=2$) averaged 1.5 (0.08 – 2.9) hours per day.

Conclusion: There is a shortage of literature examining newer screen-based devices (e.g., smartphones, tablets). Findings may be used to inform future research and policy designed to identify the time-use of newer

screen-based devices and limit overall screen-time among young people where appropriate.

Usability and acceptability of a wearable activity tracker in young adolescents

Nicola Ridgers¹, Anna Timperio¹, Helen Brown², Kylie Ball¹, Susie Macfarlane¹, Samuel Lai³, Kara Richards³, Kelly Mackintosh⁴, Melitta McNarry⁴, Megan Foster⁴, Jo Salmon¹

¹Deakin University, ²Deakin University; Jean Hailes for Women's Health, ³Deakin, ⁴Swansea University

Little is known about how adolescents use wearable activity trackers or perceive their acceptability. This study examined the acceptability and usability of the Fitbit Flex among adolescents. A secondary aim was to determine adolescents' awareness and use of the different functions and features of the Fitbit Flex and accompanying app.

Sixty adolescents (aged 13-14 years) from three secondary schools in Melbourne, Australia, were provided with a wrist-worn Fitbit Flex and accompanying app and asked to use them for six weeks. At the conclusion of the 6-week period, all adolescents participated in focus groups that explored their perceptions of the acceptability and usability of the Fitbit Flex, accompanying app, and online Fitbit profile. Qualitative data were analysed using pen profiles, which were constructed from verbatim transcripts.

Adolescents found the Fitbit Flex easy to use and useful for activity tracking. Greater difficulties were reported for monitoring sleep. Adolescents used a range of features and functions available through the device and the app. Barriers to use included the comfort/design of the Fitbit Flex, a lack of specific feedback about activity levels, and the inability to wear the device for water-based sports.

Adolescents reported that the Fitbit Flex was easy to use and a useful tool for tracking daily activity. However, several barriers to use were identified, which may impact on sustained use over time. Wearable activity trackers have potential to be integrated into physical activity interventions, but both the functionality and wearability of the device should be considered.

Using technology for physical activity surveillance and promotion with school children: The Youth Activity Profile

Stuart Fairclough¹, Danielle Christian¹, Robert Noonan¹, Lynne Boddy², Pedro Saint-Maurice³, Greg Welk⁴

¹Edge Hill University, ²Liverpool John Moores University, ³National Cancer Institute, ⁴Iowa State University

Physical inactivity and sedentary behaviours among children and adolescents are on the rise and are linked to a range of unfavourable health indicators. For these reasons efforts have been made by researchers, health agencies, and practitioners to promote active behaviours among youth. These efforts increasingly involve technology as a means of tracking, recording, sharing, and motivating physical activity participation. Technology has also been at the forefront of advances in physical activity surveillance. Objective assessment tools such as accelerometers have acceptable validity and reliability and are commonly used to quantify physical activity behaviours. However, they are also limited by their cost and the level of technical expertise required for operation and data analysis.

In contrast, self-report methods of physical activity have minimal costs and can be used with large numbers of participants. Drawbacks of these approaches are their lack of validity, and that they were not designed to provide immediate feedback about PA levels. In recent years the Youth Activity Profile (YAP) has been developed to overcome these limitations.

The YAP is an online tool that has been calibrated to provide accurate estimates of youth physical activity and sedentary time and which provides immediate feedback and PA messaging.

This presentation will describe [1] how technology in the form of multi-sensor activity monitors was used to calibrate the online YAP, and [2] how the electronic YAP platform allowed for children and teachers to receive immediate feedback that could be used to complement and develop school-level physical activity promotion strategies.

Validity of consumer monitors in three different conditions

Adam Simunek¹, Lukas Jakubec², Filip Neuls², Jan Dygryn², Karel Frömel²

¹Palacky university, ²Palacký University Olomouc

Introduction: Activity trackers are useful tool for youth physical activity promotion in adolescents but robust evaluations of validity haven't been done yet under different conditions. This study evaluated the validity of the Garmin Vívofit 1 (G1), Garmin Vívofit 3 (G3), Garmin Vívosmart (GV) and Polar Loop (PL) in different settings and contexts.

Methods: Devices have been tested in laboratory (G1, GV, PL), controlled (G1, G3, GV, PL) and free living conditions (G1, G3). Free-living conditions were divided into 4 segments: "before school", "in school", "after school" and "whole day".

Results: In laboratory MAPE score was lowest at 3 km·h⁻¹ (G1 0.35%, GV 0.45%) and highest at 7 km·h⁻¹ (G1 36.3%, GV 18.45%). Accuracy of PL was lowest at 3 km·h⁻¹ (47.1%) but better at 7 km·h⁻¹ (5.7%). In controlled conditions, G3 has lowest MAPE score during walk (0.34%) and run (0.54%). In free-living conditions overall MAPE values were relatively low for the "whole day" segments (G1 11.8%, G3 11.5%). However, both trackers were found to be statistically equivalent to the pedometer for 3 of the 4 segments. The G1 device showed higher level of the systematic bias than G3 in all segments.

Conclusions: Validity of the tested devices depends on the activity speed, total activity amount and on placement on left or right wrist. GV is best device in laboratory conditions. G3 is better than other devices in controlled and free living conditions.

External funding details: Study was supported by the UPOL's research grant „Use of fitness trackers for physical activity monitoring” (IGA_FTK_2017_002).

Theme: Translation of Sport and Exercise Medicine Into Population Health

Tuesday 16 October

A real Olympic legacy: A whole systems approach to physical activity in Sheffield

Robert Copeland, Sheffield Hallam University; NCSEM Sheffield

A real Olympic Legacy has never been achieved on any large scale. The London 2012 Olympic and Paralympics Games was awarded with the commitment to 'encourage the whole population to be more physically active'. The aim of London 2012 was therefore not just to deliver a successful sporting event but to act as a driver for lasting change in the context of health and wellbeing. Following London 2012, innovative, ambitious and creative city's in England were invited to bid to become partners in a National Centre for Sport & Exercise Medicine (NCSEM). The aim of the NCSEM is to extend the reach of Sport and Exercise Medicine throughout the UK and the Olympic movement.

The city of Sheffield, UK was awarded the status as one of three NCSEM founding partners with a vision to develop a culture of physical activity that would significantly change the health & wealth of the population, transforming the city into the most active city in the UK.

This talk will set out the journey so far of the Sheffield NCSEM providing a practical road map for a whole systems approach to increasing physical activity. It will look at; system leadership, behaviour change, research, funding, branding, stakeholder engagement, building community networks and governance structures. This legacy is not about stadia, facilities and infrastructure left behind from London 2012 but about creating a Move More culture for the main conduit of sustaining a legacy, the people.

A review of enablers and barriers to older people's participation in strength and balance activities

Nick Cavill, Cavill Associates Ltd

Introduction: The UK Chief Medical Officers recommend that Adults and older adults should undertake physical activity to improve muscle strength on at least two days a week, and Older adults at risk of falls should incorporate physical activity to improve balance and co-ordination on at least two days a week. These recommendations are often ignored, in favour of the mainstream advice on aerobic physical activity. This review set out to answer the question: *What are the key barriers and enablers for individuals undertaking muscle strengthening and balance activities, and how can these be addressed by individuals and practitioners?*

Methods: A review of reviews, identified through a PUBMED search and expert input

Results: 43 studies were found; following screening twelve papers were included: four systematic reviews two reviews; and six primary studies for context. This review found 92 motivators and 24 barriers to resistance exercise. The most common motivator was the physical health benefit of experiencing an increase in strength, endurance, flexibility balance and coordination. At an individual level the most commonly reported barriers included poor health, pain, tiredness/fatigue, and lack of willpower. There were few barriers or motivators reported for balance activities. Overall the review showed that older people identify many positive facets of strength activity, but also face barriers to taking part.

Conclusion: Physical activity promotion needs to take account of the importance of the strength and balance guidelines, and be designed around the needs of participants, addressing the barriers they identify.

An evidence-based, co-developed physical activity referral scheme: A mixed methods pilot trial

Benjamin Buckley¹, Dick Thijssen², Rebecca Murphy¹, Lee Graves¹, Greg Whyte¹, Fiona Gillison³, Philip Wilson⁴, Diane Crone⁵, Daniel Hindley¹, Paula Watson¹

¹Liverpool John Moores University, ²Liverpool John Moores University & Radboud Medical Center, ³University of Bath, ⁴Brock University, ⁵University of Gloucestershire

Background: UK exercise referral provides a promising framework for population level physical activity (PA) behaviour change. Yet, evidence of effectiveness is unclear. Few schemes have been underpinned by behavior change theory or involved practitioners and patients in their development.

Aim: To explore the preliminary effectiveness and acceptability of an evidence-based, co-developed PA referral scheme.

Methods: 32 patients were referred to a PA referral scheme that included 12 weeks subsidised fitness centre access, plus 4 PA behaviour change consultations (based on Self-Determination Theory). Baseline-to-12-week

change in cardiorespiratory fitness (CRF; Astrand-Rhyming protocol), blood pressure and PA (7-day accelerometry) were analysed using t-tests and magnitude-based inferences. Semi-structured interviews were conducted with a subsample of patients (n = 12) and analysed thematically to explore experiences of the scheme.

Results: Significant increases were observed in CRF (95% Confidence Interval (CI) 1.9-5.4, $P < 0.001$) and moderate-to-vigorous PA (16.9 min.day (95% CI 4.3-29.6) $p = 0.013$), whilst systolic blood pressure decreased significantly (9.8 mmHg (95% CI 4.4-15.2) $p = 0.001$) from baseline to 12 weeks. Positive aspects reported by patients included the frequency and quality of support, plus use of a self-report logbook. Some patients, however, felt the scheme was too gym-focused and noted an under-staffed and busy fitness centre.

Conclusion: Pilot work is vital to ensure complex interventions are developed to a point where they can have a worthwhile effect. A co-developed, evidence-based PA referral scheme elicited short-term improvements in PA levels and cardiometabolic health in a clinical population. Further work is needed to improve intervention acceptability prior to conducting definitive trials.

Associations for volumes and patterns of physical activity with metabolic health in children: a multivariate pattern analysis approach

Eivind Aadland¹, Lars Bo Andersen¹, Sigmund Alfred Anderssen², Geir Kåre Resaland¹, Olav Martin Kvalheim³

¹Western Norway University of Applied Sciences, ²Norwegian School of Sport Sciences, ³University of Bergen

Background: It is unclear how total volumes versus patterns (bouts and breaks) of physical activity relate to health. The current evidence for these relationships is limited by the reliance on analytic approaches that cannot handle collinear variables. By means of multivariate pattern analysis, we determined the associations of physical activity volumes and patterns with children's metabolic health, using epoch settings of 1, 10, and 60 seconds.

Methods: A sample of 841 Norwegian children (age 10.2 ± 0.3 years) provided valid data on accelerometry (ActiGraph GT3X+) and several indices of metabolic health (aerobic fitness, abdominal fatness, insulin sensitivity, lipid metabolism, blood pressure) that were used to create a composite metabolic health score. We created 355 physical activity indices covering the whole intensity and bout duration spectrum, and used multivariate pattern analysis to analyze the data.

Results: Total time and accumulation of time in bouts of intensity-specific physical activity, as well as associations with metabolic health, was completely dependent on the epoch settings used to analyze the data. Short intermittent bursts of physical activity were favorably associated with children's metabolic health, whereas associations for prolonged bouts was weak.

Conclusions: This study is the first to determine the multivariate physical activity association pattern related to metabolic health in children across the whole intensity and bout duration spectrum. Our findings, varying largely between epoch settings, challenge our understanding of physical activity patterns, and are of major importance for the analysis of accelerometry data.

External funding details: The Research Council of Norway and the Gjensidige Foundation

Cycling and cardiovascular diseases: A systematic literature review and meta-analysis

Solveig Nordengen¹, Lars Bo Andersen², Ane Solbraad², Amund Riiser²

¹Western Norway University of Applied Science, ²Western Norway University of Applied Sciences

Background: Physical inactivity is a risk factor for cardiovascular disease (CVD); cycling is a physical activity (PA) that can be integrated into everyday living and therefore has great potential to prevent CVD. We aimed to determine whether cycling reduces the risk of CVD and CVD risk factors and to investigate potential dose-response relationships.

Methods: We performed a systematic review and meta-analysis by searching four databases (Web of Science, MEDLINE, Sport Discus, and Scopus). All quantitative studies, published until August 2017, were included when a general population was investigated, cycling was assessed either in total or as a transportation mode, and CVD (incidence or mortality) or CVD risk factors were reported. Studies were excluded when reporting continuous outcome or when cycling and walking were combined. We meta-analyzed published adjusted relative risk (RR) and odds ratio (OR). Heterogeneity was investigated using I^2 . The protocol was registered at Prospero in Dec 2016, with registration number CRD42016052421.

Results: The search yielded 5174 studies; 21 studies including 1,069,034 individuals were eligible. We found a significant reduction in combined CVD incidence, mortality, and risk factors of 0.783 (95% confidence interval [CI]: 0.744–0.824; $p < 0.001$; $I^2 = 58\%$). Separate analyses for CVD incidence, mortality, and risk factors showed effect estimates of RR 0.837 (0.797–0.880; $p < 0.001$; $I^2 = 29\%$), RR 0.827 (0.761–0.899; $p < 0.001$; $I^2 = 0\%$), and OR 0.753 (0.691–0.821; $p < 0.001$; $I^2 = 66\%$), respectively. We found no dose-response relationship or sex-specific difference.

Conclusion: Any cycling seems to be protective against CVD, and thus, we recommend cycling as health-enhancing PA.

Integrating physical activity into cancer care

Josefine Björkqvist, Sport Aberdeen/ University of Aberdeen

Introduction: People living with cancer (PLWC) experience long-lasting adverse effects of their disease and treatment. Physical activity has been shown to be safe and clinically effective for PLWC. Despite this evidence physical activity is still not prescribed as part of routine cancer care. Macmillan Cancer Support, Sport Aberdeen and NHS Grampian entered a partnership to deliver the 12-week community-based physical activity programme Move More Aberdeen (MMA) for PLWC.

Methods: MMA delivery started in January 2015 with 12-week community-based physical activity groups of moderate-intensity and high-intensity. The cancer and physical activity standard evaluation framework (CaPASEF) was used to measure physical activity levels, fatigue and quality of life at baseline, 3, 6 and 12 months. A 6-minute walk test, sit-to-stand test and hand grip strength test were later introduced at baseline and 12 weeks to assess MMA's impact on cardiorespiratory fitness, strength and mobility.

Results: MMA has generated over 400 referrals to date. Referrals were highest for prostate (25%), breast (24%), bowel (9%) and lung (7%) cancer. MMA has demonstrated a long-term increase in physical activity levels ($P < 0.01$), decrease in fatigue ($P < 0.05$) and improvement in quality of life ($P < 0.05$) for participants. Results from objective measurements will be available in June 2018.

Conclusions: MMA has successfully supported PLWC into a lifestyle of long-term, independent physical activity for health. The programme has improved access and adherence to physical activity for PLWC and

demonstrates a feasible model for integrating physical activity into standard cancer care.

External funding details: Move More Aberdeen is funded by Macmillan Cancer Support.

Moving Through Motherhood: A mixed methods investigation into experiences of physical activity, and physical activity advice around pregnancy

Richard Pulsford¹, Peter Rouse², Oliver Williams³, Rachel Jarvie¹, Christina Weis⁴, Lauren Rodgers¹, Victoria Salmon¹

¹University of Exeter, ²University of Bath, ³University of Leicester, ⁴De Montfort University Leicester

Background: Evidence for the benefits of physical activity (PA) for mother and baby during pregnancy is compelling. However PA levels amongst expectant mothers remain disproportionately low, due in part to: i) unclear and conflicting guidance from disparate sources regarding what is safe, appropriate and healthy, and ii) diverse experiences of pregnancy.

Methods: 'Moving Through Motherhood' (MtM) aims to develop new resources for expectant mothers to support confident, safe and healthy choices for PA during pregnancy. In Phase 1, qualitative and quantitative data was collected using an online survey distributed via UK mothers' networks in December 2017. Questionnaire items examined prior experiences of PA and PA guidance during pregnancy, what guidance would be considered welcome/useful, and how/where this guidance should be available.

Results: 589 women responded. 71% reported being at least 'Quite Active' before pregnancy, but 60% reported reduced PA during pregnancy. While over three-quarters of respondents reported receiving PA advice, this came from a wide range of sources, and was often vague and unhelpful. Only 31% were aware of national guidelines. Diverse experiences of pregnancy, safety concerns, and fear of judgement further undermined confidence with PA.

Conclusions: Findings highlight the need for accessible resources that support safe and healthy PA choices. Findings have informed the Phase 1 development of the MtM web-platform which provides evidence-based PA guidance using 'like-me' vignettes reflecting diverse experiences of pregnancy. Phase 2 includes national data collection, stakeholder consultation, and extensive user-group evaluation to inform continued development of the MtM platform.

External funding details: GW4-Alliance Seed Award (RP) #GW4CrucibleSF1706

Relationship of physical fitness and obesity status with cardiometabolic risk factors in college aged students

Christopher Bopp, Melissa Bopp, Zack Papalia, Haley Sanders, Pennsylvania State University

Little examination of cardiometabolic risk in college students has occurred as this population is typically presumed healthy; the number of studies exploring the influences of fitness and obesity on this topic are fewer still. The purpose of this investigation was to determine the effects of fitness and obesity on cardiometabolic risk in college students. Undergraduate students (n=5,986) completed an assessment battery including: estimated cardiorespiratory fitness (VO₂max), BMI, percent body fat, waist girth,

blood lipids and glucose and blood pressure. Among males (n=3634) higher fitness was associated with reduced rates of dyslipidemia ($\beta=0.94$, $p<0.000$), prediabetes ($\beta=0.97$, $p<0.000$) and hypertension ($\beta=0.93$, $p<0.000$). Among females (n=2352), higher fitness was associated with lower rates of prediabetes ($\beta=0.97$, $p=0.04$) and hypertension ($\beta=0.93$, $p<0.000$). Males and females in the lowest quartile of fitness demonstrated significantly higher BMI, percent body fat, waist girth, total cholesterol (TC), LDL cholesterol (LDL-C), triglycerides, systolic blood pressure (SBP) and diastolic blood pressure (DBP) compared with the most fit quartile. In males and females, obesity was associated with greater dyslipidemia ($\beta=1.15$, $p<0.000$), prediabetes, ($\beta=1.06$, $p<0.000$) and hypertension ($\beta=1.14$, $p<0.000$). Compared to their normal weight or overweight counterparts, obese participants demonstrated significantly lower fitness and HDL, and higher TC, LDL-C, triglycerides, and SBP and DBP ($p<0.000$). Although the consequences of obesity and low fitness in young adulthood will not lead to clinical symptoms for decades, both increase the likelihood that an individual will meet criteria for cardiometabolic risk factors. A significant difference in cardiometabolic risk factors can be detected between quartiles of fitness and by obesity status in young adults.

Square peg in a round hole: Mismatch in system needs and investment for promoting physical activity in low-income countries

Lewis Keane¹, Netina Latu², Joel Negin³, Lindsey Reece³, Justin Richards³

¹The University of Sydney, ²Ministry of Internal Affairs, Government of Tonga, ³Sydney School of Public Health, The University of Sydney

Introduction: The United Nations Year of Sport and Physical Education in 2005 sparked mass investment in sporting interventions in low-and middle-income countries. Despite the paucity of evidence for identifying policy and system "readiness" for uptake of "western" sport-based interventions in this setting, the Australian Government has invested AUD \$29 million into the Western Pacific region since 2009. We used the Kingdom of Tonga as a case study to examine the current policy structure for integrating externally funded sporting interventions within the local health and international aid systems of low-and middle-income countries more broadly.

Methods: A novel ethnographic approach was employed through an observational research design triangulating a 12-month in-country field placement with local document analysis, key informant interviews, and focus groups. Implementation structures were mapped; objectives and evaluation outcomes analysed by stakeholder; and policy and system facilitators and barriers elucidated.

Results: Strategic plans between international and local stakeholders were detrimentally misaligned, competing and mutually exclusive. Key barriers included differing program objectives of aid donor and receiving countries. Novel findings included a paucity of guiding evidence or attention paid to how competing foreign aid donors impact local political, resource and organisational 'buy-in' during the delivery of physical activity interventions in low-and middle-income settings.

Conclusion: Sporting interventions in low-and middle-income countries have invested in what is 'palatable' and 'marketable', rather than necessary. Without genuine cross-sectoral investment and integration within local systems, sporting interventions delivered in these settings risk being confined to isolated program components unable to claim sustainability or a population-level effect.

ePosters

Theme: Behaviour Change

A new intervention model for increasing physical activity levels in fitness centres based on the Behaviour Change Wheel

Jorge López-Fernández¹, Lou Atkinson², Elizabeth Horton³, Alfonso Jimenez⁴

¹Coventry University, UK; ²GO Fit LAB, Ingesport, Spain, ³Aston University, School of Life and Health Sciences, ⁴Coventry University, Centre for Innovative Research Across the Life Course (CIRAL), ⁵Coventry University, Centre for Innovative Research Across the Life Course (CIRAL), UK; ⁶GO Fit LAB, Ingesport, Spain

Introduction: As a health promotion environment, fitness centres could probably play a proactive role to address the high physical inactivity levels of modern societies. We used the Behaviour Change Wheel (BCW) to design an intervention model to increase physical activity levels in fitness centres.

Methods: This intervention was designed following the three stages defined in the BCW. In Stage 1, the target behaviour and COM-B Model were defined using a pragmatic review until saturation. In Stage 2, the intervention functions were selected using the APEASE criteria. In Stage 3, a pragmatic review was performed to identify the most efficient Behavioural Change Techniques (BCTs; taxonomy version 1) to deliver the intervention model. Finally, only those BCTs that met the APEASE criteria were selected.

Results: The intervention model addressed the six components of the COM-B model:

- Physical capability: designing an individualised exercise programme.
- Physiological capability: training users to do the proposed exercises.
- Physical Opportunity: providing users with an instrument to get feedback in real time.
- Social Opportunity: Connecting users with others with same values.
- Reflective motivation: making users to take part in objective selection (outcomes and behaviour), training design, and evaluation process.
- Automatic Motivation: asking for commitment.

Moreover, eighteen BCTs were identified to deliver the intervention model defined in this research.

Conclusion: The BCW is a useful framework for designing physical activity behaviour change interventions to be delivered in fitness centres.

External funding details: This research has been funded by GO fitfi and Coventry University.

Active commuting to school patterns and associations with socio-economic level in Spanish pre-schoolers

Manuel Herrador Colmenero¹, Cristina Cadenas-Sanchez², Idoia Labayan³, Adrià Muntaner-Mas⁴, Diego Moliner-Urdiales⁵, Gabriel Lozano-Berger⁶, Pedro J Benito⁷, Manuel A Rodríguez-Pérez⁸, Alvaro Delgado-Alfonso⁹, Joaquín Sanchis-Moysi¹⁰, Vicente Martínez-Vizcaino¹¹, Francisco B. Ortega², Palma Chillón²

¹University of Granada, ²PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada., ³Department of Health Sciences, Faculty of Health sciences,

Public University of Navarra, Pamplona, ⁴GICAPE "Physical Activity and Exercise Sciences Research Group" Research Group, University of Balearic Islands. Balearic Islands. ⁵PROFITH "PROmoting FITness and Health through physical activity" Research Group, Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada. Granada., ⁶LIFE research group, Faculty of Humanities and Social Sciences, University Jaume I, Castellon., ⁷GENUD "Growth, Exercise, NUTrition and Development" research group, Department of Physiatry and Nursing, Faculty of Health and Sport Sciences, University of Zaragoza, Zaragoza., ⁸Laboratory of Exercise Physiology Research Group, Department of Health and Human Performance, Faculty of Physical Activity and Sport Sciences, Universidad Politécnica de Madrid, Madrid., ⁹SPORT Research Group (CTS-1024), CERNEP Research Center. Department of Education, Faculty of Education Sciences, University of Almería, Almería., ¹⁰Department of Physical Education, Faculty of Education Sciences, University of Cádiz, Puerto Real., ¹¹Research Institute of Biomedical and Health Sciences (IUIBS), Las Palmas de Gran Canaria, Canary Islands., ¹²Health and Social Research Center. Universidad de Castilla-La Mancha, Cuenca.

Introduction: Active commuting to school has previously been associated with socio-economic level in children and adolescent. However, this association is unknown in preschoolers. Therefore, the aims were to describe the patterns of active commuting to school (ACS) in Spanish children aged 3-5 years old and to analyse the association between active commuting to school and socio-economic factors.

Method: A total of 2,639 parents of preschoolers aged between 3 and 5 years old participating in the PREFIT project self-reported information about the mode of commuting to school of their children. Additionally, mothers and fathers reported their socioeconomic level (i.e. marital status, educational level, and occupation). Binary logistic regression was used to analyse the relationship between ACS and socio-economic factors.

Results: Nearly a 50% of pre-schoolers commuted actively to the school. Their parents were mostly married (80%); 72% mothers and 62% fathers had university studies, 60% mothers and 69% fathers were skilled workers. Preschoolers with non-university degree-s parents were more likely to ACS than those preschoolers with university degree-s parents (all $P < 0.001$). Additionally, preschoolers with low professional level-s fathers were more likely to ACS than those preschoolers with high professional level-s fathers ($P < 0.01$). Preschoolers with unskilled worker or unemployed mothers were twice more likely to ACS ($P < 0.001$) than those preschoolers with high professional level's mothers.

Conclusion: Almost half of preschoolers commuted actively to school. Markers of socioeconomic level were inversely associated with ACS, being the characteristics of the mother greater predictors than the parent-s ones, to active commuting.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R (MINECO/FEDER, UE) and BES-2014-068829] and the Spanish Ministry of Education, Culture and Sport (FPU13/02111). The PREFIT project takes place thanks to the funding linked to the Ramón y Cajal grant (RYC-2011-09011).

Beliefs, motives and gains associated with physical activity in people with osteoarthritis

Alice Berry¹, Candy S McCabe², Sarah Muir³, Nicki Walsh¹

¹University of the West of England, ²University of the West of England / Royal National Hospital for Rheumatic Diseases, ³Bournemouth University

Introduction: Osteoarthritis (OA) affects approximately 8.75 million people in the UK. Physical activity is recommended as a core treatment, however, 44% of people with OA report doing no activity at all. Motivation and Self-Efficacy (the extent to which a person believes they can carry out a behaviour) are both considered to be key factors in understanding participation in physical activity. The aim of this study was to explore the beliefs, motives, and gains associated with physical activity engagement, in a group of people with OA.

Method: This study adopted a cross-sectional survey design, utilising a one-point-in-time questionnaire to gather information. The Exercise Motives and Gains Inventory and the Exercise Self-Efficacy Scale were used to collect data.

Results: Questionnaires were completed between August 2015 and January 2016. The sample size was 262. Participants who were active on four or more days per week, were significantly more motivated for enjoyment, avoidance of negative health, and general health/fitness reasons. A comparison of motives and gains revealed that participants reported a higher gain score for social engagement and enjoyment, when compared to related motive scores. Self-efficacy for exercise was also significantly higher for participants who reported being most active.

Conclusion: This study provides evidence about the central role that different motives, gains, and levels of self-efficacy might play in determining health-related behaviour, such as physical activity, in this population.

Descriptive and injunctive norm misperceptions of sedentary behaviour among Czech adolescents

Ferdinand Salonna¹, Michal Vorlicek¹, Peter Badura¹, Peter Kolarcik², Jana Vokacova¹, Josef Mitas¹

¹Palacky University Olomouc, ²PJ Safarik University Kosice

Aim: We were interested whether descriptive and/or injunctive norm misperceptions of sedentary behaviour among Czech adolescents exist.

Methods: Data were collected in Autumn 2017 as baseline measurement of 'Social Norms Intervention for Active Adolescents (SONIAA)' project using a web-based questionnaire (1586 students; age 11-15; 48% girls). Respondents were asked about their own behaviours and in addition about the descriptive norms and injunctive norms for different domains of sedentary behaviour (TV-time, Computer-time, Video Game-time and Phone/text time).

Results: We found that adolescents overestimate the level of sedentary behaviours of their peers in every explored domain (TV-time: Difference between Perceived peer Norm (PN) and Actual Behaviour (AB) was 30%; Computer-time PN-AB 40%; Video Game-time PN-AB 42%; Phone/text time PN-AB 57%). There was difference in approval of the PNs between boys and girls. For every explored domain, only a minority of boys disapproved the PNs whereas girls only for TV-time.

Conclusions: Most of adolescents perceive the level of sedentary behaviours among their peers as higher than actually are. In addition, most of them do not feel uncomfortable with the perceived norms, especially boys.

Our findings could be used as the basis for a social norms campaign that aims to correct the misperceptions, by focusing on the positive behaviour of the majority, instead of the negative behaviour of the minority.

External funding details: This work was funded by a grant of the Grant Agency of the Czech Republic 'Social Norms Intervention in the

prevention of excessive sitting and physical activity promotion among Czech adolescents' (project No. 17-24378S).

Digital behaviour change interventions to address sedentarism. Evaluation of a 4-month Fitbit intervention to increase physical activity levels in children with congenital heart disease

Christine Voss¹, Paige Dean², Astrid DeSouza², Kevin Harris²

¹BC Children's Hospital, University of British Columbia, ²BC Children's Hospital

Introduction: We assessed whether a 4-month Fitbit intervention increases physical activity levels in children and youth with congenital heart disease.

Methods: Participants (10-18 yrs) with congenital heart disease were recruited from pediatric cardiology clinics (n = 93), and given a wrist-worn FitBit Charge HR to wear for 4 months. We included those with ≥1 month of valid Fitbit days (defined as ≥2,295 steps/day). We used multi-level linear regression to assess change over time.

Results: 59 participants completed the study (13.1±2.6 yrs, 51% male). Non-compliant participants were significantly older vs. compliant ones (15.0±3.0 vs. 13.1±2.6 yrs), but there were no differences otherwise. In compliant participant, the Fitbit was worn on 80% of intervention days, yielding 5,094 person-days. Daily steps were significantly associated with: age (-290 steps/year), being female (-1743 steps), daily temperature (33 steps/degree C), precipitation (-50 steps/mm), school-break (-1,606 steps/day). Overall, there was no significant change in daily steps during the course of the intervention after adjusting for confounders, but 8 participants (14%) increased their daily steps (+46 steps/day; 'responder'). Responders and non-responders were no different by age, sex, cardiac diagnosis, or BMI and physical activity questionnaire at baseline. In a follow-up survey, 74% found the Fitbit useful and nearly half stated they felt they were more active because of the intervention.

Conclusions: Daily steps improved only in a small proportion of participants, but the Fitbit device was well-received and offers promise for long-term and remote monitoring of physical activity in vulnerable clinical populations.

External funding details: Heart and Stroke Foundation, BC & Yukon

Effects of telephone based coaching and prompting on self-reported physical activity: First results of the randomized controlled trial Movingcall®

Xenia Fischer¹, Lukas Zahner², Oliver Faude², Lars Donath³

¹University of Basel, ²University of Basel, Department of Sport, Exercise and Health, ³German Sport University Cologne, Department of Intervention Research in Exercise Training

Introduction: Phone and web-based physical activity (PA) promotion has a great potential because individual counselling can be provided at participant's homes. The present study analyses the potential of telephone coaching and SMS prompting for PA promotion.

Method: 288 participants (age 20 to 65 y) were stratified (strata: age, sex) to three different intervention arms of a 6-month lasting PA promotion program: A control group received one written PA recommendation. The two intervention groups received 12 telephone coachings with (prompting group) or without (coaching group) additional SMS that prompt behavioural change (n = 48 SMS). The program consists of evidence-based behaviour change techniques and all participants had access to a personal online profile. Self-reported moderate-to-vigorous physical activity (MVPA) was assessed via telephone interview based on the Simple

Physical Activity Questionnaire. This analysis refers to 204 participants who have completed intervention by February 2018.

Results: At 6 months, participants (32% male, age = 42 (SD = 11), baseline MVPA = 97 min/week (129)) in the coaching (+252 min/week, 90% CI 193 ± 310) and prompting (+246 min/week, 90% CI 190 ± 303) group showed a similar but higher increase in MVPA compared to the control group (+97 min/week, 90% CI 53 ± 140). Dropout rate was higher in control (18%) as in the coaching (4%) and prompting (10%) groups.

Conclusion: This study suggests that telephone coaching is an effective and well-accepted tool to promote PA in working aged adults. Additional SMS prompts do not result in higher levels of PA.

Energy expenditure during bread baking

Elling Bere, Sveinung Berntsen, University of Agder

Introduction: In the past, physical activity was a necessity of food procurement. Today, we do not need to be physical active to obtain food. However, we need to compensate for this loss, e.g. through exercise. Not all people like to exercise, and again linking food procurement with energy expenditure might be a solution for some. The objective of the present study was to report time spent in moderate-to-vigorous intensity physical activity (MVPA) during bread baking.

Methods: Eight females and to males (age range: 23 to 41 yrs) conducted a baking process of 28 minutes; five minutes of mixing the ingredients, four sessions times four minutes dough kneading as intensely as possible with one minutes restitution after each interval session, and then three minutes to put away the dough, wash their hands and the dishes. Participants' oxygen consumption was continuously measured throughout the entire experiment with a portable oxygen analyzer (Metamax 3B-R2, CORTEX Biophysik GmbH, Leipzig, Germany). Prior to the experiment, resting metabolic rate (RMR) were measured. Average metabolic equivalents (MET) per min was calculated using each individual RMR-values. Cut points defining MVPA was 3 times RMR.

Results: Median (min-max) MET values for the full 28 min session were 3.2 (2.6-4.0), and for the 20 min 4-times-4 interval session (including resting periods) 3.6 (2.9-4.8). Median (min-max) time spent in MVPA was 18 min (4-22) out of the total 28 min session (64%).

Conclusion: Intensive bread baking can be considered moderate intensity physical activity ± linking energy expenditure to food procurement.

Evaluation of the United Arab Emirates (UAE) Mass media campaign to promote physical activity (PA), "Move it, UAE" 2017

Adrian E Bauman¹, Nouf Khamis Al Ali², Khulood Saeed², Mahaba Salem Al Saleh², Khadija Al Ameri², Margaret Thomas¹

¹Sydney University, ²United Arab Emirates Ministry of Health and Prevention

Introduction: Many Middle Eastern countries have high NCD rates and antecedent risk factors including physical inactivity. UAE initiated a multi-year NCD prevention strategy; the first wave was a PA mass-media campaign in early 2017 comprising mass communications, social media, community events, Mall events/screening, #MoveitUAE.

Methods: Pre (n=2014) and post (n=2102) independent population surveys evaluated campaign impacts on awareness, attitudes, intention and physical activity behaviours, using established campaign evaluation questions. Analyses were adjusted for demographic covariates.

Results: The pre-and post-samples were similar by gender (males 68%, 67.6%), age distribution (18-29 years 38%, 37% respectively), nationality groups (Emirati 12%, 15%), low income (38%, 41%), and married

(58%, 57%). Awareness of "any health campaign" increased slightly (10%, 14.8%, adjOR = 1.17, 95%CI: 0.98-1.40); prompted awareness of the specific Moveit campaign increase significantly (4.3% to 10.8%, adjOR = 2.70 (95%CI: 2.10-3.51); awareness was significantly more likely among women, Emirati locals, and in the Abu Dhabi region. The mean number of PA barriers remained unchanged (0.9, 0.9), but reported facilitators for activity increased (means pre 2.86 (sd2.8), post 3.5 (sd3.1), P<0.001). Among responders, six-month intention to increase PA improved from 47.1% to 52.9% (adjOR = 1.44, 1.16-1.79). The mean number of physical activities reported in the previous month increased [pre 1.09 (sd 1.1), post 1.19 (sd 1.1), P<0.004], total weekly PA sessions increased (4.08 to 4.56, P<0.01), and median total weekly time active increased: 101 [i/quantile 0,345] to 131 [0,367] minutes per week, P<0.001.

Conclusion: Well-implemented, community-wide mass-media campaigns in non-Westernised countries such as UAE, can start the process of improving population physical activity levels.

Exploring views on physical activity in Slimming World members: a collaborative survey with England Athletics' RunTogether

Laura Holloway, Sarah Bennett, Jacqui Lavin, Slimming World

Introduction: Slimming World's (SW) physical activity programme, Body Magic, encourages and supports members to gradually increase activity levels by moving more and decreasing sedentary behaviours. SW partnered with England Athletics' RunTogether, a programme offering supportive and inclusive running opportunities, to understand members' views on exercise and activity behaviours to support development of future physical activity partnerships.

Methods: SW members were invited to complete an online survey developed by RunTogether asking about thoughts on exercise. Results were analysed using descriptive statistics.

Results: 3359 SW members completed the survey. The majority (80%) agreed they feel guilty if they do not exercise, while over half felt they could do more to improve their health (57%). Respondents preferred exercises that are free/cheap (78%), flexible (74%), allow them to socialise with friends/family (71%), and give them an opportunity to "zone out" (63%). By engaging in exercise, the majority wanted to improve/maintain their fitness (96%), lose weight/change their body image (95%), feel good about themselves (94%) and challenge themselves (68%). In terms of what doesn't appeal to members, 65% didn't want to be too physically challenged, 58% don't need someone to motivate them and 33% didn't want a competitive element.

Conclusion: Results suggest Slimming World members hope exercise will improve their health, fitness and body shape, preferring exercise programmes that are cheap and flexible, while allowing them to socialise or have time for themselves. The findings support Slimming World's Body Magic programme, which focuses on incorporating activity into everyday life.

Fit For Me physical activity insight

Joy Wyche, Nicky Yates, Gina Perigo, Liverpool City Council

Almost 25% of people aged 16 and over in Liverpool are currently inactive and a further 11% are fairly active resulting in a significant impact on health and wellbeing.

To combat this, Liverpool City Council, Liverpool NHS Clinical Commissioning Group and key stakeholders set out a vision to be the most active core city in England by 2021. A behaviour change strategy was developed to support this vision based on an extensive customer insight research programme to ensure that the strategy was targeted to increase activity amongst the inactive.

To enable us to go beyond the traditional insight techniques, a multi layered programme using both quantitative and qualitative methodologies was developed which enabled us to understand attitudes and motivations to physical activity using innovative techniques to get beyond what people could articulate. By fusing different data sets and segmentation models we were also able to profile people by psychological traits allowing us to identify what people wanted and needed, to develop a deep understanding of what would make our audience change their behaviour.

The insight led to a marketing campaign approach that has not been previously taken before and has resulted in outstanding changes to behaviours in a very short timeframe. Five months following launch a representative survey of the local target audience found half were aware of the campaign and 18% had taken action as a result of seeing it.

Helping more people to GetOutside more often

Nick Giles, Elizabeth Beverley, Ordnance Survey

Introduction: At Ordnance Survey, we believe an active outdoor lifestyle helps you live longer, stay younger and enjoy life more. In 2015, we created GetOutside in response to the worrying increase of inactivity. Even our children are less active and for the first time ever, may have a life expectancy of 5 years less than their parents. Statistics like these made us want to educate, enable and inspire more people to GetOutside more often.

Method: GetOutside aims to tackle this alarming evidence by removing barriers, re-engaging people with the outdoors and encouraging behavioural change. Online, it aggregates all outdoor information simply, bringing together activity and place in over 250,000 pages of content. GetOutside is supported by a team of 60 Champions with a passion for the outdoors whose aim is to give inspiration, advice and confidence.

Results: The initiative has gained significant exposure and is recognised as the flagship campaign within the outdoor sector by both the Outdoor Industry Association and the European Outdoor Group. In the past year www.GetOutside.uk inspired around 2.5 m people. Our Champions are regular speakers at schools, community groups and through media with an active social following of over 1m.

Conclusion: GetOutside is for everyone, just as the outdoors is for everyone. It's an initiative that encourages, motivates and inspires people of all ages and abilities to reap the physical and mental health benefits of an active outdoor lifestyle. We remain firmly committed to inspiring everyone who isn't currently active to GetOutside: www.GetOutside.uk #GetOutside.

Mayors Golden Kilometre

Cassie Bridger, Courtney Warden, London Borough of Barnet

Established as a pilot project in 2017, the aim of the MGKM is to assist primary school aged children (4 – 11) to increase physical activity levels. The project works with primary schools to encourage their pupils to walk, skip, jog or run a 1 KM route around their school or a local open space on a daily basis.

Coordinated via a multi-agency steering group which includes the London Borough of Barnet, Public Health, Saracens Sport Foundation, Middlesex University and the Barnet Partnership for School Sport. A partnership approach has enabled the project to develop expertise, deliver efficiencies, build capacity and share best practice.

Using the NCMP dataset enabled effective target engagement of primary schools that are in most need of intervention to tackle the growing concern of excess weight. The project has also been linked to other initiatives i.e. Healthy Schools London, identifying how schools can use the MGKM as an activity to contribute to achieving their Bronze, Silver or Gold status.

The pilot evidence included - 12 schools engaged (7000 participants) with a sustained programme. Health assessments undertaken by Middlesex University (two selected primary schools over a 6 week basis) demonstrated;

- A decrease in waist circumference by 1.1 cm
- Improved physical activity levels with the MGKM being completed 2.5 minutes quicker between the start and end of analysis
- Three children went from being obese to overweight and one overweight child went from overweight to normal weight

Reported improvements in concentration and behaviour from head teachers and increased involvement from parents.

Permanency of a movement behavior change in older women: Assessment of intervention based on walking to work

Roman Cuberek¹, Jana Pelclová², Jana Harvanová²

¹Palacky University in Olomouc, ²Palacký University

Background: Any of intervention model based on physical activity (PA) leading to behavior change should not be perceived as a beneficial if an individual does not internally accept PA-changes in future. In a previous research, we verified several effects of designed walking intervention in older women with sedentary occupation. In the research continuity, we therefore aim to assess one-year permanency of relevant walking behavior change (identical to the intervention model).

Methods: The study involved 53 women (54.8±3.7 years). The original ten-week intervention was based on brisk walk to work (35-35 minutes; five times a week) (WW). We collected data in the 55th week after the beginning of the intervention. In seven consecutive days, women were recording the number of daily steps measured by Yamax SW-700 pedometer and registering those days they performed WW. The permanency of walking behavior change was assessed based on a percentage of women continuing WW after one year, a decrease of PA level in women in post-intervention period, and a one-year-increase of number of women which met the PA recommendations.

Results: We observed one-year adherence to WW in 77.4% (at least three times a week) and 41.0% (five times a week) of women, the decrease of 323.3 number of steps per day in post-intervention period ($p = .468$), and large one-year percentage increase (from 34% to 56.6%) of women meeting the PA recommendation.

Conclusions: The presented WW seems to be well acceptable movement behavior change in women with sedentary occupation.

Physical activity: Perceptions and behaviours, and the association with well-being

Sandra Winter¹, Haley Hedlin², Vidhya Balasubramanian², Catherine Heaney²

¹SPRC, ²Stanford University

Peoples' perceptions of their physical activity (PA) have been associated with health outcomes, accounting for actual levels of PA and other health determinants. This study examined the association of self-reported PA with wellbeing, and the extent to which this association was mediated by perceptions of the influence of PA on wellbeing.

Participants ($n = 597$, mean age = 45.1±17.3, women = 73%, education = 16.0±3.9 years, marital status-married = 45%, never married = 32%, other = 23%) completed the Stanford WELL for Life survey that included questions about 10 domains of wellbeing: social connectedness, lifestyle behaviors, physical and emotional health, stress/resilience, purpose/meaning, sense of self, finances, spirituality/religiosity, and creativity. For each

domain, a score from 0-10 was created. For each lifestyle behavior within the lifestyle domain, a sub-domain score from 0-10 was created. An overall wellbeing score was created by summing the 10 domain scores. Participants reported the influence of their health behaviors on their wellbeing. Linear regression analyses were conducted, controlling for age, gender, education and marital status.

A 10% improvement in the PA domain score was associated with a 1.3% increase in the wellbeing score (95% CI 1.02, 1.66). Adding the perceived influence of PA to the model, the association was attenuated but still statistically significant - the increase in wellbeing decreased from 1.3% to 0.9%, primarily explained by people who perceived their PA as contributing to their wellbeing.

On average, participants in this study who reported healthier PA behaviors also reported higher levels of wellbeing. This association was partially mediated by their perceptions of PA and wellbeing.

External funding details: Nutrilite Health Institute Wellness Fund

Self-efficacy scale for breaking up prolonged sitting among office workers: Development and validity

TAKASHI Jindo¹, Yuko Kai¹, Naruki Kitano¹, Hirokazu Arai², Mitsuru Makishima³, Toshiya Nagamatsu¹

¹Meiji Yasuda Life Foundation of Health and Welfare, ²Hosei University, ³Okamura Corporation

Purpose: This study investigated the criterion validity of a newly-developed self-efficacy scale to break up prolonged sitting among office workers with objectively measured sedentary behavior (SB).

Methods: Participants were 90 office workers from a single company; 70 participants were eligible for the analysis. We developed a task-specific self-efficacy scale in Japanese. The scale investigated perception of SB at work by asking participants if they felt it was possible to stand regularly to break up prolonged sitting during work hours. Five levels were proposed, involving standing up at least once in a specific period (30, 45, 60, 90, and 120 min). Responses were on a 10-point Likert scale: completely impossible = 0, neither agree nor disagree = 5, completely possible = 10. We measured participants' SB with a waist-worn triaxial accelerometer (HJA-750C). Participants were instructed to wear the accelerometer at all times while they were awake for 2 weeks, except when swimming or bathing.

Results: For the 60- and 90-min levels, self-efficacy was significantly correlated with number of bouts ($r = -0.302$, -0.269 , respectively) and total time ($r = -0.269$, -0.241 , respectively) of prolonged SB (sitting for periods of 30 min or longer) in the working day. There were no significant correlations between self-efficacy for these levels and overall SB time.

Conclusion: Self-efficacy for standing up at least once every 60 and 90 min was favorably related to prolonged SB in the working day. The findings suggest that an intervention focus on improving self-efficacy might effectively reduce SB at work.

Service design: A tool for activity

Kaisa Laine, *Culture and Leisure*

The new strategy 2017-2021 of the City of Helsinki is highlighting the participation of the residents. City of Helsinki aims to be a moving and healthy City for all and to resolutely fight segregation and social exclusion.

Target suburbs, where is larger risk for lack of life control, segregation and exclusion, were observed through walking and by photographing the environment to visualise current services. The main interest were sports and exercise facilities, parks, shopping centres, light traffic lines and location of the services. Residents of the areas and users of the services

were interviewed. The existing services were monitored and tested by mystery shopping. Open workshops and working groups were used to collect the needs and ideas from residents for new sport services and regional development.

Service design enables new ways of working and is one way to encounter residents. Possible user profiles were defined from the collected data. Valuable information for the development of low-threshold sports services were gained. Working group operations, workshops and face to face discussions increased the customer-oriented planning. Local sports events were proven to lower threshold of participation in organised sports. Information was gained on the awareness, visibility and safety of sports facilities. Participation of the residents in service design process was a chance to learn something new.

Co-design creates a sense of community. The benefits of participation and service design are shown in the long run. Involving people is not easy. It takes time and we must accept that not everyone wants to participate.

Sport-Santé™ Actimeter: a new tool to encourage medical doctors to evaluate the physical activity level of their patients

Alexis Lion¹, Charles Delagardelle², Axel Urhausen², Romain Seil², Daniel Theisen¹

¹Luxembourg Institute of Health, ²Centre Hospitalier de Luxembourg

Physical activity (PA) mitigates the risk of non-communicable diseases and confers health benefits during and after treatment. Nevertheless, two thirds of the patients seen in primary care are not advised to engage regularly in PA. We created the "Sport-Santé™ Actimeter" to encourage medical doctors to evaluate PA levels of their patients. The "Sport-Santé™ Actimeter" is cardboard tool designed to assist primary caregivers in evaluating PA levels of their patients by asking two questions (adapted from Robert E. Sallis, 2017): "On average, how many days per week do you engage in moderate or greater intensity physical activity?" (question 1) and "On average, how many minutes do you engage in this physical activity in those days?" (question 2). The "Sport-Santé™ Actimeter" is then used to align the number of days per week (question 1) and the number of minutes per session (question 2) and evaluates with a colour code if the patient reaches the minimal recommendations of the World Health Organization (WHO) on aerobic PA. Accompanying instructions of use include the definition of PA levels, the WHO recommendations and a decision-making algorithm to help caregivers provide relevant guidance according to the specificities of the patient. The "Sport-Santé™ Actimeter" may contribute to remind medical doctors to assess patient's PA level, facilitate the assessment of patient's PA level, highlight quickly and simply the results to the patient, and inform the patients on the PA recommendations. The "Sport-Santé™ Actimeter" and its accompanying instructions of use will be distributed and evaluated in Luxembourg in 2018.

Stage of change for physical activity in adolescents considering built environment and psychosocial factors

Susana Aznar Lain¹, Ana Queral², Xavier García-Massó³, Israel Villarrasa-Sapiña⁴, Javier Molina-García⁵

¹PAFS Research Group. Faculty of Sports Sciences, University of Castilla-La Mancha, ²Department of Nursing, University of Valencia and AFIPS research group. University of Valencia, Valencia, ³Department of Teaching of Musical, Visual and Corporal Expression. University of Valencia, Valencia, ⁴Department of Teaching of Musical, Visual and Corporal Expression. University of Valencia, ⁵AFIPS research group and Department of Teaching of Musical, Visual and Corporal Expression. University of Valencia, Valencia,

The aim of this study was to determine which multifactorial combinations are useful to predict stage of change for physical activity (PA) in adolescents considering together built environment and psychosocial factors.

The sample comprised 465 adolescents from the IPEN Adolescent study (Valencia, Spain). Stage of change for PA, physical self-efficacy and social support were measured by questionnaire. PA behavior was objectively measured by accelerometers. Weight and height were measured using standardized protocols, and BMI was calculated (kg/m^2). A neighborhood walkability index score was calculated based on Geographic Information System.

A classification tree was established using Matlab R2015a program (Mathworks Inc., Natick, USA) to discern adolescents depending on their stage of change (i.e., active and inactive stages) using as input variables the age, gender, neighborhood walkability, BMI percentile, social support, self-efficacy and MVPA.

Results indicated that only with a high perception of physical self-efficacy (greater than 4.25), 40% and 33% of students, were classified into the active stages of change (i.e., action and maintenance stages) with an accuracy of 80-90%. Built environment was responsible to classify 21-23% of adolescents (of training and validation dataset, respectively) into active stages of change.

Conclusion: Multifactorial combinations including social-support for physical activity, self-efficacy perception, neighborhood walkability and MVPA are useful to predict the stages of change in adolescents with an accuracy of 84.72%.

External funding details: This work was supported partially by Generalitat Valenciana, Spain [grant number GV-2013-087]

The impact of a sitting reduction intervention on cardiometabolic health in obese older adults

Dori Rosenberg¹, Melissa Anderson², Tessa Matson², Anne Renz³, Jacqueline Kerr⁴, David Arterburn², Jennifer McClure²

¹Dr., ²Kaiser Permanente Washington Health Research Institute, ³Kaiser Permanente Washington Health Research Institute, ⁴University of California San Diego

Introduction: Physical activity is important to cardiometabolic health, but there is little data from randomized trials on whether sitting time (ST) reduction interventions can improve cardiometabolic risk factors among older adults. We developed and tested an intervention (I-STAND) targeting older adults with obesity, a population at high risk for low physical activity and high ST for whom alternative health-promoting strategies are needed.

Methods: We conducted a randomized controlled pilot trial (N = 60; mean age = 68, mean BMI = 36). I-STAND participants (N = 29) received a Jawbone UP band to prompt breaks from sitting, feedback on sitting time from a thigh-worn activPAL device, educational materials, and 6 brief health coaching sessions over 12 weeks. Control participants (N = 31) received healthy living information. Outcomes measured change from baseline to 12 weeks for fasting glucose, cholesterol, blood pressure (BP), and weight. Linear regression models adjusted for baseline measures.

Results: The study was not powered to detect statistically significant differences and there were no significant changes in health outcome measures. Change in BP was greater for I-STAND participants with systolic BP >140 at baseline (adjusted mean difference: systolic -6.3, $p=0.15$; diastolic -5.5, $p=0.55$). Weight change was greater in the intervention (-1.4 lb I-STAND vs. +0.5 control; $p=0.15$).

Conclusions: Data from this pilot study indicate some improvement in health outcomes after a 12-week ST reduction intervention that reduced

sitting time by ~75 minutes per day. The results indicate the intervention warrants evaluation in a larger RCT.

External funding details: National Institute on Aging

What are the main parental barriers to active commuting to school of their children?

Maria Jesus Aranda-Balboa¹, Manuel Herrador-Colmenero², Francisco Javier Huertas-Delgado³, Greet Cardon⁴, Palma Chillón⁴

¹University of Granada PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ²PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ³Teaching Centre La Inmaculada. University of Granada. Granada., ⁴PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada.

Introduction: The aim was to review and categorize parental barriers to active commuting to school.

Method: The search was conducted in seven online databases until March of 2017. Five categories of search terms were established: parents, barriers, school, active commuting and children. To determine if the studies met the inclusion criteria, the titles and abstracts were reviewed. The full text of the selected studies was revised by two researchers.

Results: The electronic search strategy produced 951 studies. After applying the inclusion criteria, we identified 27 eligible studies. The wide variety of barriers reported by parents were classified into 14 categories (e.g. crime-related safety). Moreover, the main parental barriers associated with active commuting to school were distance, traffic safety, crime-related safety, built environment and social support. Regarding quality assessment of the studies included, was evaluated as weak in the global rating.

Conclusion: The categorization of parental barriers provided is a useful tool to design educational and environmental initiatives to increase active commuting by minimizing the main barriers (i.e., distance, traffic safety, crime-related safety, built environment and social support). Conducting studies in each context to analyse the more relevant barriers is a priority to promote active commuting behaviours.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R (MINECO/FEDER, UE)], the Spanish Ministry of Education, Culture and Sport [CAST17/00072] and "I+D+i research staff contract, within the framework of the national youth guarantee system" funded by the Junta de Andalucía and the European Social Fund of the European Union.

Theme: Cross sector working

Active travel in a rural university community: Associations with BMI, perceived health, facilitators and barriers

Philip Scruggs, Megan Nelson, Yazhuo Deng, University of Idaho

Introduction: The purpose was to explore the associations of seasonality, BMI, and perceived health, facilitators and barriers with active travel in a rural university setting.

Method: A cross-sectional survey design was used to collect employee (mean age 45.19±12.55 years, 37% male) data from a rural inland northwestern U.S. public university. Survey (N = 1,647) responses

(response rate 29%) were acquired across three seasons (fall [n=593], winter [n=546] and spring [n=508]), and 61%, 48% and 55% were active travelers, respectively. A Qualtrics survey utilized the International Physical Activity Questionnaire active travel questions, along with facilitator and barrier, perceived health, BMI and demographic questions. Descriptive (f), Chi-square and logistic regression (adjusted odds ratio [AOR]) statistics were used to examine associations between active travel and identified factors.

Results: Overall, the perceived health of the sample was healthy to very healthy for a majority of active travelers (73%) and non-active travelers (57%). Dominate barriers for non-active and active travelers were time, weather and items to carry. Dominate facilitators for active travelers were functional fitness, stress reduction and weight management. Active traveling was significantly associated with higher perceived health status [AOR 3.11, 2.08-4.63, $p=.001$], higher education attainment [AOR 2.04, 1.42-2.94, $p=.001$], healthy BMI [AOR 1.45, 1.07-1.95, $p=.016$], and seasonality [AOR 1.60, 1.24-2.06, $p=.001$]. For active travelers, seasonality impacted bicycling more than walking ($X^2 [2]=27.1$, $p=.001$).

Conclusion: Active travel has significant potential as a key component of a healthy lifestyle, and rural university communities can benefit from a better understanding of active travel engagement.

Connecting health and well-being to multifamily real estate: Opportunities to define and enhance the development of healthy, active communities

Margaret van Bakergem, Aaron Hipp, Traci Rider

North Carolina State University

The inclusion of health and wellbeing (HWB) strategies in multifamily housing developments is emerging, yet its conceptualization remains ill-defined. Collaboratively, built environment researchers and multifamily developers can enhance and standardize HWB terms and constructs.

Study aims: 1) understand, define and codify perceived HWB strategies from multifamily developers' perspectives; and 2) combine our built environment knowledge base with newfound real estate insights to develop a comprehensive, interdisciplinary toolkit to guide construction of health promotive multifamily developments.

Five multifamily developers deemed early adopters for perceived inclusion of HWB strategies were identified for this multiple case study design. Semi-structured interviews and site-visits with development leadership were completed by January 2018 to gather in-depth information about HWB techniques and decision-making. Thematic coding of interview transcripts will be completed by March 2018 with iterative data triangulation from financial pro-formas and website content analysis.

Preliminary HWB themes include:

1. Scale context (unit, building, property, and community scale): majority of HWB amenities were at unit and building scale.
2. Ownership control (build-to-sell vs. build-to-hold): build-to-hold linked to increased HWB initiatives through programming efforts.
3. Health typology (physical, mental, and social): social cohesion focal at building and property scales.
4. Lack of standard HWB metrics for market differentiation (analogous to LEED certification).
5. Value creation and risk (financial and social).

Provided the influence of home on health behaviors, multifamily real estate must become part of the mainstream interdisciplinary research-to-practice conversation. There is opportunity to deliver and standardize

evidence-based techniques to increase healthy, active lifestyles within multifamily environments.

External funding details: Funded by Robert Wood Johnson Foundation

Counselling in a health care setting combined with the standardized sports club exercise programme JACKPOT positively affects the physical activity behaviour: A quasi-experimental design

Sylvia Titze¹, Wolfgang Schebesch-Ruf¹, Lena Grisschaedl², Albert Strehn², Thomas Dorner³, Josef Niebauer⁴, Christian Lackinger⁵

¹University of Graz, ²Social Insurance Authority for Business, ³Medical University of Vienna, ⁴Paracelsus Medical University Salzburg, ⁵SPORTUNION Österreich

It is recommended to combine actions across sectors to increase the physical activity (pa) behavior in populations. The objective of this presentation is to compare short-term changes of pa after health care setting counselling (HCSC) only and HCSC plus sports club exercise intervention.

Social insurance companies contacted adults from 11 regions in Styria, a state of Austria, who were assigned to attend a one- to three-week health resort stay. All participants received HCSC and the intervention group (IG) in addition a voucher for 12 JACKPOT-programme sessions in their close neighbourhood. Pa was assessed by accelerometer (GENEActiv) and potential predictors of pa behavior with a questionnaire at baseline and 10-weeks after the start of the health resort stay. Mixed ANOVA was applied for within and between-group effects comparison.

Valid measurements were available from 400 participants at baseline and from 170 (43%) participants at follow-up. In the final sample 128 (75.3%) participants belonged to the IG and 42 (24.7%) to the control group (CG); 94 (55.3%) were women, and the average age was 52.3 (SD = 6.4). There were no baseline differences in pa behavior and sociodemographic variables between IG and CG. Participants of IG significantly increased their moderate- to vigorous-intensity pa behavior from 113 (SD = 92) min/week to 169 (SD = 138) and the change in pa was higher in the IG compared to the CG.

Health care setting counselling combined with an exercise programme in a sports club successfully increased the pa behaviour.

External funding details: The project was supported by the Gesundheitsfonds Steiermark and the Bundessportförderungsfonds: Breitensport.

Cross sectoral HEPA promotion at the local level in Finland?

Tanja Onatsu, Jyrki Komulainen, Fit for Life program

In Finland, 34% of adults and 20% of older adults (65+ y) are meeting the physical activity (PA) levels recommended by WHO. The majority of adults (76%) spent most of their waking hours exhibiting sedentary behavior, such as sitting, standing still, or lying down. The effects of sedentary lifestyle is not without its problems. Several common illnesses are related to physical inactivity and obesity is also rapidly growing problem among Finns. The nature of PA has changed in recent years. People are more physically active during leisure time but less active at work and during commuting.

The objectives for promoting PA are laid down in the Act on the Promotion of Sports and Physical Activity. Promotion of PA is one of the basic services provided by municipalities. Grounded by a cross sectoral cooperation municipalities can encourage physical activity through built environment in general as well as promote daily PA in several forms. Municipalities are responsible for the construction of sports facilities as well as provide recreational sports activities together with sports clubs. In

addition, municipalities have started PA counseling in health care setting such providing support and guidance to inactive people. In Finland national PA promotion program, Fit for Life (FFL), supports municipalities in the above processes. The operational model of the FFL includes seminars, campaigns, materials, mentoring and funding for physical activity projects. Cross-sectoral cooperation is a crucial principle integrated into the program and it aims to strengthen cooperation and networking between organizations operating in health enhancing physical activity.

Development of a local HEPA policy analysis tool (CAPLA-Santé) in France

Antoine Noël Racine¹, Aurélie Van Hoyer², Amandine Baron³, Flore Lecomte⁴, Marina Honta⁵, Anne Vuillemin⁶

¹Université Côte d'Azur, LAMHESS, Nice, ²University of Lorraine, APEMAC, ³University of Lorraine, ⁴French Society of Public Health, ⁵University of Bordeaux, Centre Emile Durkheim, ⁶Université Côte d'Azur, Nice

Introduction: The promotion of Health-Enhancing Physical-Activity (HEPA) became a major public health issue at international, national and local levels. To develop effective HEPA policies at the local level, policy-makers need to take into account a territorial context embedded in complex systems. Therefore, based on the WHO HEPA Policy Audit Tool (HEPA PAT), a local tool was designed to support local governments to build and pilot HEPA policies. This study aims at describing the adaptation and the test of the HEPA policy analysis tool (CAPLA-Santé) at the local level.

Method: (1) An intersectoral group of experts has been constituted, (2) The group adapted each item of the HEPA PAT tool for the local level. (3) Based on structured interviews, qualitative and quantitative feedbacks will be collected from practitioners and decision-makers in the testing phase. (4) A final workshop with the group of experts will be dedicated to reach consensus on the final version of the tool.

Activities undertaken: 4 workshops were organized to adapt and to design the local HEPA policy analysis tool. The first draft of the tool will be tested in 12 local governments from 3 pilot territories in South, Est and West of France: city (n=3), metropolis (n=3), county (n=3) and region (n=3). The results of this test will be presented at the symposium.

Conclusion: A final version of the local HEPA policy analysis tool is expected taking in account stakeholders' feedbacks. This tool will be largely disseminated in subnational territories in France for HEPA capacity-building.

Embedding physical activity as a place-based system priority

Gina Perigo¹, Nicky Yates²

¹NHS Liverpool Clinical Commissioning Group, ²Liverpool City Council

Liverpool City Council (LCC) is committed to a whole systems approach and is working collaboratively to deliver a more seamless and co-ordinated response to increasing participation in physical activity and sport (PAS). LCC recognises the need for a radical plan to achieve sustainable behaviour change and has developed an effective partnership approach, strong working relationships and integrated management structure with the NHS and key stakeholders, resulting in a shared vision to become the most active city in England by 2021.

The partners have recognised the value of PAS in supporting the health improvement agenda; as a result, inactivity was identified as the key local priority for prevention and transformation, resulting in £2m of new investment by LCCG to support the implementation of the city's PAS

strategy in July 2015. An Executive Board was created to oversee the investment and consists of representatives from LCC Communities, Sport and Recreation Services and Public Health, LCCG and the PAS Stakeholder Group. The shared vision is set out in the Liverpool Active City Strategy 2014-21, adopted by the city's Health and Wellbeing Board.

The programme aimed to increase physical activity through the delivery of a wide range of innovative initiatives targeting the inactive and fairly active populations of all ages across the life course. The partnership has successfully engaged clinical leaders, embedding structures in general practice to promote physical activity, resulting in over 110,000 patient conversations in 18 months. These approaches have resulted in evidenced shifts in attitudes, behaviour and participation at population level.

How to create a regional physical activity knowledge exchange: Lessons learnt from Yorkshire and Humber

James Brown¹, Nicola Corrigan², Andy Daly-Smith³, Kiara Lewis⁴

¹Yorkshire Sport Foundation, ²Public Health England, ³Leeds Beckett University, ⁴University of Huddersfield

Introduction: Following a 'physical activity evaluation' regional event in March 2016 multiple stakeholders recognised the need to bridge the gap between research and practice. A group of like-minded individuals who represented various stakeholder groups led the formation of the Yorkshire & Humber Physical Activity Knowledge Exchange (YoHPAKE).

Process:

- Initial meetings
- Scoping event
- Formation of services (membership sign up, virtual knowledge exchange, ask YoHPAKE)
- Launch conference

Outcomes: Launched in November 2016, the membership now totals 255 individuals who represent over 50 stakeholder organisations including: Local Authorities, Universities, County Sports Partnerships, Leisure Trusts, the National Centre for Sport & Exercise Medicine, Public Health England, Charities and Private Organisations.

- A virtual platform for the sharing of research and knowledge around physical activity.
- A membership platform to maintain accurate membership records.
- A virtual "ask YoHPAKE" platform where members can submit requests for support from other members.
- A schedule of physical events including an annual conference.

Examples of projects will be presented.

Lessons learnt:

- There is a need for a central team to drive the development of the group and maintain momentum- this requires shared time and resource commitment from all the sectors represented.
- Clear roles, responsibilities and expectations need to be established and understood by all partners.
- The opportunity for collaboration is huge as we learn more about the priorities for each sector partner.
- Do not underestimate the differences between the sectors and their individual approaches to research and evaluation.

NowWeMOVE: Global physical activity campaigning at scale

Jacob Schouenborg, ISCA

NowWeMOVE is Europe's biggest campaign promoting sport and physical activity. Its vision is to get "100 million more Europeans active in sport

and physical activity by 2020". The campaign's overall objectives are to:

- Raise awareness of the benefits of grassroots sport and physical activity among European citizens;
- Develop and promote opportunities to be active in grassroots sport and physical activity;
- Enable sustainable and innovative capacity building for grassroots sport and physical activity providers;
- Advocate for the societal benefits of grassroots sport and physical activity among policy makers.

The main flagship events of the NowWeMOVE campaign are: MOVE Week, No Elevators Day, European School Sport day, European Fitness Day; and European NowWeBike tour.

The implementation of the campaign is done through:

1. Securing a strong network of nationally based partners in all European countries.
2. Capacity building of the national partners - 42 national coordinators
3. Creating resource libraries - PR toolkits, social media toolkits, off-line campaign materials; company activation pack, Guerilla marketing toolkit. 24/7 technical, graphical and PR support.

Results: ISCA estimates the number of participants involved in NowWeMOVE campaign activities from 2012 to now to be 3.5 million people. The European campaign has now been modeled with our partners in Brazil to organize MOVE Week there from 2013 to now and since 2016 the MOVE Week initiative have been expanding to the other Latin-American countries. Next steps include scaling the campaign to further countries and ensuring sustainability and the important bottom-up approach.

External funding details: Co-funded by the European Commission, local and regional implementation by further partners.

Swiss NCD strategy: Model projects - sustainable spatial development

Fabienne Keller

Swiss Federal Office of Public Health

The initiative "Model Project — Sustainable Spatial Development 2014–2018" promotes physical activity in urban and regional planning. Since 2014 eight federal agencies have been working together supporting the third generation of Model Projects, nine of them focusing on enhancing the development of free spaces in suburban areas, where 75% of the population lives.

One such project is located in Sursee, where 17 communities have committed themselves to promoting open spaces as places for physical activity. This is part of the regional urban planning strategy with a special focus on seniors and young people. The method and the key results of the conducted social space analysis will be discussed in this contribution, as well as insights concerning the regional free space development concept.

In summer 2018 the third generation of pilot-projects will be evaluated. On the basis of those results and further reporting regarding the development of free spaces, we would like to discuss aspects of quality and process as well as future health related foci.

The contribution of active commuting to total daily moderate to vigorous physical activity

Abolanle Gbadamosi, Alexandra Clarke-Cornwell, Paul Sindall, Malcolm Granat

The University of Salford

Background: Physical inactivity is associated with a number of chronic diseases. Active commuting has been recognised as a way to increase daily physical activity. The aim of this study was to look at the contribution

active commuting makes to total daily moderate to vigorous physical activity (MVPA).

Methods: A convenience sample ($n = 24$) of university staff were asked to wear an activPAL™ for seven days. An activity diary was used to collect information on travel times to and from work, and modes of commute to and from work each day. The activPAL™ was used to measure MVPA in terms of cadence (rate of stepping) and total steps. The relationship between commute time in MVPA and total physical activity was analysed.

Results: The average number of steps taken per day was 10,359 (SD $\pm 3,469$) with total time spent in MVPA per day being 48.97 (± 26.19) minutes. The commute accounted for 17.07 (± 13.08) minutes (37%) of daily time spent in MVPA. The average active commute time spent in MVPA by car was 8.89 (± 7.55) minutes, by public transport 23.31 (± 13.36) minutes, and by walking 28.87 (± 9.23) minutes. A statistically significant positive relationship was found between commute time spent in MVPA and total MVPA (Pearson's correlation test $p < 0.001$).

Conclusion: Commuting contributes to total physical activity and can be incorporated into daily life for working individuals. Commuting actively is one way to increase daily physical activity, and the mode of transport can play an important role in determining how much MVPA is accumulated during travel.

The perceived elements of successful workplace active travel promotion: A qualitative analysis

Michael Kavanagh, Barry Lambe, Niamh Murphy, Waterford Institute of Technology

Background: Workplace travel plans are a commonly used measure to promote active travel to workplaces. In Ireland, there is little research carried out on the strategies used to implement successful workplace travel plans.

Objectives: To identify the perceived elements of successful workplace travel plans and to develop a set of recommendations to help implement these plans with long-term effectiveness in the future.

Methods: Ten semi-structured interviews were conducted from various workplace sites across Ireland. Interviewees consisted of project coordinators, active travel advocates, policy-influencers and senior management. Data saturation was reached after ten interviews and grounded theory was used to conduct the thematic content analysis.

Results: The potential impact of workplace travel planning is mitigated by a strong driving culture in Ireland. This is particularly evident outside the major cities. Workplaces need better examples of successful demonstration projects in settings which reflect diversity in population density, transport infrastructure and workplace type. A 'one-size fits all' suite of policy measures will not work in all workplaces. Key elements of a successful project include having the commitment and investment from senior management, implementing parking management strategies and collaborating with the local community, businesses and local authorities.

Conclusion: There is a need to establish an evidence base for inter-sectoral workplace travel planning in regions with lower population density and with poorer transport infrastructure. Workplaces should receive training on collaborative work practices and on implementing a broader suite of active travel measures specific to their workplace setting.

The Project "Living Healthy" - co-financed by the European Union from the European Social Fund

Slaven Krtalic, Maja Lang Morovic, Sanja Musić Milanovic, Croatian Institute of Public Health

Introduction: Since 2016 Croatian Institute of Public Health is implementing comprehensive health promotion Project “Living Healthy” on a national level. The goal of the project is the improvement of health of the entire population through activities implemented at the local community level through acting in the community, with a goal to inform, educate and raise awareness among the citizens of the Republic of Croatia of all ages on positive aspects of healthy lifestyles – healthy nutrition, physical activity, obesity prevention, decreasing overweight, decreasing morbidity from chronic non-communicable diseases.

Method: Due to its comprehensiveness and multisectorial implementation, activities of the Project are implemented through five elements: Health Education (Polygons, 10-minute exercises, Recommended menus for elementary schools and high schools), Health and Physical Activity (Walking Towards Health), Health and Nutrition (Certification Mark Living Healthy), Health and the Workplace (Health-Friendly Company) and Health and the Environment (Volunteers in Parks). The target populations of the Project are all residents of the Republic of Croatia.

Results: The implementation of Project has initiated in 14 out of 21 Croatian counties. The first activity in each county is activity “Walking towards health” followed by the “Living Healthy” conference on health promotion and best county practices in health promotion.

Conclusion: The expected public health contributions of the Project are: raising awareness of the citizens on the need for maintaining their health, modification of changeable unhealthy habits, decreasing the morbidity from chronic mass diseases and increasing the share of healthy citizens in total population of the Republic of Croatia.

Theme: Disability

Exploring the Richmond Group's insight and approaches to increasing physical activity levels in people with long term conditions and disabilities

Michelle Roberts, Age UK

Introduction: There are growing number of people with long terms conditions and disabilities in the UK, which has repercussions for individuals and society. There is significant evidence pointing towards clinical outcomes and other benefits arising from physical activity as management for a range of symptoms and conditions. The Richmond Group members and affiliates are well placed to work together to support people with long term conditions and disability to increase their physical activity levels.

Method: Supporting more people to be physically active requires improved understanding of the barriers to and the facilitators of physical activity. The Richmond Group have undertaken insight to explore this and create an approach to support people into activity based on behaviour change theory and tailored messaging. They are collaborating to share and apply learning through evidence-based interventions.

Results: The *Richmond Group* has widely disseminated its insight amongst a range of audiences and continues to build on this as evidence and learning is accumulated. Application of learning and evidence through discrete delivery projects, has highlighted that physical activity needs to be made more accessible and achievable to improve engagement and it needs to be underpinned by behaviour change to optimise adherence.

Conclusion: Working together to understand physical inactivity amongst people with a broad spectrum of conditions, symptoms and impairments and apply learning in different settings with different approaches has enabled the Richmond Group and partners to develop increasingly targeted and effective approaches to reducing physical inactivity and increasing activity.

Health related physical fitness measurement of children with special education needs in Hungary

Katalin Kälbli, Mónika Kaj, Anita Király, Tamás Csányi, Hungarian School Sport Federation

Introduction: Every child should be provided the same quality education, including physical education (PE). In Hungary, within the curriculum of PE, it is compulsory to annually assess physical fitness level of each 5-12 grade student by using an online software-supported, health-related, criterion-referenced physical fitness battery, the Hungarian National Student Fitness Test (NETFIT®). To ensure equal opportunities, the Hungarian School Sport Federation started to adapt the NETFIT® to children with special education need (SEN) evidence based in 2016.

Method: 1214 student with different kinds of SEN (mild intellectual disability (MID), other declared psychological developmental disorder (ODD), autism spectrum disorder, visual impairment, hearing impairment (HI), physical disability) were investigated along five different research objectives. Physical fitness was measured with NETFIT® and alternative tests. In the course of MID and ODD our aim was to compare the percentile distribution of the test results with those of typically developing children (TDC). In other fields validity and reliability researches were made.

Results and Conclusion: The NETFIT® and its IT system will be adapted for children with SEN. NETFIT® will be expanded with some alternative tests. The standards will be lower for MID, because in musculoskeletal tests they perform on average 20 percentile lower than TDC. In the case of blindness a new equation was developed to estimate peakVO₂. NETFIT® handbook was supplemented. New tutorial videos are available for the alternative tests, which were subtitled in order to be accessible also for children with HI. The purpose of presentation is to introduce the newly developed battery.

Theme: Environment

Adult and child physical activity benefits from taking your dog to the park

Jenny Veitch¹, Hayley Christian², Jo Salmon³, Alison Carver⁴, Anna Timperio³

¹Deakin University, ²University of Western Australia, ³Institute for Physical Activity and Nutrition (IPAN), Deakin University, ⁴Australian Catholic University

Introduction: The study examined whether adults and children who visit the park with a dog, visit more often, spend more time, and are more physically active during their park visits compared to those who visit the park without a dog.

Methods: Adults residing nearby two parks in Melbourne, Australia completed surveys in 2013 on their usual park visitation during the past three months. They reported whether they visited with their dog, the frequency and duration of visits, activity performed and time spent being physically active. They also proxy-reported corresponding items regarding their child's (2-15 years) park visits. Ordinal logistic regressions and multiple linear regressions examined associations between visiting the park with a dog and the outcome variables.

Results: Among adults (n = 1190), mean age 49 (SD:13.3), 27% visited the park with a dog. Among children (n = 725), mean age 9 (SD:3.6), 23% visited with a dog. Park visitation with a dog was associated with increased odds of being in the 'high' category for frequency of park visitation (visit > once/week) among adults (OR = 2.55, 95% CI:1.95,3.33) and children (OR = 1.96,95% CI:1.38,2.78) and increased odds of being in the 'high'

category for usual park-based activity (mostly vigorous activity) among adults (OR = 1.89, 95%CI:1.47,2.44).

Conclusion: Adults and children who visited the park with a dog visited parks more often but for a shorter duration. Adults were also more likely to engage in higher levels of physical activity. Providing supportive park amenities for dog walkers may further promote dog walking and physical activity.

Associations between neighbourhood block pattern and transportation and leisure physical activity in Canadian adults

Gavin McCormack¹, Anita Blackstaffe¹, Brenlea Farkas¹, Lindsay McLaren¹, Christine Friedenreich², Beverly Sandalack¹, Francisco Uribe Alaniz¹, Melissa Potestio², Afrah Rayes³, Alberto Nettel-Aguirre¹

¹University of Calgary, ²Alberta Health Services, ³City of Calgary

Background: Cross-sectional studies can provide useful insight about built environment-physical activity associations when factors related to neighbourhood choice are considered. Our study compared weekly transportation and leisure physical activity (PA) between three neighbourhood block patterns, statistically adjusting for sociodemographic characteristics and reasons for neighbourhood choice.

Method: A stratified random sample of adults (age ≥20 years) living in established (pre-1980) Calgary neighbourhoods (Canada) with different block patterns (grid, warped-grid, curvilinear) and socioeconomic status completed a self-administered questionnaire capturing PA, sociodemographic characteristics, and reasons for neighbourhood choice (response rate = 10.1%; n = 1023). Logistic and linear regression models estimated associations between block pattern, and transportation and leisure PA (participation and MET-hours), adjusting for neighbourhood SES, socio-demographic characteristics (sex, age, ethnicity, education, household income, marital status, number of children, motor vehicle access, dog ownership, injury), and reasons for neighbourhood choice (e.g., proximity and quality of recreational and utilitarian destinations, proximity to work, access to highways, aesthetics, and sense of community).

Results: N = 915 participants provided complete data. Compared with those living in curvilinear neighbourhoods, grid neighbourhood participants had greater odds (P < .05) of participating in transportation walking (OR = 2.00), transportation and leisure cycling (OR = 2.22 and OR = 1.62), and high-intensity leisure PA (≥6 METs; OR = 1.72). We found similar associations for warped-grid versus curvilinear neighbourhood participants. There were no differences in weekly transportation or leisure MET-hours by block pattern; however, combined MET-hours was higher for warped-grid versus curvilinear neighbourhood participants (141 vs. 120, P < .05).

Conclusion: Neighbourhood block pattern may shape PA patterns in adults, even taking reasons for neighbourhood choice into account.

External funding details: This study was part of the Pathways to Health project funded by the Canadian Institutes of Health Research (CIHR; MOP-126133). Gavin McCormack is supported by a CIHR New Investigator Award (MSH-130162). Christine Friedenreich was supported by an Alberta Innovates Health Solutions Health Senior Scholar Award and an Alberta Cancer Foundation Weekend to End Women's Cancers Breast Cancer Chair.

Designing healthy communities: Creating evidence on metrics for built environment features associated with walkable neighbourhood activity centres

Lucy Gunn, RMIT University

Background: Designing healthy, sustainable and equitable communities requires evidence-based metrics to inform urban planning policy

development. This study examined the association of a broad range of policy-relevant built environment features surrounding neighbourhood activity centres (NACs) measured using GIS with two transport walking related outcomes.

Methods: 534 NACs in Melbourne, Australia were categorized by their built environment features using cluster analysis. Victorian Integrated Survey of Travel Activity participants (n = 19,984) were linked to their closest NACs and multilevel logistic regressions estimated to evaluate associations between each cluster typology and two health outcomes: any transport walking; and, any neighbourhood transport walking. Local planning policy compliance on supermarket location was assessed.

Results: Three clusters were identified and associated with walkability. NACs categorized as highly walkable had significantly higher street connectivity (mean:161, SD:20), destination diversity (mean:16; SD:0.4); and net residential density (mean:77, SD:65) compared with low walkable NACs which had lower street connectivity (mean:57; SD:15); destination diversity (mean:11; SD:3); and net residential density (mean:10; SD:3). Regression results showed a significant trend for transport walking outcomes by cluster. Only highly walkable NACs met the policy requirement that residents live within 1 km of a local supermarket.

Conclusions: NACs built environment features must reach certain levels to encourage walking and deliver health promoting, sustainable, and equitable cities. Research about the type and quantity of built environment features is needed to create metrics for inclusion in urban planning policies and urban design guidelines.

External funding details: Research supported by the Centre of Research Excellence in Healthy, Liveable, Communities (NHMRC grant #1061404).

Environmental correlates of active transport to school in New Zealand adolescents living within a walkable distance to school

Sandra Mandic¹, Antoni Moore¹, John Spence², Enrique García Bengoechea³

¹University of Otago, ²University of Alberta, ³University of Limerick

Background: Physical environment factors (including built environment) are predictors of active transport to school in children and adolescents. However, perceptions and features of the built environment are location-specific. This study examined the environmental correlates of walking to school in adolescents from Dunedin, New Zealand, who lived within a walkable distance to school.

Methods: Adolescents (n = 381; age: 15.3±1.4 years; 44.6% boys; living ≤ 2.25 km from school) from all 12 secondary schools in Dunedin, New Zealand, completed an online survey about travel to school and Neighbourhood Environment Walkability Scale for Youth questionnaire in 2014-2015. Distance to school was calculated using Geographic Information Systems network analysis. Threshold distance for walking to school (≤2.25 km) was calculated using Receiver Operating Curve analysis (BEATS Study data; 1,463 adolescents; sensitivity/specificity/area under the curve: 0.86/0.82/0.93). Data were analysed using mixed effects binary logistic regressions.

Results: Overall, 69.6% of adolescents walked to school (range across schools: 61.9% to 83.1%). In a multivariate analysis, adolescents perceptions of good street connectivity in their home neighbourhood was positively associated with walking to school [OR (95%CI): 2.21 (1.08-4.50)], whereas age [0.79 (0.66-0.96)] and distance to school [0.99 (0.99±0.99)] were negatively associated. No other aspects of the perceived neighbourhood environment were related to adolescents' walking to school.

Conclusions: Built environment interventions for promoting walking to school in adolescents living within a walkable distance to school should focus on improving street connectivity.

External funding details: Health Research Council of New Zealand, National Heart Foundation, Lottery Health Research Grant, Dunedin City Council, University of Otago.

Exploring the significance of public parks to physical activity and health in Bangkok, Thailand

Orana Chandrasiri¹, Sigit Arifwido²

¹International Health Policy Programme, ²Kasetsart University

In Bangkok, built environment is considered as a hindrance for engaging physical activity (PA) and parks have become the only public infrastructure in the city that can provide support to PA promotion. However, parks and green space is considered secondary in infrastructure planning in Thailand, where roads and highways are more important. The paper explores the PA levels in ten district and community parks in Bangkok, Thailand. System for Observing Play and Recreation in Communities (SOPARC) is used to examine the change of activity patterns of users in the park and levels of PA. A survey questionnaire of people who live in five minutes' walk from the park is used to understand the perception and attitude of Bangkok's residents towards public park. It is found that in Bangkok, there are average of 1,000 to 10,000 people visiting public parks every day and more than 70% of them are already engaged in physical activity. It is also found that in Bangkok, one time visit to the park is equal to the increase of seven minutes of total moderate to vigorous PA per week. The implication of the study is that in Bangkok, clustering physical activity campaigns in the urban and community parks will broaden the current efforts on advocating the issue. This is because public parks offer a unique setting, providing opportunities for physical activity, enjoyment of nature, and social interaction compared to any other public infrastructure.

Exposure to extreme heat conditions and air pollution by low-income minority children playing in NYC parks

Oriol Marquet¹, Claudia Alberico², Elizabeth Mazak², Jing Huang², J. Aaron Hipp², Myron Floyd²

¹NORTH CAROLINA STATE UNIVERSITY, ²North Carolina State University

Introduction: Children's use of parks and playgrounds make them vulnerable to ultraviolet radiation, episodes of dangerous heat and unhealthy air quality conditions. This study examined how children's park use and physical activity changed during extreme heat conditions and poor air quality episodes.

Methods: Trained observers conducted 1051 SOPARC (System for Observing Play and Recreation in Communities) scans in 20 parks (181 total target areas) in low-income, high-minority areas of New York City during spring 2017. 16,603 children (5-10 y) were counted. Scans recorded ethnicity, age, and physical activity. We used METAR data and EPA Air Quality Data to measure weather and air quality conditions at the time of each scan.

Results: During episodes of high heat (defined by National Weather Service), attendance of children to the parks was 20.6% lower than in normal conditions. Latino children were more likely to be observed in parks during high heat conditions (IRR = 1.693; $P < 0.001$) than Asian (IRR = 0.657; $P < 0.001$), or African-American children (IRR = 0.809; $p = 0.031$). During high heat episodes, shaded areas gathered 73.8% more children than non-shaded ones. Other significant differences related to high heat exposure and preference for shaded areas were found by gender, for

moderate and vigorous activities, and across ethnicities. Children's park attendance did not change significantly with poor air quality conditions.

Conclusions: High heat conditions seem to affect children park attendance differently in terms of ethnicity. Park attendance did not change in episodes of poor air quality, putting children at risk.

External funding details: Funded by the Robert Wood Johnson Foundation through the Physical Activity Research Center.

Moving to an active lifestyle? A systematic review of the effects of residential relocation on walking, physical activity, and travel behaviour

Klaus Gebel¹, Binh Nguyen², Vincent Learnihan³, Adrian Bauman², Rachel Davey³, Bin Jalaludin⁴, Ding (Melody) Ding²

¹Australian Catholic University, ²University of Sydney, ³University of Canberra, ⁴University of New South Wales

Background: Longitudinal relocation studies allow establishing the temporal sequence of cause and effect for neighbourhood environments and physical activity, a key criterion for causation. To date no systematic review has synthesised the literature on effects of residential relocation on physical activity, walking and travel behaviour.

Methods: Systematic review following the PRISMA guidelines (PROSPERO registration CRD42017077681). Databases for peer-reviewed and grey literature were systematically searched to March 2017, followed by forward and backward citation tracking. Studies were eligible for inclusion if they 1) measured changes in neighbourhood built environment attributes through residential relocation (prospectively or retrospectively); 2) included a measure of physical activity, walking, cycling, or travel modal change as an outcome; 3) were quantitative; and 4) included an English abstract.

Results: A total of 23 studies was included in the review. Among the 8 retrospective longitudinal studies, there was good evidence for the relationship between relocation and walking (consistency score [CS] >90%). For the 15 prospective longitudinal studies, the evidence for the effects of environmental change/relocation on physical activity or walking was weak to moderate (CS mostly <45%), even weaker for effects on other outcomes, including physical activity, cycling, public transport use and driving. Results from risk of bias analyses support the robustness of the findings.

Conclusion: The results are encouraging for the retrospective longitudinal relocation studies, but weaker evidence exists for the methodologically stronger prospective longitudinal relocation studies. The evidence base is currently limited. Continued longitudinal research should extend the plethora of cross-sectional studies to build higher quality evidence.

Neighbourhood walk score and falls among older Taiwanese adults

Yung Liao, National Taiwan Normal University

Although falls plays an important role on active aging, fewer studies have focused on the relationships between neighbourhood walkability and falls among older adults. This study aimed to examine the cross-sectional associations between Walk Score and fall risks among older Taiwanese adults. A telephone-based interview survey targeting older Taiwanese adults aged over 65 years was conducted in Sep-Oct 2017. The outcome variable was self-reported fall in past one year (yes/no). The exposure variable was four category of Walk Score (Walker's Paradise, Very Walkable, Somewhat Walkable, Car-Dependent) determined manually for each participant's residential village using Walk Score® website (<https://www.walkscore.com/>). Binary logistic regression analyses were utilized.

Among a total of 1,056 respondents (73.0 ± 6.1 years), 23.4% of them reported having the experience of falls in the past one year. After adjusting for demographic and health-related covariates, there were significant negative associations between one category of neighbourhood Walk Score and risks of falls in older adults. Older adults living in Very Walkable neighbourhood is associated with lower odds of experiencing a single fall (odds ratio (OR): 0.65, 95% confidence interval (CI): 0.42-1.00) compared with Car-Dependent neighbourhood. This study was the first to find that neighbourhood Walk Score was related to falls among older adults in a non-Western context. Further longitudinal research to confirm these results using other objective measures of the environment, such as a geographic information system, are still needed.

External funding details: This research was supported by a grant (MOST 106-2410-H-003 -124) from the Ministry of Science and Technology of Taiwan.

Neighborhood walkability and physical activity of Czech adolescents

Josef Mitáš¹, Lukáš Rubín¹, Jiří Nykodým², Emil Řepka³, Dana Feltlová⁴, Aleš Suchomel⁵, Ladislav Bláha⁶, Petr Valach⁷, Hana Klimtová⁸, Oldřich Racek², Jan Schuster³, Karel Frömel¹

¹Palacký University, Faculty of Physical Culture, ²Masaryk University, Faculty of Sport Studies, ³University of South Bohemia, Faculty of Education, ⁴University of Hradec Králové, Faculty of Education, ⁵Technical University Liberec, ⁶Jan Evangelista Purkyně University, Faculty of Education, ⁷University of West Bohemia, Faculty of Education, ⁸University of Ostrava, Faculty of Education

Background: Neighborhood environment might influence health behavior in Czech adolescents with Increasing prevalence of obesity and unhealthy lifestyle. The aim of this study was to look for difference in physical activity of Czech adolescents according to neighborhood walkability.

Methods: Standardized method using the IPEN adolescent protocol was used to get the sdata on physical activity (PA) and neighborhood environments across Czech regional cities. The research was running from 2014 to 2016. Total of 1745 adolescents (895 boys) aged 11-19 years participated in the study. Current results include sample of 217 respondents who met the including criteria (objective measures of both PA and environment).

Results: High walkability was significant factor to be more physically active in adolescent only in weekend days ($p < 0.01$). During the week and school day, neighborhood walkability did not influence the level of PA. The locality (city center and surroundings) was a significant factor for meeting 60 min of MVPA guideline (OR = 1.58; $p = 0.550$; 95% CI [0.99; 2.53]), in other parts of the cities (outskirts and block of flats) PA did not vary in both sexes.

Conclusions: The research on PA and built environment in Czech adolescents indicates no significant differences across the neighborhoods. The policy and school intervention programs should reflect these indicators in creation more active friendly and safe environments to influence the level of physical activity in adolescents.

External funding details: Supported by the research project of Czech Science Foundation “Multifactorial research on built environment, active lifestyle and physical fitness in Czech adolescents” (No. 14-26896S).

Public parks: Characteristics, users and potential for physical activity promotion

Maria Paula Santos¹, Simone Oliveira², Paula Silva²

¹University of Porto, ²Univeristy of Porto

Introduction: Public parks are outdoor environments that could favour physical activity. The aim of this study was to describe public parks use and

supply of structures. Four parks from Guimarães (North of Portugal) were assessed through the EAPRS instrument. Data on the parks use were obtained with the iSOPARC app. Kruskal-Wallis test and Chi-squared tests were used.

Results: From 4.906 observations (4.842 valid), 9.882 park users were observed (63.5% male), 14.1% children (0.36±1.32), 15.8% adolescents (0.32±1.07), 37.2% adults (0.83±1.7) and 23.3% older users (0.53±1.83). Walking *e* Vigorous categories were more frequently observed during the morning period (28.8% and 30%). Children (38.9%), adolescents (38.8%) and adults (31.2%) were more frequently observed during the evening period “17:30”, older users were more observed during afternoon period (33.5%). An association was found between age group (older) and sedentary PA level ($r = 0.69$; $P < 0.05$) and between walking and adult users ($r = 0.62$; $P < 0.05$). Vigorous PA level was moderately associated with children age group of users ($r = 0.46$; $P < 0.05$). There was also an association between adults and children observed in parks ($r = 0.35$; $P < 0.05$). The unpaved trail seems to contribute to greater walking in parks.

Conclusion: The use of parks to be active can be promoted from a varied distribution of structures favouring the practice of moderate-vigorous physical activity

External funding details: Research Centre in Physical Activity, Health and Leisure (CIAFEL) is supported by Grant: UID/DTP/00617/2013

Systematic review of activity spaces in studies of environment, physical activity, and health

Lindsey Smith, Jenna Panter, Louise Foley, University of Cambridge

Static measures of environmental exposures may be restrictive, however activity spaces (AS) provide a dynamic measure of mobility and describe how spaces are used. We aimed to identify methods used to delineate AS which show greatest promise for strengthening causal inference for studies of the environment and physical activity.

Published and unpublished articles identified from seven electronic databases from a range of disciplines, reference lists, bibliographies, and websites up to February 2018 were systematically searched for, appraised, and analysed. We included studies if they comprise a spatial summary measure of movement, behaviour, activity, or locations visited and explicitly geo-located these locations using objective or self-reported measures. Assessments included the shape or size of an AS or environmental characteristics of it. We extracted information on study design, sample characteristics, exposure and outcome measures, spatial analytical approaches and conceptual issues discussed (e.g selective daily mobility bias and causality). Results will be presented narratively to understand the research questions answered and the methods used to further causality.

Studies came from the fields of public health, social and behavioural sciences, and transport studies. Self-reported and objective measures were used and some used mixed method approaches. Relatively few studies discussed conceptual issues and improved our understanding of causality but those that did used qualitative methods to unpack mechanisms and quantitative methods to understand changes in use of space over time. This review will provide conceptual, methodological and analytical insights and describe how these may be applied to strengthen causal inference.

External funding details: MRC

The development and testing of an objective and practical Flemish walkability tool

Sara D’Haese¹, Sara D’Haese¹, Ragnar Van Acker¹, Jelle Van Cauwenberg², Peter Vervoort³, Mieke Nol¹, Werner De Wael¹

¹Flemish Institute Healthy Living, ²Ghent University, ³Flemish Government

Introduction: Studies worldwide have shown that living in high-walkable neighbourhoods is related to more physical activity. However, few practical tools are available to policy makers to assess neighbourhood walkability in order to prioritize neighbourhoods in need for environmental interventions. Therefore, the objective was to develop and test an objective walkability tool that can be used by policy makers in Flanders (Northern region of Belgium).

Method: Walkability was calculated by following formula: walkability = (2*z-connectivity) + (z-residential density) + (z-land use mix). Based on the input of a panel of urban planners and policy makers, a prototype was developed using geographical information systems (GIS). This prototype was tested and adjusted based on focus groups with civil servants in five municipalities of different scales.

Results: A user friendly open-source walkability tool was developed. Users can indicate their local neighbourhoods of interest to calculate and compare walkability scores. A manual with guidelines on the interpretation of the score is incorporated in the tool.

Conclusion: This Flemish walkability tool is probably the first European tool that maps and compares the objective walkability scores of neighbourhoods in a large region. This tool will be disseminated to policy makers, civil servants, private organisations and citizens as part of a larger project on health in local spatial policies. It provides support in making more evidence-based decisions on spatial planning and design. The tool will stimulate them in the further development of a more integral local (health) policy (e.g. integration of physical activity in spatial policy).

External funding details: This project is funded by the Flemish Government.

The environment as a physical activity facilitator: for advantaged only?

Nicole Stappers¹, Dave Van Kann², Nanne De Vries¹, Stef Kremers¹

¹Maastricht University, ²Fontys University of Applied Sciences

This study investigated associations between socio-demographic characteristics, health-related quality of life (HRQOL), perceived environment and objectively measured physical activity (PA) outcomes. Socio-demographic characteristics were assessed using a questionnaire and HRQOL was measured using the EQ-5D. The Neighborhood Environment Walkability Scale (NEWS) was used to assess the perceived environment. Sedentary behaviour (SB), light PA (LPA) and moderate-to-vigorous PA (MVPA) were measured using Actigraph GT3X+. Data of 622 Dutch adults were used in multivariate linear regression analyses to investigate associations between NEWS and PA outcomes. Analyses were controlled for socio-demographic characteristics and HRQOL. Presence of attractive buildings was associated with less SB ($\beta = -.086$, $p < .01$) and more MVPA ($\beta = .118$, $p < .01$). Presence of destinations within walking distance was also positively associated with MVPA ($\beta = .106$, $p < .01$). Less crime was associated with less MVPA ($\beta = -.092$, $p < .05$). Interactions between personal and environmental characteristics showed that the presence of PA facilitating factors was associated with less SB and more LPA and MVPA. These associations were only found for higher educated residents, residents without problems regarding usual activities, residents with a normal weight, and residents living with children. The absence of PA hindering factors was associated with less SB and more MVPA, but only for residents with problems regarding pain and usual activities. More PA-supportive environments can lead to decreased SB and increased PA, but differ in potential for advantaged and disadvantaged residents. Exploration of context-specific associations between environment and PA outcomes might help to clarify the identified associations and the differences between advantaged and disadvantaged residents.

The perceived built and social environments, objectively measured physical activity and body weight changes in a longitudinal cohort of South Africans from low-income communities: STOP-SA (Slow, Stop or Stem the Tide of Obesity in the People of South Africa)

Estelle Lambert¹, Kufre Okop¹, Robert Dover², Amy Luke³, Lara Dugas³, Tracy Kolbe-Alexander⁴, Olufunke Alaba¹

¹University of Cape Town, ²University of Antioquia, ³University of Loyola, ⁴University of Southern Queensland

Background: South Africa is a middle-income country; nearly half of all households are food insecure. Despite this, >60% of women and >30% of men are overweight/obese, and >50% are insufficiently active. Additionally, the legacy of apartheid legislation reinforced spatial isolation of the built environment. There is a need to identify ecological factors linked to this “wicked problem” of obesity, food insecurity and physical inactivity.

Methods: We examined perceived built and social environments, objectively-measured moderate-to-vigorous physical activity (MVPA) and body composition changes in 247 participants (62% women) of the original Modeling the Epidemiological Transition Study cohort (N = 504), living in an urban, low-income township. Weight, body composition, accelerometry (MVPA), and perceived neighbourhood attributes (NEWS, NQLS) were measured.

Results: Follow-up was 4.5 yrs. At baseline, 29% were obese, 40% food insecure. More than 40% gained >5% weight. Multivariate analysis showed perceived neighborhood safety (Beta, -0.05), social cohesion (-0.07), freedom from litter (-0.25), and MPA (min/wk in 1 min bouts, Beta -0.006) were significantly negatively associated with relative gain in body fat/yr (adj R² = 0.162). Mediation analysis, controlling for gender, showed neighborhood freedom from litter had a significant inverse correlation (-0.20; $p = 0.010$) with >5% change in body fat. When considering this relationship with the contribution of VPA (min/wk in 1 min bouts), the significance of the correlation (-0.25; $p = 0.008$) increased; indicating that PA is an effect modifier. This study advances our knowledge by demonstrating a prospective association between neighborhood attributes and body composition changes over time, in low-income settings, which may be mediated by PA.

External funding details: National Research Foundation

Using GPS and accelerometry to explore the use of green space for physical activity of older adults

Ruth Hunter¹, Claire Cleland¹, Sara Ferguson¹, Ruibing Kou¹, Claudia Alberico², Rodrigo Reis³, Adriano Akira Hino⁴, Jasper Schipperijn⁵, Geraint Ellis¹

¹Queen's University Belfast, ²North Carolina State University, ³Washington University in St. Louis, ⁴Pontifical Catholic University of Parana, ⁵University of Southern Denmark

Introduction: Healthy urban ageing is a global issue with the need for cities to align with the ‘New Urban Agenda’ to ensure ‘age- and gender-responsive planning and investment for sustainable, safe and accessible urban mobility’ and ‘resource-efficient transport systems, linking people, places, goods, services and economic opportunities’. However, we know little about if and how older adults access and utilise green space for physical activity.

Methods: 254 older adults (aged 60 years and over) in Northern Ireland wore an accelerometer (Actigraph GT3X) and GPS device for 7 days, and completed a survey detailing their use and perceptions of local parks and green space.

Results: Results showed that 75% of participants had a park within a 1 km distance from their home. However, preliminary analyses suggest that

older adults make limited use of the parks and green space in their local area to be physically active. The presentation will explore the demographic characteristics of those regularly using green space to be active, accessibility and the types of green space being used for physical activity.

Conclusion: Interventions are required to encourage older adults to make better use of local parks and green space for being physically active. This may include improving access and/or quality of green space, and developing programmes to encourage older adults to utilise their local green space

External funding details: Economic and Social Research Council (ESRC) and Newton Fund

Which physical and social environmental factors most strongly influence a street's appeal for transportation cycling among adolescents? An experimental study using manipulated photographs

Benedicte Deforche¹, Hannah Verhoeven¹, Ariane Ghekiere¹, Ilse De Bourdeaudhuij¹, Peter Clarys², Delfien Van Dyck¹, Jelle Van Cauwenberg¹

¹Ghent University, ²Vrije Universiteit Brussel

Objective: We used manipulated photographs in an experimental setting to investigate which physical and social environmental factors are most important for adolescents' preferences towards transportation cycling. In addition, we examined whether subgroups of adolescents with different environmental preferences for transportation cycling could be identified and whether these subgroups differed in individual characteristics.

Methods: An online survey consisting of questions on socio-demographics, psychosocial characteristics and cycling level, and 15 choice tasks with manipulated photographs was completed by 882 adolescents (55.3% male; 12-16y). Participants chose between two possible streets to cycle to a friend's house which differed in seven physical micro-environmental factors, cycling distance and co-participation in cycling. Hierarchical Bayes analyses and latent class analyses were performed.

Results: In the total sample, adolescents' preference for transportation cycling was predominantly determined by separation of cycle path, followed by shorter cycling distance and co-participation in cycling. Three subgroups that differed in their environmental preferences for transportation cycling could be identified. Subgroup 1 (70%) attached most importance to separation of cycle path and for them predominantly safety-related aspects were important. Subgroup 2 (24%) attached most importance to being able to cycle together with a friend and had the highest percentage of regular cyclists. In subgroup 3 (6%), the importance of cycling distance clearly stood out. This subgroup included the lowest percentage of regular cyclists.

Conclusion: Results of this experimental study justify investment by local governments in well-separated cycling infrastructure, which seemed to be more important than cycling distance and the social environment for most adolescents.

Theme: Epidemiology

24-hour activity profiles and longitudinal associations with health-related quality of life in breast cancer survivors

Terry Boyle¹, Jeff Vallance², Brigid Lynch³

¹University of South Australia, ²Athabasca University, ³Cancer Council Victoria

Introduction: Evidence from longitudinal studies on the associations of physical activity (PA), sedentary time and sleep with health-related quality of life (HRQoL) among breast cancer survivors is sparse. We investigated the

association between profiles of 24-hour activity (based on sleep, sedentary time and PA) and change in HRQoL over time in breast cancer survivors.

Methods: Baseline (2013) and follow-up (2017) assessments were completed by 169 participants. Self-reported sleep duration and accelerometer-assessed sedentary time, light-intensity PA (LPA) and moderate-to-vigorous intensity PA (MVPA) were collected at baseline. HRQoL was assessed at baseline and follow-up with the Functional Assessment of Cancer Therapy-Breast (FACT-B). We used latent profile analysis to identify profiles of 24-hour activity, then linear regression to investigate the association between these profiles and change in HRQoL between baseline and follow-up.

Results: Four distinct 24-hour activity profiles were identified. After adjusting for demographic and clinical confounders, mean change in FACT-B score was significantly lower among participants in Profile 4 (characterized by high sedentary time and low LPA and MVPA) than Profile 1 (high MVPA, long sleep; difference in change score to Profile 4 = +4.4 points), Profile 2 (low sedentary time, high LPA, short sleep; difference = +6.7 points) and Profile 3 (average for all behaviours; difference = +6.8 points). No individual behaviours were significantly associated with change in HRQoL.

Conclusion: A greater decline and/or smaller improvement in HRQoL (some meeting the minimal clinically important difference threshold) was observed among breast cancer survivors with high sedentary time and low LPA and MVPA at baseline.

External funding details: BCRC-WA; CCWA; NHMRC

Arterial hypertension and physical activity in Brazilian adults:

Population-based study

Luciana Monteiro¹, Francelino Braga Junior¹, Andrea Varela²

¹University Center of the Federal District, ²Federal University of Pelotas

Background: To analyze the epidemiologic characteristics of the systemic arterial hypertension (SAH) in the adult population of Cuiabá, Brazil and the associations between physical activity (PA) and physical inactivity.

Method: Cross-sectional population-based study, with 1,298 adults, ages between 20 and 59 years, of Cuiabá, Brazil. Through inquiry of simple random sample, with replacement, of domiciliary application, sociodemographic information and of life habits were obtained including the PA, with measures of blood pressure (BP), weight, height and waist circumference.

Results: The prevalence of the SAH was 28.3%, with significant predominance in men (30.5% versus 17.8%). The population being studied presented 23% of smokers, 22.3% of former smokers and 54.1% with alcoholic habit. The independent association between SAH and gender, age, less than 8 years of study, per capita income inferior to 3 to 6 minimum wages, overweight and obesity, central adiposity and condition of the former smoker. In relation to the PA in the free time: physical inactivity occurred in 55.7%, moderate in 11.1% and intense in 1.1%. At work: physical inactivity in 42.2%, moderate in 13.3% and intense in 20%. Overall, there was no association between SAH and sedentary activity, however an association between arterial hypertension and sedentary activity during free time and work was noticed.

Conclusion: The SAH was association with classic risk factors and suggests the further study of the relations between high blood pressure and physical activity, during leisure and work.

Assessment of physical activity in preschoolers

Celine Roda¹, David Donaire González¹, Michelle Mendez², Chara Chatzigeorgiou³, Theano Roumeliotaki³, Maria Vassilaki³, Leda Chatzi³, Manolis Kogevinas¹, Jordi Sunyer¹, Judith Garcia-Aymerich¹

¹ISGlobal, ²Department of Nutrition, University of North Carolina, Chapel Hill, North Carolina, ³Department of Social Medicine, Faculty of Medicine, University of Crete, Heraklion

Introduction: Accurate assessment of physical activity (PA) in preschoolers is challenging. We aimed to compare a direct measure of PA in preschoolers with parental-report measures.

Methods: A total of 40 preschoolers in Spain and Greece worn an Actigraph GT3x accelerometer for at least 3 days. Their parents filled out a questionnaire about their child's PA (type, frequency, and duration of moderate-to vigorous PA – MVPA) and sedentary behavior over a typical week. They also reported how they rated their child's activity. Validity and reliability (one month apart) of parental-report measures were assessed using Spearman correlations, Bland-Altman plots, intraclass correlations (ICC), and Wilcoxon tests.

Results: Half of participants were boys. The mean (SD) age of children was 4.2 (0.6) years. **Validity:** Medians of time spent in MVPA during school time and out-of-school hours assessed by accelerometer (versus questionnaire) were 51.5 min (vs. 60.0 min) and 43.0 min (vs. 58.6 min), respectively. Measures derived from accelerometer and questionnaire were significantly correlated ($r > 0.50$). The questionnaire overestimated daily time spent in MVPA (mean difference +22.2 min/day compared to accelerometer). Highest values of accelerometer measures were observed for children considered as “quite or very active” by their parents. **Reliability:** No difference between the two waves was identified for all indicators of time spent in MVPA, and sedentary behavior. The ICC for total MVPA and TV viewing were 0.45 (95% CI: 0.07; 0.71) and 0.90 (95% CI: 0.79; 0.96), respectively.

Conclusions: The designed questionnaire might be a useful tool for assessing preschoolers' PA in large epidemiological studies.

Characteristics of park usage by children and adolescents, Bucaramanga, Colombia: A secondary analysis

Diana Marina Camargo Lemos¹, Paula Camila Ramírez Muñoz¹, Vanesa Quiroga¹, Hernán Porras¹, Mike Barreto², Rogério Férmino³, Ana Paola Ríos⁴, Olga Lucía Sarmiento⁴

¹Universidad Industrial de Santander, ²Universidad Santo Tomás, ³Universidad Federal Tecnológica de Paraná, ⁴Universidad de los Andes

Introduction: Public parks offer a great opportunity for recreation and leisure time for children and adolescents in which obesity and screen time has been increasing. This study describes the patterns of park usage by children and adolescent in a Colombian intermediate city.

Method: Ten public parks were observed using the System for Observing Play and Recreation in Communities (SOPARC) between August to December in 2015. Ten observations periods were made in 5 days of the week. Sex, age, period of day, parks' strata and areas for physical activity were analyzed.

Results: In total 16,671 observations were completed, recording 17,248 children and adolescents as park users of which more men were observed 11,264 (65.3%); also among women, more girls (62.7%) were observed compared to female adolescents (37.3%). Fifty percent visit the park in the afternoon of which 69.1% were male adolescents. Both, girls and boys (76.7%;60.4%), compared with adolescents, visited more frequently low strata parks, showing a significant trend to decrease in medium (62.4%; 53.3%) and high strata parks' (52.6%;31.5%) respectively. More adolescent men were observed on weekdays (51%) comparing to weekend (45.1%). Playgrounds, outdoor gyms and roundabouts were highly used by children 78%, 73% and 57.7%, respectively; on the contrary courts,

fitness stations and walking/bike trails were more used by adolescents 56.8%, 63.4% and 60% respectively.

Conclusion: Is necessary to increase, innovate, diversify and maintain in good conditions the areas for recreation and enjoyment of leisure time for children and adolescents.

External funding details: Administrative Department of Science and Technology of Colombia (Colciencias).

Clustering of physical activity domains and its association with nutritional status among Brazilian adults

Thiago Matias, Kelly Silva, Sofia Manta, Giovani Del Duca

Federal University of Santa Catarina

Introduction: There is often synergy among physical activity (PA) domains. In turn, this combination may substantially affect nutritional status. This study aimed to identify clustering patterns of PA across multiple domains (leisure, occupation, transport, and home domains) in Brazilian adults and cross-sectional associations with nutritional status.

Method: Data from the 2013 Brazilian National Health Survey (n = 50,176 adults; from 18 to 59 years-old; females: 51,7%) were analyzed. Standardized questionnaire was applied to investigate PA and height and weight were measured. Two-step cluster analysis was conducted to identify PA patterns. Multinomial logistic regression assessed associations between the clusters and nutritional status (normal weight was the reference category).

Results: Three reliable and meaningful clusters were identified and labelled as follows: (1) low active (68.3%); (2) active occupational/transport (14.6%), and (3) active leisure (17.1%). Compared to low active, active occupational/transport cluster (OR = 0.54; 95%CI = 0.34-0.85, p = 0.008) and active leisure (OR = 0.49; 95%CI = 0.33-0.72, p < 0.001) were less likely to be underweight than normal weight. Active occupational/transport cluster was 24% less likely to be overweight, and 30% less likely to be obese than normal weight. No association was observed between active leisure cluster and overweight/obese adults.

Conclusion: Almost three quarters of the sample reported a low active profile across multiple PA domains. Consistent associations between the active occupational/transport cluster and nutritional status were found. Identification of cluster patterns of obesity-related protective factors point an urgent need of health promotion engaging adults in active lifestyle.

External funding details: Brazilian Institute of Geographic and Statistics, Brazilian Ministry of Health

Daily pattern of active commuting in Chilean adult according to gender and day of the week

Timoteo Araujo¹, Timoteo Araujo², Sandra Matsudo³

¹Universidad Mayor, Santiago / CELAFISCS / FMU, ²CELAFISCS - fmu,

³Facultad Ciencias, Universidad Mayor, Clínica MEDS - Santiago

Background: The objective of the study was to describe the daily pattern of active commuting in adults from Gran Santiago de Chile according to gender and day of the week. We analyzed data from the “Experimental Survey on the Use of Time in the Gran Santiago de Chile” including 3477 adults aged ≥ 15 years (1886 women and 1610 men). The assessment of active commuting time was performed as a daily record every 30 minutes, 14 hours/day and analyzed in 3 domains: leisure and physical activity-LEX, occupational-WK, and commuting to work and school-COM. We used Chi Square test to examine the associations of daily patterns of active commuting with gender and day of the week.

Results: The percentage of men and women involved in the three types of active commuting were respectively: 6.2% and 6.4% for LEX; 3.4% and 2.8% for COM; and 7.2% and 11.6% for WK. The mean time spent in these 3 domains (LEX, COM and WK) were 52.1, 48.2 and 51.5 min/day for men, and 51.1, 44.6 and 51.3 min/day for women. According to the weekday and weekend day the distributions were as follows: LEX- men 10.3% and 8.8%; women: 9.2% and 5.6%; COM- men 7.1% and 4.9%; women: 6.6% and 1.6%; WK- men: 9.1% and 10.2%; women: 10% and 12.1%.

Conclusion: The pattern of active commuting in adults from Gran Santiago de Chile does not seem to be related to gender and day of the week.

Effects of main transportation mode on physical activity and frailty in Japanese older adults living in rural areas

Takumi Abe¹, Jaehoon Seol², Hitomi Matsuda³, Yuya Fujii⁴, Tomohiro Okura⁵

¹Tokyo Metropolitan Institute of Gerontology, ²Doctoral Program in Physical Education, Health and Sport Sciences, University of Tsukuba, Japan, ³Faculty of Medicine, University of Tsukuba, Japan, ⁴Master's Program in Health and Sport Sciences, University of Tsukuba, Japan, ⁵Faculty of Health and Sport Sciences, University of Tsukuba, Japan

Purpose: This study aimed to investigate the cross-sectional and longitudinal relationships between transportation mode (TM), physical activity (PA), and frailty status.

Methods: Mailed baseline and follow-up surveys for older adults were conducted in 2013 and 2014, respectively. This analysis included 460 Japanese older adults living in rural areas. Based on responses about main TMs, participants were categorized into car drivers, car passengers, and non-car users. PA was assessed using the International PA Questionnaire. The standardized Kihon Checklist was used to assess frailty status. Analysis of variance was used to compare total PA between those in the three TM categories. Logistic regression analysis was performed to examine the associations between main TM, baseline frailty (pre-frail and frail), and worsening of frailty (robust to pre-frail or frail, and pre-frail to frail) over the follow-up period.

Results: In total, 288, 132, and 40 adults exhibited robust, pre-frail, and frail statuses, respectively. The total PA of car passengers was significantly lower than that of car drivers and non-car users. Compared to car drivers, at baseline, non-car users showed significant associations with frailty (odds ratio (OR): 2.45, 95% confidence interval (CI): 1.30±4.63), but car passengers did not show associations with frailty (OR: 1.53, 95% CI: 0.74±3.16). In longitudinal analysis, non-car users were more likely to exhibit worsening of frailty (OR: 2.97, 95% CI: 1.26±6.97), but car passengers did not exhibit worsening (OR: 1.80, 95% CI: 0.61±5.35).

Conclusions: Not using cars affects frailty status, but has a small influence on PA.

Environmental characteristics of early childhood education and care centres, daily movement behaviours and adiposity in toddlers: a multilevel mediation analysis from the GET UP! Study

Zhiguang Zhang¹, João Pereira², Eduarda Sousa-Sá³, Anthony Okely⁴, Xiaoqi Feng⁵, Rute Santos⁶

¹University of Wollongong, ²1.Early Start, Faculty of Social Sciences, University of Wollongong, NSW, Australia; 2.CIDAF (uid/dtp/04213/2016), University of Coimbra, Coimbra, Portugal, ³Early Start, Faculty of Social Sciences, University of Wollongong, NSW, Australia, ⁴1.Early Start, Faculty of Social Sciences, University of Wollongong, NSW,

Australia; 2.Illawarra Health and Medical Research Institute, NSW, Australia, ⁵1.Early Start, Faculty of Social Sciences, University of Wollongong, NSW, Australia; 2.Illawarra Health and Medical Research Institute, NSW, Australia; 3.Population Wellbeing and Environment Research Lab, Faculty of Social Science, University of Wollongong, NSW, Australia, ⁶1.Early Start, Faculty of Social Sciences, University of Wollongong, NSW, Australia; 2.Research Centre in Physical Activity, Health and Leisure; University of Porto, Porto, Portugal

Study objective: this study aims to examine the direct effects of environmental characteristics of early childhood education and care (ECEC) centres on adiposity as well as the indirect effects through daily movement behaviours, including physical activity, sedentary behaviour and nap, in a sample of Australian toddlers.

Methods: 274 children (average age 19.73 ± 4.15 months) from 27 ECEC centres participated in this study. Environmental characteristics of ECEC centres were rated using the Infant/Toddler Environment Rating Scale-revised edition (ITERS-R). Daily movement behaviours were assessed using 24-hour accelerometry. Body mass index z-scores were used to indicate adiposity.

Results: there were neither significant direct effects of environmental characteristics on toddlers' adiposity nor indirect effects through daily movement behaviours. However, the environmental characteristics "personal care routine" (B = 0.72, $p = 0.041$) and "activity" (B = 0.87, $p < 0.050$) were positively associated with the percentage of time these toddlers spent in moderate-to-vigorous physical activity (MVPA). Also, "Listening and talking" was positively associated with nap(s) durations (B = 4.08 $p = 0.001$).

Conclusion: the relationships between environmental characteristics of ECEC centres and adiposity in toddlers as well as the mediating roles of daily movement behaviours still need to be confirmed by future longitudinal and experimental studies with long follow-up periods. At the same time, a broader spectrum of environmental characteristics of these settings needs to be examined with toddlers' adiposity in future studies; other potential mediators may also need to be taken into considerations. In addition, ECEC centres may improve the quality of play activities to increase children's levels of physical activity.

Individual and built environmental factors associated to physical activity in park users in Colombia: A preliminary analysis.

Diana Marina Camargo Lemos¹, Paula Camila Ramírez Muñoz¹, Vanesa Quiroga¹, Hernán Porras¹, Mike Barreto², Rogério Férmino³, Ana Paola Ríos⁴, Olga Lucía Sarmiento⁴

¹Universidad Industrial de Santander, ²Universidad Santo Tomás, ³Universidad Federal Tecnológica de Paraná, ⁴Universidad de los Andes

Introduction: Parks, streets and neighborhoods as part of the built environment (BE) elements could be essential for encouraging a variety of physical activity behaviors. The aim of this study was to examine the associations between selected BE attributes and moderate to vigorous physical activity (MVPA) perceived in park users.

Method: A cross-sectional study was conducted with 1,247 park users from ten parks in Bucaramanga, Colombia. The survey included sociodemographic variables and related with the park use such as accessibility and frequency; also the characteristics of the target areas for PA in the park were evaluated. BE attributes as mixed land use (entropy index) and walkability index in a buffer within 1000 m were calculated. The outcome was defined by one question as absolute physical activity (seldom, moderately, vigorously active). A multilevel logistic regression was applied for the analysis.

Results: Individual covariates positively associated to MVPA perceived were male, live more than a year in the neighborhood, visit the park from 6:00 to 10:00 in the morning and number of weekly visits to the park; also among BE covariates we founded the availability of equipment inside the parks and entropy index. Only walkability index showed a negative association.

Conclusion: This is the first study that provides evidence on park use in an intermediate city from Latin America (LA) that evaluated individual and BE attributes associated to MVPA. More studies are necessary to understanding and contribute to the planning of our cities.

External funding details: Administrative Department of Science and Technology of Colombia (Colciencias)

Is change in physical activity related to change in exercise self-efficacy? Results from the Examining Neighbourhood Activities in Built Living Environment in London (ENABLE London) study.

Elizabeth Limb¹, Claire Nightingale¹, Alicja Rudnicka¹, Bina Ram¹, Aparna Shankar¹, Billie Giles-Corti², Anne Ellaway³, Steven Cummins⁴, Daniel Lewis⁴, Christelle Clary⁴, Ashley Cooper⁵, Angie Page⁵, Duncan Proctor⁵, Peter Whincup¹, Derek Cook¹, Christopher Owen¹

¹St George's University of London, ²University of Melbourne, ³University of Glasgow, ⁴London School of Hygiene and Tropical Medicine, ⁵University of Bristol

Background: Individuals' physical activity (PA) has been shown to be related to self-efficacy. However, few studies have assessed change in PA related to change in self-efficacy. We examined this in the ENABLE London study, a natural experiment which recruited adults seeking to move to social, intermediate and market-rent accommodation in East Village, a neighbourhood designed for healthy active living.

Methods: 1278 participants were recruited. Self-report exercise self-efficacy (mean score over nine questions) and objective measures of PA from 7-day accelerometry (average daily step count and daily minutes of moderate-to-vigorous PA in ≥ 10 minute bouts (MVPA bouts)) were obtained at baseline and 2-year follow-up. Associations between change in PA and change in self-efficacy were assessed by regressing 2-year PA outcome on baseline value, change in self-efficacy and adjusted for age, sex, ethnicity, housing sector and whether the participant had moved to East Village.

Results: 877 (69%) participants provided data at 2-year follow-up. Change in each PA outcome was positively associated with change in self-efficacy: a SD increase in self-efficacy (SD=0.8) was associated with an extra 253 steps per day (95% CI 74,431 $p=0.006$) and an extra 11 minutes per week of MVPA bouts (95% CI 3,18 $p=0.005$).

Conclusion: An increase in an individual's exercise self-efficacy was related to an increase in PA. Whilst the increases in PA were modest, interventions designed to increase self-efficacy could be effective in increasing PA levels.

External funding details: MRC National Prevention Research Initiative (MR/J000345/1) and National Institute for Health Research (12/211/69).

Light physical activity and quality of life after colorectal cancer: A longitudinal analysis.

Eline H. van Roekel¹, Linda van Delden², Martijn J.L. Bours², José J.L. Breedveld-Peters², Kenneth Meijer³, Ijmert Kan⁴, Valeria Lima Passos⁵, Piet A. van den Brand², Stéphanie O. Breukink⁶, Silvia Sanduleanu⁷, Matty P. Weijenberg²

¹Maastricht University, ²Department of Epidemiology, GROW School for Oncology and Developmental Biology, Maastricht University,

³Department of Human Movement Science, NUTRIM School for Nutrition and Translational Research in Metabolism, Maastricht University, ⁴Department of Epidemiology, CAPHRI School for Public Health and Primary Care, Maastricht University, ⁵Department of Methodology and Statistics, Maastricht University, ⁶Department of Surgery, GROW School for Oncology and Developmental Biology, Maastricht University Medical Center+, ⁷Department of Internal Medicine, Division of Gastroenterology and Hepatology, GROW School for Oncology and Developmental Biology, Maastricht University Medical Center+

Introduction: Emerging evidence suggests that light-intensity physical activity (LPA) may be beneficial for the quality of life of colorectal cancer survivors. We performed a longitudinal analysis to investigate associations of LPA with quality of life, between 6 weeks until 2 years after colorectal cancer treatment.

Methods: Colorectal cancer patients ($n=325$) were included at diagnosis at three hospitals in the South-Eastern region of the Netherlands, with measurements at 6 weeks ($n=267$), 6 months ($n=215$), 1 year ($n=169$), and 2 years post-treatment ($n=72$). Time spent on LPA (hours/week) and relevant quality of life outcomes were measured by validated questionnaires. Linear mixed regression was performed to analyze overall longitudinal associations, as well as independent inter-individual (between participant differences) and intra-individual (within participant changes over time) associations of LPA with quality of life.

Results: In confounder-adjusted analyses, more time spent in LPA was overall significantly ($P<0.05$) associated with better global quality of life and physical, role and social functioning, and with less fatigue. Significant intra-individual associations over time were observed of LPA with all these outcomes, and significant inter-individual associations with physical functioning and fatigue.

Conclusion: We found that a higher level of LPA during the first two years after colorectal cancer treatment was associated with better quality of life outcomes. Further research is necessary to unravel the underlying biological mechanisms and to establish LPA as a potential target for lifestyle interventions.

External funding details: Wereld Kanker Onderzoek Fonds (WKOF), part of the World Cancer Research Fund International grant programme (grant number 2016/1620).

Nutritional status, physical activity and eating habits of university students from the Midwest of Brazil

Luciana Monteiro¹, Andrea Varela², Suliane Rauber¹, Francelino Braga Júnior¹

¹University Center of the Federal District, ²Federal University of Pelotas

Background: To assess university students nutritional status and habits and determine the association with physical activity practice.

Method: Cross-sectional study with 2.163 undergraduate students from the health area (Nursing, Physical Education and Pharmacy) from a private institution in the city of Brasília, Brazil. A self-administered questionnaire was used with questions related to health-related life habits, where all these questions were taken from the questionnaire on Surveillance of Risk Factors and Protection for Chronic Diseases by Telephone Inquiry.

Results: Of the 2.163 students, 69.3% were women, 65.4% were between 20 and 29 years of age, 66.8% were alcoholic drinkers and 44.2% did not perform physical activity above 150 min/week. Regarding dietary habits, women presented significant differences in bean consumption ($p<0.04$) and whole milk with fat ($p<0.01$) when compared to men, and were also more sedentary than men ($p<0.01$) and presented a higher prevalence of

overweight (33.8%) and obesity (5.0%). The students who did not perform physical activity were overweight ($p=0.03$), consumed more refrigerant ($p<0.01$) and meat with visible fat ($p=0.01$). We observed that the nutritional status was associated with fruit consumption ($p=0.02$), salad ($p<0.01$) vegetables ($p<0.01$) and beans ($P<0.01$). The practice of physical activity was associated with nutritional status.

Conclusion: The habits of the adolescents surveyed were not consistent with a healthy lifestyle and the prevention of non-communicable diseases in adulthood. A concerted effort on the part of all relevant government agencies will be needed to develop school and community-based interventions, and to promote.

Occupational and leisure time physical inactivity and the risk of type II diabetes and hypertension among Mexican adults: A prospective cohort study

Catalina Medina¹, Ian Janssen², Simon Barquera¹, Sergio Bautista¹, Maria Elena Gonzalez³, Clicerio Gonzalez¹

¹National Institute of Public Health, ²Queen's University, ³Centro de Estudios en Diabetes

Background: There is a lack of longitudinal data linking physical inactivity and chronic diseases among Mexicans.

Objective: To examine the relationship between total, leisure and occupational moderate-to-vigorous physical activity (MVPA) and incidence of type II diabetes (T2D) and hypertension in the Mexico City Diabetes Study.

Study design and population: A prospective cohort study was conducted from 1989 to 2009 among 2282 men and non-pregnant women residing in six low-income neighborhoods in Mexico City.

Main outcome: Incidence of T2D and hypertension. Results. After controlling for confounders, <1 MET/min/week of MVPA during leisure time was associated with higher risk of hypertension (HR 1.29, CI 95% 1.01, 1.66) and T2D (HR 1.31 CI 95% 1.00, 1.72). In addition, accumulating <1 MET/min/week of occupational MVPA was associated with higher risk of hypertension (HR 1.47, CI 95% 1.13, 1.90).

Conclusion: The absence of leisure and occupational MVPA was associated with an increased risk of hypertension. However, no associations were found between occupational MVPA and T2D.

Occupational sedentary time and associations with adiposity markers: a quantile regression analysis

Alexandra Clarke-Cornwell, Penny Cook, Malcolm Granat

The University of Salford

Background: Sedentary behaviour is associated with a number of health-related outcomes, independent of physical activity; however, there is limited research that has examined the role that occupational sedentary time contributes to these associations. For those who are economically active, the majority of their sedentary time may be accrued in the workplace. The aim of this study was to examine the associations of occupational sedentary time with waist circumference (WC) and body mass index (BMI).

Methods: Data were taken from the Health Survey for England, a nationally representative annual survey of adults. In 2008, a subsample wore an ActiGraph GT1M accelerometer for 7 days; non-wear time was removed using the Troiano algorithm, and time in occupational sedentary behaviour was extracted using previously derived cut-points. To examine the variable effects of sedentary time on WC and BMI, quantile regression models were used; models were adjusted for age, gender, accelerometer

wear-time, lifestyle variables, health status, non-work sedentary time and time in moderate to vigorous physical activity (MVPA).

Results: From the accelerometer subsample, 911 were in full-time employment. Occupational sedentary time was not associated with either WC or BMI across quantiles of these adiposity markers, after regression models were adjusted for MVPA: for each 1 minute increase per day in MVPA there were significant associations with reduced WC, and this effect varied with increasing quantiles of WC (β coefficients for the 25th, 50th, 75th quantiles were -0.045 , -0.065 , -0.101).

Conclusion: Associations between occupational sedentary time and adiposity markers can be explained by MVPA.

Occupational walking and bicycling, in leisure time and as a means of transportation of adults according to age

Sandra Matsudo¹, Josivaldo Lima², Timoteo Araujo³

¹Facultad Ciencias, Universidad Mayor / Clinica MEDS, ²Facultad Ciencias, Universidad Mayor, ³CELAFISCS / FMU

The aim of the study was to compare the daily pattern of the walking or cycling for commuting of a national sample of adults according to age. A cross-sectional study was conducted with a household survey of 4,489 individuals from the city of Santiago, Chile. We used valid data of 3,477 adults with age analyzed in 4 age groups: 15-29, 30-44, 45-59 e >59 . The subjective evaluation of the time of walking or cycling in minutes was performed in 3 settings a) in leisure and physical activity-LEX, b) in the occupational-WK, c) in the commute to work and school-COM. The analysis of walking and bicycling were performed as a daily self-report every 30 minutes, 14 hours/day on weekday. Chi Square test was used to compare groups ($p < .05$).

Results: 6.4%, 3.1% and 9.6% reported to walk or cycle on LEX, WK, and COM respectively. The average time of walking and bicycling was 55.4 ± 44.1 minutes/day. The time during LEX was 51.4 ± 44.5 min/day, commuting 46.3 ± 34.8 min/day, and WK was 51.3 ± 38.4 min/day. According to age categories (15-29, 30-44, 15-59 e $+60$) LEX time was 53, 43, 52 and 61 min/day respectively. WK time was 49, 46, 41 and 35, COM time was 54, 50, 48 and 49. There were no statistical differences among groups.

Conclusion: the commuting pattern does not differ by age or in the context which is performed in adults of a metropolitan city.

Physical activity patterns in adolescents - BE ACTIV INDIA! Study

Pradeepa Rajendra¹, Ranjani Harish¹, Unnikrishnan Ranjit¹, Mohan Viswanathan¹, Sallis Jim², Anjana Ranjit Mohan¹

¹Madras Diabetes Research Foundation & Dr.Mohan's Diabetes Specialities Centre, Chennai, ²Australian Catholic University, Melbourne

Purpose: Studies in western populations have reported that physical activity (PA) declines during one's lifespan, particularly in adolescence. However, currently there is no data available in Indian adolescents. Thus, the aim of this study was to assess the PA patterns among Asian Indian adolescents.

Methods: The Built Environment and physical ACTivity (BE ACTIV) INDIA! Study was a cross sectional door-to-door survey conducted on adolescents aged 12 ± 17 years in Chennai, India. In all adolescents, PA was objectively measured as minutes of moderate to vigorous PA (MVPA) using the hip-mounted triaxial accelerometer (3 weekdays and 1 weekend and at least 8 hours of wear time) and subjectively measured by a validated youth version of the Neighborhood Environment and Walkability Scale (NEWS-Youth) questionnaire.

Results: Of the 324 adolescents (boys:51.2%) who participated in the study, overall MVPA was reported as 26.3 mins/day. Not surprisingly, when split by gender, a significantly higher MVPA (33.9 mins/day) was reported among boys compared to girls (18.3 mins/day)[$P < 0.001$]. Overall, 4.6% of the participants reported MVPA and all were boys (9.0%). The overall sedentary time reported was 534.9 ± 87.3 mins (Boys 503.4 ± 86.4 mins vs. Girls 568.0 ± 75.3 mins, $P < 0.001$). 51.9% (Boys 47.6% vs. girls 56.3%) reported sedentary behavior (time spent in viewing TV, using computer, playing video games).

Conclusions: Our data suggest that compared to western populations, Indian adolescents spend significantly less time in MVPA and more time in sedentary activities. Therefore, a multipronged approach including awareness, education and intervention programmes at a national level targeting youth is the need of the hour!

Physical activity, sedentariness and metabolic risk in Portuguese children

Thayse Natacha Gomes¹, Peter T Katzmarzyk², Fernanda Karina dos Santos³, Sara Pereira⁴, Michele Souza⁵, Raquel Chaves⁶, José Maia⁴

¹University of Sergipe, ²Pennington Biomedical Research Center, ³Department of Physical Education, Federal University of Viçosa, ⁴CIFID2, Faculty of Sport, University of Porto, ⁵Department of Physical Education, Federal University of Santa Catarina, ⁶Federal University of Technology-Paraná (UTFPR)

It has been suggested that physical activity (PA) and sedentariness are associated to metabolic risk (MR) factors in children.

Purpose: To study the relationship between different PA intensities [moderate to vigorous PA (MVPA) and light PA (LPA)] and sedentariness with children MR.

Methods: The sample comprises 388 Portuguese children, from both sexes (219 girls; mean age 10.5 years). MR indicators included fasting glucose, triglycerides, HDL-cholesterol, as well as waist circumference and mean arterial blood pressure; MR score (zMR), adjusted for maturity offset, was computed. MVPA, LPA, and sedentariness were measured with the GT3X+ Actigraph accelerometer with at least 4 days (with one weekend day) of at least 10 hours/day of monitoring. Linear regression, by sex, was used to identify correlates of zMR.

Results: In girls, none of the variables included in the model were significantly related to zMR ($p > 0.05$); however, in boys a negative and significant effect of MVPA was observed ($b = -0.026$; $p = 0.011$), where those who spent more time in MVPA had a better zMR profile, but no significant effect was observed for LPA or sedentariness.

Conclusion: The role of PA on MR in children differs according to gender. In girls no significant link was observed, suggesting that other factors (namely biological and nutritional) may be associated with girls' metabolic health. In boys MVPA is a relevant predictor in their metabolic health, suggesting that MVPA should be promoted.

External funding details: Study founded by The Portuguese Foundation of Science and Technology (individual grant SFRH/BOD/1231452016).

Physical education and public health: Population-based findings from the MoMo Study

Anke Hanssen-Doose¹, Claudia Albrecht², Steffen Schmidt², Annette Worth¹

¹University of Education Karlsruhe, ²Karlsruhe Institute of Technology

Purpose: Although almost all children and adolescents are exposed to compulsory physical education (PE) in school, the scientific evidence

addressing the public health effects of PE is limited. This paper describes PE classes in terms of quantity, quality and context factors and verifies the predictability of health outcomes by PE.

Method: Data originate from the representative MoMo Study in Germany (data collection: 2009±2012). Measurement of PE, physical activity and health-related data by questionnaire, anthropometric and fitness data by test. Health outcomes 'general state of health', 'cardiovascular disease risk' and 'reduced motor performance' were calculated. The sample consisted of $n = 2,282$ pupils aged 7 ± 17 yrs (1,170 male, 1,112 female). Means, SD, χ^2 , T-Test and LASSO regressions carried out.

Results: The average time spent with PE was 118 min (± 41 SD) which is less than time spent in sports clubs (130 min ± 147 SD). Quality of PE classes was assessed predominantly positive with two exceptions: 33% reported a lack of intensity and 44% a lack of difficulty. Variables of PE had a weak predictive power only on 'general state of health' ($R^2 = 0.27$), not on 'cardiovascular disease risk' and 'reduced motor performance'.

Conclusion: The ability of PE to contribute to public health is limited. In terms of quality of PE, levels of difficulty and intensity should be subject of further research. In terms of quantity, the time spent with PE should be increased to at least 180 min per week.

External funding details: Funded by Federal Ministry of Education and Research, funding reference number: 01ER1503.

Prevalence of recreational running and behavioral characteristics of Portuguese runners: The Keep on Running national survey

Hugo Pereira¹, António Palmeira², Eliana Carraça², Inês Santos¹, Marta Marques³, Pedro Teixeira¹

¹University of Lisbon, ²University of Lisbon, Lusófona University, ³University College of London, University of Lisbon

Introduction: The aim of this study was to estimate, in a representative sample of Portuguese adults, the prevalence of recreational running and describe the associated demographic and behavioral characteristics.

Method: Recreational running was defined as running without a competitive affiliation (i.e., sports federation), at least two days and 60 minutes/week, for the past 3 months. A nationally representative sample of Portuguese adults ($n = 1084$; 50% women), aged between 18 to 65 y, was selected through a probabilistic random sample of telephone numbers. We assessed weekly physical activity habits and running behavior (including frequency, distance, setting: environment and groups, and the monitoring equipment used).

Results: The prevalence of recreational running was 10.6% (18-40 y: 13.6%; 41-65 y: 7.7%, $p < 0.05$; Men: 14.6%; Women: 6.6%, $p < 0.05$). On average, participants ran 3h, in 3.4 days, covered 20 km/week (Men: 21.3 km; Women: 16.4 km, $p < 0.05$). Fifty-seven percent of the participants interrupted their regular running in the past year (averaging 2 months), and the most prevalent barrier was lack of time (43%). They reported preference to run alone (73%), in the street (53%), and use wearables for time monitoring (44%) and music (45%).

Conclusions: Overall, about one tenth of Portuguese adults ran at least two days and 60 minutes/week which is similar to other European countries. The prevalence was superior in men and in the younger age group. More than half of the runners had an interruption in the past year. Considering the accessibility, low cost of this activity and its known health benefits, physical activity promotion in Portugal should consider running related activities.

Relationship between regular exercise and sleep in a large housing complex

Yoshinori Kitabatake, Saitama Prefectural University

Introduction: Average sleeping time gets shorter every year. We predict an increase in insomnia and other sleep disorders. Physical activity may prevent insomnia, as a non-drug alternative. The purpose of this study was to examine the relationship between physical exercise habits and sleep patterns.

Methods: In total, 2000 subjects were randomly selected from those over 20 years of age living in a large housing complex. The following information regarding exercise habits was gathered via questionnaire: do you regularly exercise more than 3 times per week and more than 20 minutes each time? The questions asked about these five items regarding sleep condition: difficulty initiating sleep, difficulty maintaining sleep, early morning awakening, satisfaction with sleeping time, and satisfaction with overall sleep quality. To examine the association between regular exercise as the independent variable and status of sleep (5 items) as the dependent variable, odds ratios (ORs) and 95% CIs were calculated using multilevel logistic regression analysis (Covariate; age, smoking, drinking and medication).

Results: Of 787 subjects (collection rate 39%, male $n=307$, mean age 66 years, female $n=480$, 65 years), 38.3% of males and 31.8% of females exercised regularly. Odds ratio (95%CI) of sleep loss was 2.1(1.3-3.4) in males. Odds ratios of difficulty initiating sleep and quality of overall sleep complaints were 1.8 (1.2-2.9) and 1.6 (1.1-2.5), respectively, in females.

Conclusion: These results suggest that exercise may be effective in producing sound sleep. We must conduct a data longitudinal study to confirm the relationship between regular exercise and sleep.

Relationship between the combination of leisure-time physical activity and fear of falls on physical function in older people

Taiki Inoue¹, Jaehoon Seol¹, Takumi Abe², Mamoru Nagata¹, Tomohiro Okura¹

¹University of Tsukuba, ²University of Tsukuba, Japan Society for the Promotion of Science

Background: Although both leisure-time physical activity (LTPA) and fear of falls are related to physical function, little is known about the influence of combination of these on physical function.

Purpose: To examine the association between the combined effect of LTPA and fear of falls and physical function in older people.

Methods: There were 535 (73.9 $\pm$ 5.5 years) participants. LTPA was assessed using the Physical Activity Scale for the Elderly, and the score was divided by the median (i.e., active and inactive). Fear and incidence of falls in the past year were examined through a questionnaire. To evaluate lower-extremity function, we conducted the following performance tests: one-leg standing test, 5-times sit-to-stand test, timed up and go (TUG) test, and 5-m walking test. Two-way analysis of covariance was used to examine LTPA by fear of falls, and interaction and main effects of LTPA and fear of falls. Adjusted variables were age, gender, body mass index, medical history of knee and lower back pains, hypertension, and psycho-active drug use.

Results: Fear of falls was reported by 29.5%. There were no significant LTPA by fear of falls interaction for all performance tests. Significant main effects of fear of falls were found in one-leg standing test, TUG, and 5-m walking test, but those of LTPA were not observed in all performance tests.

Conclusions: These results suggest that the combined effect of LTPA and fear of falls are small, and older people without fear of falls would have better physical function.

Relevance of physical fitness in the association of red and processed meat consumption with all-cause, cardiovascular, and cancer mortality: a UK Biobank cohort study

Stavroula Argyridou¹, Francesco Zaccardi², Melanie Davies³, Kamlesh Khunti², Thomas Yates³

¹University of Leicester, ²NIHR Collaboration for Leadership in Applied Health Research and Care—East Midlands, University of Leicester, Leicester, Diabetes Research Centre, ³NIHR Leicester Biomedical Research Centre, Diabetes Research Centre, University of Leicester

Introduction: It is unknown how physical fitness and diet interact with health outcomes. This study aims to examine the association of red and processed meat consumption with all-cause, cardiovascular, and cancer mortality and to investigate whether markers of physical fitness modify the associations.

Method: Data were derived from 419 136 participants within UK Biobank with information available for all covariates. A red and processed meat score was derived from a food frequency questionnaire at baseline. Cox proportional hazard models adjusted for demographic, anthropometric and lifestyle factors were used to explore the associations between red and processed meat consumption with all-cause, cardiovascular, and cancer mortality. Objectively measured handgrip strength and self-reported walking pace were used as covariates and interaction terms.

Results: Participants were followed-up for a median of 7 years. Each additional serving of red and processed meat consumption (serving/week) was associated with a hazard ratio (HR) of 1.037 (95% CI: 1.028-1.047) for all-cause mortality; 1.030 (1.009-1.051) for cardiovascular mortality; and 1.029 (1.016-1.042) for cancer mortality. Interaction analyses showed the association of red and processed meat consumption with all-cause and cancer mortality was modified by walking pace, with brisk walkers having the lowest risk per additional serving (HR 1.025; 1.006-1.045 and 1.015; 0.990-1.040, respectively). Handgrip strength did not modify reported associations.

Conclusion: The consumption of red and processed meat should be limited. However, the magnitude of association with mortality may be attenuated in those with high physical fitness.

External funding details: Funded by: National Institute for Health Research (NIHR) Leicester Biomedical Research Centre, Leicester

Robust compositional analysis of physical activity and sedentary behavior in Czech adolescents

Jan Dygryn¹, Nikola Šteflová¹, Karel Hron¹, Aleš Gába¹, Lukáš Rubín¹, Javier Palarea-Albaladejo²

¹Palacký University Olomouc, ²Biomathematics and Statistics Scotland

Background: Although there is an increasing awareness about the suitability of using compositional data methodology in public health research, traditional methods of statistical analysis have been primarily used so far. The present study aims to illustrate the potential of robust statistics to model movement behaviour using Czech adolescent data. Since physical activity (PA) and sedentary behaviour (SB) time represent parts of overall time availability, they carry only relative information and represent a genuine case of compositional data.

Methods: We investigated (1) the inter-relationship between various PA intensities, extended to model relationships by age, and (2) the associations between adolescents' PA and SB structure and obesity. These research questions were addressed using three different types of the compositional regression analysis, including compositional covariates, compositional response, and regression between compositional parts. In order to lessen

the influence of possible outliers, robust counterparts of traditional regression methods were used.

Results: We outline and present the differences in both traditional and robust methods of compositional data analysis. There was a pattern in Czech adolescents' lifestyle behaviour, extensive SB is related to higher amounts of light-intensity PA, and that vigorous PA ratios form the main source of potential aberrant observations; aging is associated with more SB and vigorous PA at the expense of light-intensity PA and moderate-intensity PA.

Conclusion: The robust counterparts proved to be more stable tools in the presence of outlying observations. The findings stressed that replacing time spent in SB with vigorous PA can be a powerful tool against adolescents' obesity.

Seasonal variation in physical activity and sedentary behaviour patterns during spring and autumn in central european older adults

Palacky University Palacky - Faculty Hodonska¹, Jana Pelclová², Jan Dygrýn², Izabela Zajac-Gawlak³, Miroslava Přidalová², Lenka Tlučáková⁴

¹Palacky university, ²Faculty of Physical Culture at Palacký University Olomouc, ³The Jerzy Kukuczka Academy of Physical Education in Katowice, ⁴Faculty of Sports at University of Prešov

Introduction: Despite the evidence of the important influence of environmental determinants on physical activity (PA) and sedentary behaviour (SB) patterns in elderly population, differences in PA and SB by mild seasons of the year (spring and autumn) were not investigated in detail yet. Spring and autumn in the Central European climate have very similar weather conditions. Therefore, this study aimed to compare weather conditions between spring and autumn and their effect on PA and SB patterns in older adults using a repeated-measures design.

Method: The study sample consisted of 72 older adults (mean age 64 ±6 years) from Poland, Czech Republic and Slovakia (one city per country), who voluntarily underwent the PA and SB measurement using accelerometers. Each participant was measured once in spring (April–mid-June) and once in autumn season (October–mid-December). Information on daylight length, daily average of precipitation and temperature was obtained from local weather stations. Logistic regression and paired t-test were used to examine the associations between these variables and PA and SB.

Results: Overall, there were no significant differences ($p>0.05$) in SB, light-intensity PA and moderate-to-vigorous PA (MVPA) between spring and autumn measurements. The season of the year had no impact on achievement of MVPA recommendations (300 minutes of MVPA/week).

Conclusion: The present findings suggest that the differences in weather during spring and autumn play only a limited role on PA and SB patterns in Central European older adults.

Seven year longitudinal associations between children's motor competence, amount and diversified of physical activity

Paulina S. Melby¹, Peter Elsborg¹, Glen Nielsen², Rodrigo A. Lima³, Peter Bentsen¹, Lars B. Andersen⁴

¹Steno Diabetes Center Copenhagen, Health Promotion Research, ²Department of Nutrition, Exercise and Sports, University of Copenhagen, ³Research Group on Lifestyle and Health, School of Physical Education, University of Pernambuco, ⁴Faculty of Teacher Education and Sport, Western Norway University of Applied Sciences

Introduction: A positive relation between motor competence (MC) and physical activity (PA) in children has been demonstrated in cross-sectional

studies; however the evidence of the direction of this association is lacking. Longitudinal studies suggest that MC is important to PA later in life, while determinants of MC have not been satisfactorily examined in longitudinal designs. In addition, the role of diversified physical activities (DPA) for PA and MC has not been investigated yet. The aim of this study was to investigate the longitudinal association between DPA, MC and PA.

Methods: Drawing on longitudinal data from the Danish CoSCIS study, MC (KTK-test of postural stability and locomotor skills), PA (accelerometer) and DPA (self-reported) were assessed in 654 children when they attended preschool (6 years of age), third grade (9 years of age) and seventh grade (13 years of age).

Results: Two structural equation models were constructed, with DPA at age 6, MC and PA at age 9 as predictors of PA at age 13 and MC at age 13 respectively. Both models showed good model fit. DPA at age six was significantly associated with PA ($\beta=.21$) and MC ($\beta=.12$) at age 13, when adjusting for sex, age, weight-height, and PA and MC at age 9.

Conclusion: The results of this study suggest that early diversified PA is important for MC and PA in adolescence.

External funding details: This study was supported by The Danish Heart Foundation and TrygFonden.

The association of physical activity, body mass index, auto-efficacy and socio demographic factors among Ecuadorian workers during 2006

Patricia Mogrovejo¹, Pablo Jiménez¹, Nicole Jiménez²

¹Universidad Tecnológica Equinoccial, ²Savinmed

Introduction: Physical inactivity (PI) is a major risk factor for morbidity and premature mortality. However, the association among PI, Body Mass Index (BMI), auto-efficacy and socio demographic factors is unknown in Ecuadorian workers. This study aimed to determine the association among BMI, Physical Activity (PA) levels, PA auto-efficacy and socio demographic factors in Ecuadorian workers during 2006.

Method: A cross sectional study was conducted on 917 Ecuadorian private workers (663 men and 254 women). Surveys were performed to obtain: 1. Sociodemographic data; 2. BMI; 3. PA levels were measured by the International Physical Activity Questionnaire and 4. Auto-efficacy. Descriptive statistics, chi-squared test and Factorial Analysis of Multiple Correspondences (FAMC) were used.

Results: The PI prevalence was 65.3%. The prevalence of excess of weight was 50% (40.8% overweight, 9.4% obesity) and it increased with age. More than 50% of overweight subjects were men, sedentary and belong to 45 to 64 years age group. The FAMC showed that men and women aged 18 to 29 years with normal /lower BMI performed regular PA. The overweight men who were aged 30 to 44 years practiced PA. However, obese women and men 45 to 64 years age group did not practice regular PA. Lower PA auto-efficacy was associated with excess of weight.

Conclusion: The PI and obesity prevalence were high. The PI was high in obesity and older subjects. Being obese was a barrier for performing PA. A life promotion program was implemented at workplace investigated.

The contribution of genetic and environmental factors to the association between leisure-time physical activity and academic performance: A longitudinal twin study

Sari Aaltonen¹, Jaakko Kaprio¹, Urho M. Kujala², Karri Silventoinen¹

¹University of Helsinki, ²University of Jyväskylä

Background: Physical activity and academic performance are affected by genetic factors, but it remains uncertain whether these traits share some genetic background. We aimed to examine to what extent leisure-time physical activity (LTPA) and academic performance share the same genetic and environmental background from late childhood through adolescence to early adulthood.

Methods: Participants were Finnish twins (2543–2693 individuals/study wave) who reported their LTPA at ages 12, 14, 17 and 24. Academic performance was assessed with teacher-reported grade point averages (ages 12&14) and by self-reported educational levels (ages 17&24). Quantitative genetic modeling of the bivariate association at each age was performed using OpenMx.

Results: The trait correlations between LTPA and academic performance were low to moderate ($r=0.09$ – 0.22 in men, and 0.09 – 0.12 in women) at each age. The genetic influences explained 9–61% of these trait correlations. The genetic correlations between the LTPA and academic performance ranged from 0.12 (age 12) to 0.21 (age 22) in men, and from 0.02 (age 17) to 0.58 (age 22) in women. The correlations of environmental factors shared by co-twins between the traits ranged 0.10 (age 12) to 0.71 (age 22) in men and 0.19 (age 12) to 0.48 (age 17) in women, while unique environmental correlations were low ($r=0.003$ – 0.13 in men and 0.01 – 0.10 in women).

Conclusion: LTPA and academic performance share some genetic background that varies in magnitude by age. Shared family environment also has a role in explaining the association between LTPA and academic performance.

The effect of physical activity and dietary behaviours on the blood pressure and hypertension status of food-insecure overweight adults living in resource-poor South African communities

Kufre Okop¹, Estelle Vicki Lambert², Feyisayo Odunitan-Wayas³, Thandi Puoane⁴, Amy Luke⁵, Lara Dugas⁵, Naomi Levitt⁶, Robert Dover⁷

¹University of Cape Town, ²Lifestyle and Sport, Division of Exercise Science and Sports Medicine, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, ³Lifestyle and Sport, Division of Exercise Science and Sports Medicine, Department of Human Biology, Faculty of Health Sciences, ⁴School of Public Health, University of the Western Cape, ⁵Department of Public Health Sciences, Loyola University, Chicago, ⁶Department of Medicine, University of Cape Town, ⁷Departamento de Antropología, Universidad de Antioquia, Medellín, Colombia

Introduction: More than 50% of South Africans are reportedly inactive, nearly 70% of women are overweight or obese, and about half of all households are food insecure. The aim of this analysis was to determine the effect of physical activity (PA), dietary behaviours and obesity on blood pressure levels and hypertension among food insecure overweight persons (FIO).

Methods: A longitudinal study included 800 adults (212 men, 588 women, 29–78 years) from the harmonized STOP-SA study cohort. Standardised instruments were used to measure PA (GPAQ and IPAQ) and food security. Diet behaviour was assessed with food frequency questionnaire. Blood pressure was measured using Omron HEM-412. Food insecure overweight (FIO) were defined as those with BMI>25 kg/m² who reported having insufficient food to eat or meet household nutrition requirements. Multivariate regression analyses were undertaken.

Results: Nearly a third (27.8%) of the study sample were FIO. FIO compared to the rest of the study sample had a higher intake of SSBs (10.9 vs. 9.5 servings/week, $p=0.025$). Controlling for age, sex and follow-up duration, MPVA, intake of fruits and vegetables were not associated with

hypertension or SBP levels for FIO. However, FIO reporting a-10 or more servings of SSB/week and being a female respectively were 2.3 times and 1.4 times (p -value<0.05) more likely to have hypertension.

Conclusion: Increasing SSB intake can impact on hypertension among the food insecure obese individuals in the resource-poor South African setting.

External funding details: National Research Foundation of South Africa, NIH, CHIR.

The impact of sedentary time and breaks in sedentary time on 24-hour hypoglycaemia, euglycaemia and hyperglycaemia in type 2 diabetes

Aye Paing¹, Kathryn McMillan², Alison Kirk², Andrew Collier³, Allan Hewitt², Sebastien Chastin³

¹Glasgow Caledonian University, ²Physical Activity for Health Group, School of Psychological Sciences and Health, University of Strathclyde, Glasgow, ³School of Health and Life Sciences, Glasgow Caledonian University, Glasgow

Objective: To investigate the associations of objectively measured sedentary time and breaks in sedentary time with 24-hour events and duration of hypoglycaemia, euglycaemia and hyperglycaemia in type 2 diabetes.

Method: A total of 37 participants with type 2 diabetes managed by diet modifications or metformin ± sulfonylurea ± gliptin (mean age 62.8±10.5 years) wore an activPAL3 and continuous glucose monitoring (CGM, Abbot FreeStyle Libre) for 3–14 days. Average total sedentary time and number of breaks in sedentary time/day were calculated. The following glycaemic control measures were calculated: events and time in euglycaemia (3.9–7.8 mmol/l), hyperglycaemia (>7.8 mmol/l), above target (>9 mmol/l) and hypoglycaemia (<3.9 mmol/l) per day. Linear regression analyses and normalisation method for missing glucose values were used.

Results: There was detrimental association of sedentary time with decreased time in euglycaemia ($\beta=-0.44$, CI -0.1 – 0.0 , $P=0.04$). A trend towards the detrimental association of sedentary time with time in hyperglycaemia ($\beta=0.36$, CI -0.01 – 0.1 , $P=0.08$) and HbA1c ($\beta=0.89$, CI -0.02 – 1.1 , $P=0.056$) was observed. Breaks in sedentary time had beneficial association with time in euglycaemia ($\beta=0.38$, CI 0.00 – 0.01 , $P=0.04$). There was no association of sedentary time and breaks in sedentary time with events in hypoglycaemia, euglycaemia, hyperglycaemia and above target.

Conclusions: A reduction of total sedentary time and increased number of breaks in sedentary time should be recommended for better glycaemic control in people with type 2 diabetes.

External funding details:

- This work is supported by School of Psychological Sciences and Health, University of Strathclyde; PAL technologies Ltd (Glasgow, UK) and School of Health and Life-Sciences, Glasgow Caledonian University.
- Authors thanks KM who put significant effort on participant recruitment.

The joint contribution of leisure-time physical activity, insomnia symptoms and smoking to the direct cost of short-term sickness absence: A register-linked cohort study

Noora Kanerva, Tea Lallukka, Ossi Rahkonen, Olli Pietiläinen, Jouni Lahti, University of Helsinki

Introduction: Physical inactivity, smoking and insomnia symptoms are independently associated with increased sickness absence. However, their joint contribution to sickness absence and, especially, their direct cost for

the employer, are poorly understood. We aimed to examine whether leisure-time physical activity modifies the association of smoking and insomnia symptoms with short-term (<15 days) sickness absence and their cost.

Methods: The Helsinki Health Study is a cohort of midlife employees of the City of Helsinki, Finland (baseline $n = 8960$, response rate 67%). During 2000-2002 the participants were mailed a survey questionnaire that gathered information on health behaviour and sociodemographic characteristics. Sickness absence, salary, and time of employment were followed up through the employer's personnel register between 2002-2016 (78% of the participants gave written consent). Individual salary data were used to calculate the direct cost of short-term sickness absence. Data were analyzed with a two-part model.

Results: Inactive participants with frequent insomnia symptoms had 2526€ (95% CI 1736€-3915€) higher cost of short-term sickness absence than vigorously active participants without insomnia symptoms. Furthermore, inactive smokers had 4166€ (95% CI 2737€-5595€) higher cost for the employer over the follow-up than vigorously active non-smokers.

Conclusions: This study showed that leisure-time physical activity, smoking and insomnia symptoms are jointly associated short-term sickness absence and their cost. The results emphasize encouraging employees ± especially those who smoke and have frequent insomnia symptoms- into vigorous physical activity in order to reduce the cost of sickness absence.

External funding details: This study is supported by the Finnish Work Environment Fund and the Academy of Finland.

Two-year changes in body composition, physical activity, and selected metabolic risk factors among adolescents living in the North West province of South Africa: The PAHL study

Makama Andries Monyeke¹, Vincent Masocha², Stanislaw Czyż², Sarah J. Moss²

¹M.A. MONYEKE, ²Physical Activity, Sport, and Recreation Focus Area, North-West University, Potchefstroom 2520, South Africa

The purpose of this study was to determine the two-year changes in body composition, physical activity (PA) and selected metabolic risk factors (abdominal obesity and blood pressure) among adolescents from the North West Province of South Africa. A total 289, 14-year-old adolescents (116 boys and 173 girls) participated in the study. PA level was measured using the International Physical Activity Questionnaire (IPAQ). Abdominal obesity was determined using the waist circumference measurements (WC) and blood pressure was determined by Omron MIT Elite Plus. Overweight gradually increased by 7.6%. The increase was higher among the girls (12.2%) compared to the boys to (2.2%), ($p \leq 0.001$). Participation in low-physical activity (LPA) increased by 8.2% for the whole group and moderate PA gradually decreased (15.2%). With regard to the metabolic risk factors, boys had significantly higher WC at every measurement point ($p \leq 0.001$) compared to girls. The percentage of adolescents in the pre-hypertensive / hypertensive category increased (5%) and the increase was greater in girls than boys ($p \leq 0.001$). Waist circumference was positively related to BMI, percentage body fat and sum of skinfolds. In conclusion, adolescent girls were more overweight, obese and less physically active compared to the boys over a period of time.

External funding details: National Research Foundation (NRF) and Medical Research Council of South Africa (MRC).

Disclaimer: Any opinion, findings and conclusions or recommendations expressed in this material are those of the authors and therefore the NRF and MRC do not accept any liability in this regard.

Understanding the role of physical activity in socio-economic health differences: The active worker individual participant meta-analysis

Pieter Coenen¹, Maaïke Huysmans², Andreas Holtermann³, Richard Troiano⁴, Steinar Krokstad⁵, Paul Jarle Mork⁵, Els Clays⁶, Willem van Mechelen², Allard van der Beek²

¹VU University medical center, ²Department of Public and Occupational Health and Amsterdam Public Health research institute, VU University Medical Center, Amsterdam, ³National Research Centre for the Working Environment, Copenhagen, ⁴Risk Factor Assessment Branch, Division of Cancer Control and Population Sciences, National Cancer Institute, Rockville, ⁵Department of Public Health and Nursing, Norwegian University of Science and Technology, Trondheim, ⁶Department of Public Health, Ghent University, Ghent

Introduction: A growing body of evidence suggests that workers with high levels of occupational physical activity (OPA), compared to those without, have an increased risk of adverse health outcomes. This adds to the fact that these workers are rather physically inactive during leisure-time. Physical activity (both OPA and LTPA) may therefore play an important role in socio-economic health differences, which we aim to explore in the Active Worker study, an individual participant data meta-analysis.

Methods: In a review on the relation between OPA and mortality (both cardiovascular and all-cause), while taking LTPA into account, we have identified 24 studies (with $n = 288,264$ participants) with relevant data. PIs of these studies will be invited to the Active Worker consortium, which includes sharing of data and ideas, and manuscript preparation. After merging and harmonizing available data, we will perform regression analyses testing the combined association of OPA and LTPA with mortality outcomes. We will also study the contribution of OPA and LTPA on socio-economic health differences by mediation analysis performing the product-of-coefficients test, as described by MacKinnon.

Conclusion: Results from the *Active Worker study* will provide useful information regarding the potentially opposing health effects of OPA and LTPA and their mediating role in socio-economic health differences. Such information can be used to inform physical activity interventions aimed at minimizing socio-economic health differences between workers in different socio-economic strata.

External funding details: This study has been funded by The Netherlands Organisation for Health Research and Development; ZonMw (grant #: 531-00141-3).

Urbanization, physical activity and sitting time in Oman: Analysis of the World Health Survey, 2008

Ruth Mabry, Jawad Al Lawat¹; Dr Muhssen Kanaan¹

¹Ministry of Health, Oman

Background: Urbanization is a key driver for the increasing prevalence of noncommunicable diseases risk factors, including physical inactivity. Oman, a country on the Arabian Peninsula, has experienced one of the fastest urbanization process globally; however, little is known about its influence on physical activity and sedentary behaviour.

Methods: Bivariate and regression analyses using a national cross-sectional household survey was conducted to examine the association of residency on meeting physical activity recommendations, engaging in any domain-specific physical activity and high sitting time (7+ hours/day) and to identify their demographic correlates according to urban-rural residency.

Results: Prevalence of meeting physical activity recommendations and high sitting time was similar between urban and rural residents. Higher

proportion of rural residents did any transport physical activity compared to urban ones (R: 52.4%, U: 42.2%, $P < 0.001$). Women had significantly lower odds of meeting physical activity recommendations and engaging in leisure physical activity regardless of residency ($P < 0.01$); increased age was significantly associated with lower odds for being physically active, engaging in any leisure physical activity and high sitting time (P for trend < 0.05). For rural residents, increased age was significantly associated with a lower odds for engaging in any work or transport physical activity (P for trend < 0.05). Increased wealth was significantly associated with meeting physical activity recommendations and engaging in any work of leisure physical activity (P for trend < 0.05).

Conclusion: Further research to better understand these urban-rural variations using country-specific adaptation of an “urbanicity” scale is needed to guide policy interventions.

Variation in high sitting time by sociodemographic factors

Heli Valkeinen¹, Kennet Harald¹, Heini Wennman¹, Maria Hagströmer², Tommi Härkänen¹, Pekka Jousilahti¹, Tiina Laatikainen¹, Tomi Mäki-Opas³, Satu Männistö¹, Katja Borodulin¹

¹National Institute for Health and Welfare, ²Karolinska Institute, ³University of Eastern Finland

Introduction: To reduce health risks of excess sitting, we need better characterization of people who sit much. Previous research has concentrated on total sitting, while little is known on determinants of sitting in different contexts. Our aim was to examine sociodemographic variation among working-age population across sitting in different contexts.

Method: Data comprised National FINRISK 2012 Study, a population-based health examination study. Analyses included 4782 persons aged 25-64 years who had reported their amount of sitting at leisure (in front of TV, in front of computer, in vehicles) and at work and elsewhere (such as while reading). Independent variables were gender, age group (in thirds), education (low, mid, high), household income (low, mid, high), and marital status (married, single, divorced). Associations were analyzed by linear mixed-models.

Results: Fully adjusted models with all sitting types showed the largest sociodemographic variation in sitting time at work. Women, the youngest age group, those with the highest incomes and education were sitting the most at work compared with the reference groups. Socioeconomic variation in leisure time sitting in front of computer was wide, as the younger age groups, singles and highest educated were sitting the most. Less sociodemographic variation was observed in sitting in vehicles and in front of TV and in sitting elsewhere.

Conclusion: Our findings suggest large sociodemographic variation in certain types of sitting, particular in sitting at work and in front of computer. This variation needs attention in planning of health promotion interventions and programs.

External funding details: Ministry of Culture and Education (OKM/72/626/2017).

Vigorous intensity physical activity prevalence among students from three Mexican universities and its relation with socio-demographic characteristics

Vanessa Garcia Gonzalez, Universidad Autonoma Chapingo

Physical activity levels decline among young adults transitioning into university. Vigorous-intensity physical activity (VPA) is a key indicator of PA levels. The objectives of this study were to describe the prevalence of not doing vigorous intensity physical activity for a representative sample

of students from three universities located in a municipality in Mexico (Central Region), and to examine the relationships with socio-demographic characteristics.

Physical activity and socio-demographic data was collected through a survey using GPAQ Spanish version. The survey was conducted among first and fourth year students (2015, $n = 1046$) from three different universities. The questionnaire was paper based and self-administered. Questionnaires were answered inside the classrooms during school time at the beginning of school year. GPAQ protocols to clean and analyze data were used. We obtained descriptive statistics, then chi-square analyses to determine if relationships existed. Significant predictors ($p < .05$) were evaluated using logistic regression. We used IBM SPSS Statistics, (version 21).

Findings showed 39.7% of students did no VPA. The odds for not doing VPA were 0.342 times lower for male students ($p = 0.000$, 95% C for EXP (B), 0.257, 0.483); while for those studying and working at the same time decreased by a factor of 0.441 ($p = 0.000$, 95% C for EXP (B), 0.305, 0.638); and were 0.606 times lower for students whose mother completed high school or higher, ($p = 0.006$, 95% C for EXP (B), 0.425, 0.864), all other factors being equal.

Further replication of this work among other university students from middle-income countries is warranted.

Weekly patterns of physical activity and sleep, and overweight in adolescents

Stephen H. Wong¹, Wendy Yajun Huang², Yan Shi¹

¹The Chinese University of Hong Kong, ²Hong Kong Baptist University

Introduction: This study examined weekly patterns of physical activity and sleep, and their associations with overweight among adolescents in Hong Kong.

Methods: 740 adolescents aged 11-18 years were recruited from 15 secondary schools. They were instructed to wear an activPAL™ inclinometer continuously throughout eight days. Time spent MVPA and sleep were calculated every day. Number of days meeting the PA and sleep guidelines (9-11 hours for 11-13 years and 8-10 hours for 14-18 years) was quantified and recorded into three groups, i.e. fail to meet (0 day), irregularly meet (1-4 days), and regularly meet (≥ 5 days) the guidelines. The relationships between the three behaviour categories and the risk for being overweight were tested using linear mixed models.

Results: Approximately 6% of the adolescents meet the PA or sleep guidelines regularly (≥ 5 days a week). Adolescents who regularly meet the PA guidelines achieved an average of 68 minutes/day of MVPA. Regularly meeting the PA guidelines was associated with 76% reduced risk (OR: 0.24, 95%CI: 0.06-0.94), while irregularly meet the PA guidelines led to 32% lower risk (OR: 0.58, 95%CI: 0.35-0.97), of being overweight. No associations were found between weekly patterns of sleep duration and being overweight.

Conclusions: Regularly sufficient PA and sleep duration was rare among adolescents in Hong Kong. The findings support the current evidence for adults that “some is better than none” for PA participation. However, youth may gain maximal health benefits from a regular active lifestyle.

External funding details: General Research Fund from the Research Grants Council, Hong Kong, China (GRF#14501415).

Years of practice, physical activity and low intake of fruits and vegetables in hikers of Bucaramanga, Colombia.

Luis Gabriel Rangel Caballero¹, Alba Liliana Murillo López², Edna Magaly Gamboa Delgado³

¹Universidad Santo Tomás, Bucaramanga, ²Santo Tomás University, Bucaramanga, ³Universidad Industrial de Santander

Introduction: World Health Organization (WHO) contemplates physical inactivity, low intake of fruits and vegetables, harmful use of alcohol and tobacco use as behavioral risk factors (BRFs) that increase the risk of suffering noncommunicable diseases. Scientific evidence has established that hiking is a type of physical activity (PA) in nature that provides health benefits. The objective of this study was to assess the association between years of practice and BRFs in hikers of Bucaramanga, Colombia.

Methods: Analytical cross sectional study carried out in 170 hikers. Descriptive, as well as, bivariate and multivariate analysis were realized using regression binomial models. To collect data, the Noncommunicable Disease Risk Factor Surveillance from WHO was utilized. Every participant of the study signed written consent.

Results: All participants were physically active, 20.59% showed binge drinking, 3.53% were current smokers and 81.18% reported low intake of fruits and vegetables. After adjusting by sex, age, academic degree, marital status and the other three BRFs, less than five years of hiking practice was associated with less minutes of PA per week (PR: 2.47, IC 95%: 1.24;4.93, $p=0.010$) and low intake of fruits and vegetables (PR: 2.68, IC 95%: 1.92;7.81, $p=0.039$).

Conclusion: Less minutes of PA per week and low intake of fruits and vegetables were less frequent among hikers who reported more than five years of practice compare with those who reported less than five years of practice. It's important to promote among hikers the consumption of at least five servings of fruits and vegetables per day.

Theme: Inequalities

A syndemic approach: Examining the co-occurring risk factors to physical activity among African American aging women

Idethia Harvey¹, Rahma Mkuu¹, Lisa Wigfall²

¹Texas A & M University, ²Texas A & M University

Purpose: Assessment of physical activity (PA) among aging adults is of particular public health significance because of a wide variety of fitness levels in this age group and the presence of chronic conditions may limit participation in PA. Chronic exposure to socioeconomic inequalities is associated with prolonged social trauma among aging African Americans (AA). This multi-methods project used syndemic theory to explore vulnerability and stressors adversely impacts participating in PA among aging AA women.

Methods: The multi-methods approach used a convergent model to explicitly merge qualitative and quantitative data to examine the co-occurring risk factors to PA. Community-dwelling females provided data on their weekly activity patterns and completed a 7-day PA diary. Descriptive analysis was conducted to examine subjective and objective PA measures. Interviews were audio-taped, transcribed verbatim, and data were analyzed using narrative analysis.

Results: The mean age was 69.6 years of age (SD = ± 8.0 years), and the average number of chronic conditions per person was 2.5. The participants residing in low-SES neighborhoods engaged in low-level PA in the morning. Although the participants expressed that excess burden of chronic conditions impacted their PA, they acknowledge that "a little PA is better than no PA."

Conclusion: Using the syndemics approach to examine urban older African American women contributed to a novel perspective of understanding

etiologies and socio-environmental factors that influence PA among the group. The results may have implications in designing specific supportive PA programs for older AA women residing in urban neighborhoods.

Active Future: An 8-week programme to engage marginalised adolescents in a health and education initiative

Niamh Spratt-O'Shea¹, Paula Fitzpatrick¹, Shane O'Donnell¹, Michael Byrne², Noel Richardson¹

¹Institute of Technology Carlow, ²School Completion Programme

Introduction: Only 12% of post-primary school children in Ireland meet the recommended physical activity guidelines. Children and adolescents from lower socio-economic backgrounds have fewer opportunities to engage in physical activity compared to their higher socio-economic counterparts. The Active Future programme was developed to target marginalised adolescents who are (i) at risk of early school leaving (ii) physically inactive and/or (iii) suffering from mental health difficulties. The 8-week health and education programme runs in I.T. Carlow (Ireland) in partnership with local school completion programmes and secondary schools. The programme consists of (a) a physical activity input (b) a physical health input and (c) a mental health input. Inputs A and B are developed and delivered by Sport and Exercise Science students who act as mentors throughout the programme whilst a psychotherapist delivers input C.

Methods: Approximately 40 students will take part in the programme, commencing September 2018. Quantitative measurement will include assessing students physical activity levels subjectively via the International Physical Activity Questionnaire for Adolescents (IPAQ-A). Objective physical activity, sedentary behaviour and sleep measurement using accelerometers will also be undertaken. Qualitative research will be carried out through focus groups with a random selection of the students.

Results: Physical activity, sedentary behaviour and sleep levels of students both before and after the programme will be assessed and compared. Focus groups will be used to gain an insight into the success of the programme.

Conclusion: Conclusions regarding outcomes of the Active Future programme will be drawn from the quantitative and qualitative results.

Addressing inequalities in health through a community-led, place based, collaborative approach to promoting physical activity

Mandy Cheetham¹, Sarah Gorman², Alice Wiseman³, Emma Gibson³, Katie Dee³, Peter van der Graaf⁴

¹Teesside University, ²Edberts House, ³Gateshead Council Public Health Team, ⁴Teesside University

Introduction: Cross-sectoral partnerships can strengthen the integration of evidence into policy and practice, engaging communities experiencing greatest inequalities to promote physical activity (PA).

Methods: A collaborative, embedded research project was undertaken involving Fuse, the Centre for Translational Research in Public Health, a local authority in NE England, a voluntary and community sector organisation (VCS) and local communities. Participatory methods were used, alongside interviews and focus groups (FGs) with community members ($n=27$), children ($n=30$), teachers ($n=12$) and interviews with VCS staff ($n=12$).

Results: Our findings show that community-led interventions are effective in promoting PA, engaging families and local primary schools in a whole system approach to active living. This collective endeavour requires cross-sectoral responses to the structural, financial, and environmental barriers identified.

Effective partnerships and shared decision making offer promising ways of achieving change in the physical and social environment, driven by community members. Two practical examples are given of co-produced solutions to address traffic concerns, change attitudes to leisure facilities and stimulate evidence-informed changes in policy and practice. We show how wider benefits were achieved, including increased connectivity, self-confidence, and enhanced social relationships.

Conclusions: Targeted, place-based approaches require trusting relationships between agencies, researchers and local communities to tackle deep-rooted inequalities in health. Robust, visionary, leadership supported by non-judgmental, trusted staff can engage people in transformative change to promote PA. Embedded researchers can facilitate links between academia, policy and practice, increase understanding of local context, and address the wider determinants of health with communities facing disadvantage.

External funding details: Study funded by Gateshead Council

Are interventions targeting or exacerbating inequalities in physical activity? A case study of a population with complex barriers to uptake

Emily Oliver¹, Samantha Singham²

¹Durham University, ²Durham University (Alumnus)

Introduction: Intervention-generated inequalities can emerge when those with existing poor health or health related barriers cannot engage with, or benefit less from, interventions. The present work examined whether current physical activity promotion approaches are at risk of exacerbating health inequalities by examining their reach and engagement in a population with complex barriers.

Methods: Those sampled ($n=61$; 41 m, 20 f) had: shift-based work patterns, low incomes, and (at a population level) poor health and low physical activity levels. Awareness of physical activity promotion services, their perceived utility, and prior and potential engagement were assessed using questionnaires.

Results: Participants reported low awareness of physical activity services (M 3.97 (SD 3.47) out of 16 services recognised); males and those aged 55 years and over had significantly lower service awareness than females and younger participants respectively. For those who had accessed existing services (n of uses = 34) perceived utility was high. There was comparable engagement with local and national initiatives. For future engagement, participants were most interested in free or discounted services, and opportunities for physical activity participation as a family.

Conclusion: Collectively, findings suggest that although existing services are well-received by populations with complex barriers, awareness of and engagement with these services are low. Proportionate targeting of advertising, and support with economic barriers in particular, may be required to ensure low participation groups with a range of barriers benefit from physical activity promotion services.

Can walkability reduce neighbourhood inequalities in physical function? A case study among middle-aged to older adults in Brisbane, Australia

Venurs Loh¹, Jerome Rachele², Wendy Brown³, Fatima Ghani⁴, Simon Washington³, Gavin Turrell⁴

¹Deakin University, ²University of Melbourne, ³University of Queensland, ⁴Australian Catholic University

Residents of disadvantaged neighbourhoods have poorer physical function than their advantaged counterparts, although the reasons for this inequality remain unknown. We examined the role of walkability and walking for

transport in the relationship between neighbourhood disadvantage and physical function using data from the 2013 HABITAT study among 4723 men and women aged 46-72, living in 200 neighbourhoods in Brisbane, Australia. Findings revealed complex relationships between neighbourhood disadvantage, walkability, walking for transport and physical function, with clear gender differences. Overall, the relationship between neighbourhood disadvantage and physical function was not explained by walkability and walking for transport. Further work is required to better understand the underlying mechanisms.

External funding details: The HABITAT study is funded by the National Health and Medical Research Council (NHMRC) (ID 497236, 339718, 1047453). VHLY, FG and JNR are supported by the NHMRC Centre for Research Excellence in Healthy, Liveable & Equitable Communities (ID 1061404).

Differences in physical activity between Jewish and Arab adolescents in Israel: Findings from the Israeli Health Behaviour in school-aged children (HBSC) study

Riki Tesler¹, Tanya Kolobov², Kwok Ng³, Ephraim Shapiro¹, Yossi Harel-Fisch²

¹Ariel University, ²Bar Ilan University, ³University of Jyväskylä

Background: Physical activity (PA) during adolescence can help prevent obesity and related diseases. While Israeli youth typically take part in less PA than other countries, Bronfenbrenner's social-ecological model of family, school, and peer group influences on PA can have important implications for improving PA. However, there has not been research into how PA levels and the influence of Bronfenbrenner's model on PA may vary by Israeli sector (Jew or Arab) and gender, which has implications for reducing inequalities.

Objective: 1) To assess differences in Physical Activity (PA) measures among Jewish and Arab adolescents in Israel by gender 2) To analyse the relationship of Bronfenbrenner's social-ecological model and PA measures by sector and gender among Israeli youth

Methods: This study analyzed the 2014-15 HBSC-WHO cross-national survey conducted in Israel among 16,145 pupils in 708 classrooms from Jewish (72.6%) and Arab (27.4%) schools. Descriptive and multivariate analyses were performed to determine the association of family, peers & school on three PA measures for differing sectors by gender.

Results: There were marked differences in physical activity by sector and gender. Arab pupils were typically less active than Jewish pupils and girls less active than boys. Further, family, peer and school influences were found associated with PA but with variations by sector and gender.

Conclusions: Differences in physical activity measures exist by sector and gender among Israeli Youth. an understanding of the varying influences of the socio-ecological model can help tailor interventions to improve PA among different groups and potentially reduce these inequalities.

Diversifying the public health evidence-base: How scoping reviews can contribute to progress regarding physical activity inequalities.

Benjamin Rigby, Durham University

Introduction: Scoping reviews represent an increasing divergence from the hierarchy of evidence which has traditionally informed public health evidence reviews. However, this method has seldom been used in physical activity and inequalities research, due to incumbent policy emphases and a focus on epidemiological study and natural science methods. This paper examines the potential contribution scoping reviews can make to enhance understanding of physical activity and inequalities.

Discussion: Drawing from a recent scoping review, which followed Arksey and O'Malley's protocol to explore equity in outdoor walking group literature, four main benefits are proposed over traditional approaches to evidence synthesis: (1) a rapid yet rigorous process; (2) flexibility amidst emerging evidence; (3) the presentation of available information in a manner reflecting daily decision making; (4) licence to draw upon diverse literatures, which may aid connections between physical activity and health inequalities to be drawn. Acknowledging some of the limitations of scoping reviews, a series of recommendations are posed, including stakeholder involvement in knowledge production, translation and dissemination. Guidance for practitioners seeking to utilise such evidence to inform intervention is provided.

Conclusion: Scoping reviews which follow an explicit methodological framework can provide expeditious evidence for public health use, notably in understanding how physical activity can address inequalities. Continued reflection upon scoping review use will enhance their rigour and strengthen their applicability to research and practice alike.

External funding details: ESRC/Wolfson Research Institute (Durham, UK).

Evaluation of the Northumberland Exercise on Referral Scheme: Weight loss, physical activity and differential effects between sociodemographic sub-groups in overweight and obese referrals

Caroline Dodd-Reynolds¹, Adetayo Kasim¹, Nasima Akhter¹, Coral Hanson²

¹Durham University, ²Napier University

Introduction: Exercise referral can be offered by health professionals, to inactive individuals with an existing health condition/risk (for example NICE PH54). Policy and evidence fail to consider inequalities in terms of sociodemographic factors at referral point, or impact on programme effectiveness. We report part of a wider evaluation considering obese/overweight referrals specifically.

Method: 3,624 referrals (40% of wider evaluation referrals) for overweight/obesity (BMI>24.9 kg/m²) were made from 2009-2014 to a 24-week leisure centre-based exercise scheme in north-east England. Weight-related measurements were taken at baseline, 3 and 6 months; physical activity (PA, Godin Leisure-Time Exercise Questionnaire) at baseline, 6 and 12 months. A random effect linear model accounting for repeated measures, examined associations of outcome variables and sociodemographic predictors

Results: Weight, BMI and waist circumference were reduced at 3 (1.8 kg, -0.39 kg/m², -2.48 cm) and 6 months (-2.2 kg, -0.31 kg/m², -3.11 cm). Weight-related variables tended to be higher for referrals living in the 20% most deprived areas, those in receipt of benefits and those referred by GP versus practice nurse. Across all time-points, weight and PA were negatively associated with age and lower among females ($P < 0.001$). PA increased by 6 months, remaining so at 12 months ($P < 0.01$), and only varied by IMD quintile at 12 months when those in the most deprived 20% reported greatest PA.

Conclusion: Exercise referral was a popular pathway for obese/overweight, resulting in modest weight reduction and increased PA. The scheme did not widen inequalities and demonstrated greatest PA benefit for those most disadvantaged.

Female international students' experience of physical activity at a University in London

Anna Collins¹, Martha Chinouya²

¹Macmillan Cancer Support, ²University of Liverpool

Background: The Chief Medical Officer in England recommends that adults do 150 min of moderate-intensity physical activity per week. Female international students are less likely to be active than male international students. Evidence shows a high prevalence of overweight and obesity within the student population. This study explored the barriers to physical activity experienced by female international students.

Methods: A qualitative research methodology was used. Participants were postgraduate female international students studying at a university in London, and were recruited via purposive and snowballing techniques. Data were gathered from 11 semi-structured interviews. Themes explored included experience taking part in physical activity. Ethics approval was obtained.

Results: Most of the students were not aware of the Chief Medical Officer's recommendations. Barriers they faced included language, feeling isolated, the high cost of participation, and lacking in confidence to engage in different physical activities in London. Images of beauty depicted in the media, participants' religious backgrounds, and living in London all interacted in complex ways that made it difficult for them to participate in physical activity.

Conclusion: To improve the learning experiences of female international students, universities should make physical activity an easier choice by providing options that take account of students' diversity and gendered experiences of a global city like London. This study adds knowledge to a largely under-researched population's physical activity experiences. A limitation is the recruitment strategy used for sampling, so the findings are unlikely to be generalisable to the wider female international student population.

Inequalities in fundamental movement skill development: What about females and overweight children?

Lisa Kelly¹, Siobhán O'Connor², Andrew Harrison³, Niamh Ni Chéilleachair¹

¹Athlone Institute of Technology, ²Dublin City University, ³University of Limerick

Introduction: Fundamental movement skills (FMS) are building blocks for more advanced skills required for daily functioning and physical activity. They include locomotor (e.g. run, skip), object-control (e.g. strike, throw) and stability (e.g. single leg stance) skills. Children with advanced FMS are more likely to engage in regular physical activity and thus reduce their risk of contracting obesity-related diseases. The aim of this study was to examine FMS proficiency levels of Irish primary school children and identify differences according to gender and weight status.

Methods: Following anthropometric measurements, 216 males and 198 females from senior infants to fifth class (9.0±1.7 years) were video-recorded performing 13 FMS and scored using the TGMD-3. BMI percentiles were calculated and used to classify children as overweight (>91st centile) or non-overweight (≤91st centile). Differences in mean skill scores between males/females and overweight/non-overweight participants were analysed using independent samples t-tests.

Results: Percentage mastery ranged between 1.4% (gallop) and 35.7% (slide). Object-control subtest and total TGMD-3 scores were significantly better among males compared to females (both $p = 0.001$). Non-overweight participants had better locomotor subtest and total TGMD-3 scores than overweight participants (both $P < 0.001$).

Conclusion: This study highlights very poor FMS mastery among Irish schoolchildren. Furthermore, females and overweight children are less proficient than males and non-overweight children respectively. Future

programmes should aim to ensure all children are provided equal opportunities to develop proficient levels of FMS. This may stimulate confidence among 'at risk' groups to remain physically active throughout life.

External funding details: AIT President Seed Fund

Post-disaster context influencing quality of life (QoL) of adolescents: The role of organised physical activity

Maria Scatigna, Valentina Cesarini, Roberta Rossi, Anna Maria Angelone, Maria Amparo Manganaro, Leila Fabiani

University of L'Aquila

Environmental determinants of QoL are dramatic in a post-disaster context, particularly in children. In 2015, a cross-sectional survey has been carried out on a sample of 722 adolescents (50.0% males, 13.6 years average age) from two towns in Central Italy, Rieti and L'Aquila. The last one was hit by a big earthquake in 2009, with 309 victims, that destroyed the most part of buildings and had great consequences on physical and social people conditions. Levels of QoL, assessed by means of EQ-5D-Y scale, resulted significantly lower in L'Aquila vs Rieti ($P < 0.01$) and in females vs males ($P < 0.001$). The prevalence of obesity also showed differences in the two areas, but in opposite direction by gender: respectively 10.8% vs 4.9% ($P < 0.05$) in males and 6.8% vs 12.2% (n.s.) in females. Moreover, the prevalence of pre-hypertension and hypertension has been found higher in L'Aquila vs Rieti both for males (70.9% vs 61.4%, $p = 0.059$) and females (58.3% vs 49.4%, n.s.). The proportion of adolescents not practicing structured physical activity resulted higher in L'Aquila vs Rieti both for extra-school Organized PA (respectively 28.0% vs 20.3%, $P < 0.05$) and for school Physical Education (7.4% vs 2.9%, $P < 0.01$). A multiple ordinal logistic model, adjusted per gender, showed that OPA is the only significant determinant of QoL level in L'Aquila ($OR = 2.29$, $P < 0.01$), differently than in Rieti where resulted statistically significant OPA ($OR = 1.99$, $P < 0.01$), obesity ($OR = 0.37$, $P < 0.05$) and SES ($OR = 1.27$, $P < 0.01$).

Enhancing OPA is a significant opportunity to recovering QoL and health in young people in a post-disaster context.

Sedentary behaviour and hair cortisol amongst women living in socioeconomically disadvantaged neighbourhoods: A cross-sectional study

Megan Teychenne¹, Dana Olstad², Anne Turner¹, Sarah Costigan¹, Kylie Ball³

¹Deakin University, ²University of Calgary, ³Deakin

Introduction: Women living in socio-economically disadvantaged neighbourhoods are at heightened risk of experiencing psychological stress, therefore identifying potential risk factors for stress is important to support positive mental health. A growing body of research has linked sedentary behaviour with mental ill-health (e.g. depression and anxiety), however, little research has specifically investigated potential linkages between sedentary behaviour and stress. Therefore, the aim of this study was to investigate the association between common types of sedentary behaviour and objectively-measured stress (as measured by hair cortisol levels) amongst women living in socioeconomically disadvantaged neighbourhoods.

Methods: During 2012/2013, 72 women (aged 18-46) living in socio-economically disadvantaged neighbourhoods self-reported sedentary behaviour (TV viewing, computer use, overall sitting time) and provided hair samples. Hair cortisol levels were measured using enzyme-linked immunosorbent assay. Linear regression models examined cross-sectional associations between sedentary behaviour and hair cortisol levels.

Results: There was no association between any type of sedentary behaviour (TV viewing, computer use, or overall sitting time) and hair cortisol levels in either crude or adjusted models. Sedentary behaviour may not be linked to hair cortisol level (stress) in women living in socio-economically disadvantaged neighbourhoods.

Conclusions: Further studies utilising objective measures of both sedentary behaviour and stress are required to confirm these findings.

Theme: Interventions—adults

A physical activity intervention manual for people who have a stoma

Gill Hubbard¹, Rebecca Beeken², Claire Taylor³, Julie Munro¹, Will Goodman⁴

¹University of the Highlands and Islands, ²University of Leeds, ³NHS London NW Healthcare Trust, ⁴UCL

Introduction: Evidence shows that people who have a stoma formed reduce their level of physical activity. There are no physical activity interventions specifically for people who have a stoma.

Methods: A physical activity intervention manual was developed for physical activity instructors to use when instructing people who have a stoma. The manual was informed by a focus group with seven people who have a stoma, three UK charities that provide information and support for people with a stoma, a gym session involving two people with a stoma and three gym instructors, and the literature.

Results: There is no consensus about physical activity guidance and prescription for people who have a stoma. Advice about relevant and safe abdominal exercises is contradictory (e.g. exercise abdominal muscles to reduce hernia risk vs. do not exercise the abdominal muscles because it increases hernia risk). People in the focus group made a series of recommendations ('top tips') including wearing a support garment/belt, wearing flange extenders, wearing a pad inside underwear, emptying bag before starting an activity, wearing dark coloured clothing to hide any leaks, and keeping hydrated. The gym session suggests that what exercises 'feel' safe is often a matter of trial and error.

Conclusion: The use of the manual by instructors needs to be evaluated with a group of people who have a stoma.

External funding details: Bowel and Cancer Research

A pilot bodyweight exercise intervention within the workplace

Robert Southall-Edwards¹, Valerie Gladwell², Matthew Taylor²

¹University of Essex, ²University of Essex

Background: Frequently interrupting sedentary behaviour (SB) is associated with improved cardiometabolic outcomes. In older adults, breaks independent of total sitting, are associated with increased physical capability. Bodyweight exercises (BWE) may offer a cost-effective mode by which SB can be interrupted within the workplace, providing important health benefits. This pilot research investigated implementing a BWE intervention within the workplace.

Methods: Nineteen healthy participants (44.1 ± 12.5 years) completed a one-week baseline, before being randomly assigned to a control ($n = 9$) or BWE intervention ($n = 10$) group. The intervention group completed a set of five BWE once per hour, when at work, over a two-week period. Post intervention a one-week follow-up was conducted. SB was monitored via accelerometry and measures of physical capability were assessed using dynamic balance, grip strength and jump power.

Results: Workplace SB was considerably reduced (-35 minutes/day; $\eta^2 = 0.19$) when completing the BWE intervention. The intervention improved balance, with anterior balance increasing significantly at follow-up (Control: $+1.07\% \pm 1.87$; Intervention $+3.72\% \pm 0.84$, $\eta^2 = 0.39$). Grip strength and jump power did not improve from baseline in the intervention group.

Conclusions: A BWE workplace intervention resulted in considerable reductions in SB; interestingly this was twice the time required to complete the BWE. Completing the intervention improved balance, which was greatest when measured one-week post intervention. A multi-component BWE intervention, over a longer period of time, may offer permanent reductions in SB and associated health benefits.

A systematic review and meta-analysis of the effects of interrupting prolonged sitting with physical activity breaks on blood glucose, insulin, triacylglycerol

Roland Loh¹, Emmanuel Stamatakis², Dirk Folkerts³, Judith Allgrove¹, Hannah Moir¹

¹Kingston University, ²University of Sydney, ³University of Muenster

Introduction: The aim was to systematically review and meta-analyse trials breaking up sitting with bouts of PA throughout the day (INT) compared with sitting (SIT), on glucose, insulin and triacylglycerol (TAG). Another aim was comparing the effects of INT against one bout of continuous exercise before or after sitting (EX), on glucose, insulin and TAG.

Methods: PRISMA recommendations were followed. PROSPERO Registration: CRD42017080982 Eligibility: control trials comparing INT vs SIT, or INT vs EX, participants aged 18 or above, healthy, or with type 2 diabetes, but not with health conditions such as chronic obstructive pulmonary disease or peripheral arterial disease.

Results: INT vs SIT: For glucose, SMD of -0.60 [-0.81 , -0.39] in favour of INT. For insulin, SMD of -0.69 [-0.98 , -0.41] in favour of INT. For TAG, SMD of -0.27 [-0.44 , -0.09] in favour of INT. BMI was associated with glucose responses ($\beta = -0.064$, 95% CI: -0.123 , -0.005 , $p = .034$), but not insulin ($\beta = -0.066$, -0.152 , 0.02 , $p = .122$), nor TAG ($\beta = .010$, -0.048 , $.067$, $p = .722$) INT vs EX: When energy expenditure matched, SMD of -0.36 [-0.65 , -0.06] ($p = 0.02$) in favour of INT only on glucose. No significant effect for other comparisons.

Discussion: There was publication bias for TAG. PA breaks moderately attenuated post-prandial glucose, insulin, and TAG, with greater glycaemic attenuation in people with higher BMI, but differences compared to one continuous bout of exercise are small, for glucose when protocols are energy matched, or non-existent for insulin and TAG. Therefore, PA breaks attenuate markers of metabolic health.

App engagement and weight loss in a mobile health study (mDiab)

Ranjani Harish¹, Shruti Muralidharan², R M Anjana¹, Sidhant Jena³, Nikhil Tandon⁴, Steven Allender⁵, Viswanathan Mohan⁶

¹Madras Diabetes Research Foundation & Dr. Mohan's Diabetes Specialities Centre, Chennai, ²Madras Diabetes Research Foundation & Deakin University, ³Janacare Solutions Private Limited, Bengaluru, ⁴All India Institute of Medical Sciences, New Delhi, ⁵Global Obesity Centre (GLOBE), World Health Organisation Collaborating Centre for Obesity Prevention, Deakin University, Geelong Waterfront campus, Geelong, Victoria, Australia, ⁶Madras Diabetes Research Foundation & Global Obesity Centre (GLOBE), World Health Organisation Collaborating Centre for Obesity Prevention, Deakin University

Purpose: The purpose of this study was to evaluate the association of app engagement with change in weight and BMI as part of the mobile health technology for the prevention of type 2 diabetes (mDiab) trial.

Methods: The mDiab app included 12 weeks of video lessons administered to 267 obese participants who received the app as part of the intervention group. Additionally, participants received coach calls who summarized the weekly lessons and presented feedback on their tracked diet, physical activity and weight loss behaviours. App engagement was divided into four groups - no engagement, only videos, only coach calls, video and coach calls.

Results: Within a 3-4 month period, participants who viewed the video lessons showed a significant decrease in weight and obesity. Those who attended coach calls also showed a similar trend but this did not reach statistical significance. The participants who both attended the calls and saw the videos showed a significant decrease in weight and BMI however there was no synergistic effect (Table 1).

Conclusions: Engagement with the mDiab app resulted in decreased weight and BMI with the strongest effect seen for the video lessons.

External funding details: This study is supported by a funding from the Government of India under the Biotechnology Industry Partnership Programme of the Department of Biotechnology

Benefits of belly dance on quality of life, fatigue, and depressive symptoms in women with breast cancer: A pilot study of a non-randomised clinical trial

Leonessa Boing¹, Gustavo Pereira¹, Fatima Baptista², Fabiana Sperandio¹, Jéssica Moratelli¹, Allana Cardoso¹, Adriano Borgatto³, Adriana Guimarães¹

¹Universidade do Estado de Santa Catarina, ²Universidade de Lisboa, ³Universidade Federal de Santa Catarina

Introduction: Breast cancer treatment can cause some serious effects on the women's lives. In this context, dance, as a type of physical activity, can be an option for these women achieve some benefits.

Objective: To analyse the influence of belly dance in the quality of life, fatigue, and depressive symptoms in women with breast cancer.

Methods: Pilot study with a design of non-randomised clinical trial analysing 19 women, with 8 allocated in the experimental group (EG) and 11 in the control group (CG). The EG underwent 12 weeks of belly dance classes, with a frequency of twice a week and duration of 60 minutes for each lesson. Data collection was made through the use of questionnaires containing general information, quality of life (EORTC QLQ-BR23), fatigue (Piper Fatigue Scale) and depressive symptoms (BECK's Depression Inventory) applied on baseline and after intervention.

Results: The EG presented an increase in the functional scale ($p = 0.002$): body image ($p = 0.037$) and sexual function ($p = 0.027$); and a decrease in the symptomatic scale ($p = 0.001$): systemic therapy side effects ($p = 0.005$) and arm symptoms ($p = 0.001$) of quality of life, as well the decrease of fatigue ($p = 0.036$) and depressive symptoms ($p = 0.002$) after intervention. No significant differences were observed in quality of life, fatigue, and depressive symptoms between EG and CG.

Conclusion: Belly dance can be a viable form of physical activity for women with breast cancer. It was associated with benefits for quality of life, fatigue, and depressive symptoms.

External funding details: Accepted for publication in The Journal of Bodywork & Movement Therapies - DOI:<https://doi.org/10.1016/j.jbmt.2017.10.003>

Determinants of change in television viewing time over 10 years during adulthood

Xiaolin Yang¹, Anna Kankaanpää¹, Stuart Biddle², Mirja Hirvensalo³, Harri Helajärvi⁴, Tuija Tammelin¹

¹LIKES Research Centre for Physical Activity and Health, ²Institute for Resilient Regions, University of Southern Queensland, ³Faculty of Sport and Health Sciences, University of Jyväskylä, ⁴Paavo Nurmi Centre, Department of Physiology & Health and Physical Activity, University of Turku

Introduction: Understanding television (TV) viewing barriers and facilitators during adulthood is important to ensure the effectiveness of interventions and actions to reduce overall sedentary time. We aimed to examine changes in TV viewing in young adults over 10 years and identify modifiable sociodemographic and health behavior determinants of these changes.

Methods: Participants (n = 2929) of the longitudinal Cardiovascular Risk in Young Finns Study had self-reported their TV time in 2001 (aged 24-39), 2007 and 2011 and answered to repeated questionnaires to provide additional other information, as well as the required medical examination. The determinants of change (slope) in TV viewing were examined by using a linear growth curve model.

Results: In males, increasing attention to health habits was inversely associated with a slope of TV viewing, whereas age and becoming unemployed were positively associated with the slope of TV viewing over time. In females, increasing physical activity, becoming employed, motherhood and being normal weight were inversely associated with the slope of TV viewing, whereas age and staying in non-manual work were positively associated with the slope of TV viewing.

Conclusion: This suggests several gender specific determinants of change in TV time that can help identify potential targets for interventions to prevent excessive TV viewing during adulthood.

Effects of a functional training program on hemodynamic parameters of women with metabolic syndrome

Daniela Lopes Dos Santos, Cati Reckelberg Azambuja, Jessica Karine Berté, Plauto Moura Alves

Federal University of Santa Maria

Introduction: Metabolic syndrome is prevalent worldwide and usually is associated to physical inactivity and obesity. The treatment and prevention involve healthy eating and an active lifestyle. One of the physical training methods that has been gaining attention in the prevention of various diseases is Functional Training, so the purpose of this study was to analyze the effects of a Functional Training Program on hemodynamic parameters of middle-aged women with metabolic syndrome.

Methods: Seventeen women with a mean age of 49.59 (± 5.58) years, body mass of 77.88 (± 11.62) kg and waist circumference of 95.88 (± 10.67) cm, participated in the study. They all had at least three of the metabolic syndrome components (hypertension, insulin resistance, dyslipidemia and central obesity). The training program occurred during 14 weeks with 60-minute sessions, three times a week and was based on the CORE 360° method. Hemodynamic data, such as systolic and diastolic blood pressures, resting heart rate and $\text{VO}_{2\text{max}}$ were collected at the beginning and at the end of the training period and were statistically analyzed using Student t and Wilcoxon Signed Rank Tests ($p < 0.05$).

Results: The Functional Training Program significantly reduced diastolic blood pressure (from 82.29 $\pm$ 10.28 to 74.82 $\pm$ 8.03 mmHg, $p \leq 0.002$) and reduced in a non-significant manner the other studied variables.

Conclusion: It was concluded that a 14-week Functional Training Program affects positively the hemodynamic parameters, especially diastolic blood pressure, of women with metabolic syndrome, contributing in the maintenance of good health and quality of life.

Energy expenditure, physiological, and perceptual responses to a brief, simple bodyweight resistance training protocol in previously sedentary adults

James Steele¹, Rebecca Conway¹, Sarah Weber¹, Jordan Niblock¹, James Fisher¹, Paulo Gentil², Christopher Scott³, Hayao Ozaki⁴

¹Southampton Solent University, ²Federal University of Goias, ³University of Southern Maine, ⁴Jutendo University

Introduction: Resistance training (RT) participation is low compared to the moderate-vigorous aerobic activity portion of physical activity guidelines. Time and accessibility are barriers yet RT can be performed in an accessible time efficient manner using bodyweight exercises. The aim of this study was to examine energy expenditure, physiological, and perceptual responses of a brief, simple bodyweight resistance training protocol in previously sedentary adults.

Method: Ten participants (male = 4, female = 6; age = 47 $\pm$ 7 years; body mass = 76.61 $\pm$ 16.52 kg) performed a bodyweight resistance training protocol consisting of a push up, isometric wall sit, bodyweight row, and a plank. Each was performed for a single set until volitional fatigue followed by 4-minute rest periods. Oxygen consumption and blood lactate were measured and total energy expenditure estimated. In addition, heart rate, muscle swelling, and both perceived effort and discomfort (0-10) were examined.

Results: Total training time including rest was 25 $\pm$ 2 minutes (exercise time was 9 $\pm$ 2 minutes) with a total energy expenditure of 118.9 $\pm$ 22.0 kcals. Heart rate increased significantly ($p = 0.007$ to 0.005) during exercise compared to rest, yet after 1 minute of recovery did not significantly differ. Significant increases in muscle swelling also occurred ($p < 0.001$). Perceived effort was 8.2 $\pm$ 1.2 and discomfort was 7.3 $\pm$ 1.0.

Conclusion: A brief, simple body weight resistance training protocol can produce meaningful energy expenditure and may provide a suitable stimulus for improvements in health and fitness. This approach could be easily implemented to meet the twice a week recommendations for muscle strengthening activities.

Evaluating the effectiveness of a health promotion intervention program among physiotherapy undergraduate students

Liat Korn¹, Noa Ben-Ami²

¹School of Health Sciences, Ariel University, ²Ariel University

Introduction: This study evaluated the effectiveness of a health promotion (HP) intervention program among physiotherapy undergraduate students in an academic institution by examining pre- and post-intervention health perceptions and behaviors compared to a control group (non-physiotherapy students).

Methods: Participants completed questionnaires on their health perceptions and behaviors at T1 (April 2009–May 2009) before the intervention program was initiated, and at T2 (April 2015–May 2015) after the intervention program was implemented for several years. At T1, 1,087 undergraduate students, including 124 physiotherapy students, participated. At T2, 810 undergraduate students, including 133 physiotherapy students participated. Self-reported health-related perceptions and behaviors were compared in the study group (physiotherapy students) over time (T1 versus T2), and between the study group and the control group (non-physiotherapy students) pre-intervention (T1) and post-intervention (T2).

Results: Findings showed more positive perceptions and behaviors at T2 compared to T1 in the study group (51.0% at T2 versus 35.2% at T1; $P < 0.05$). There was no significant difference at T2 compared to T1 in health perceptions reported by the control group (37.8% at T2 versus 32.8% at T1; non-significant difference).

Conclusion: Our findings demonstrated the effectiveness of the intervention program.

Exploring the need for novelty in bariatric patients' life and in an exercise setting: A qualitative study

Maria Romero Elias¹, Alejandro Jiménez Loaisa¹, David González-Cutre Coll², Vicente Beltrán Carrillo²

¹Sport Research Center of the Miguel Hernández University of Elche,

²Sport Research Center of Miguel Hernández University of Elche

Introduction: The need for novelty has recently been proposed as a candidate basic psychological need within self-determination theory. The aim of this qualitative study was to throw more light on this issue, by exploring the perceived importance that bariatric patients gave to novelty in general life and in a physical activity programme in which they participated, which included novelty support strategies.

Method: Participants were 10 people (nine women) aged between 31 and 59 years ($M = 45.90$, $SD = 9.25$) who had lived with morbid obesity and who had undergone bariatric surgery. Qualitative data about the importance of novelty in their life and in the physical activity programme were collected through observation and semi-structured interviews.

Results: Participants described the important role of novelty in life to break the routine and avoid boredom, lack of interest, depression and withdrawal from activities. Regarding the physical activity programme, they highlighted the presence of novel activities (e.g., games, aquagym, indoor cycling, dance, body expression, core-training, trekking, circuits with quotidian materials such as full bottles to improve strength) was related to knowledge acquisition, enjoyment, variety and curiosity. Participants indicated that novelty was a key element for the success of the programme because only a traditional intervention with machines for endurance and strength training would be boring for them.

Conclusion: This research has shown that novelty need is present in the life of bariatric surgery patients, and its satisfaction could be related to different positive outcomes and wellbeing in life and in an exercise context.

From cars to bikes: The feasibility and effect of using e-bikes, longtail bikes and traditional bikes for transportation in parents of children attending kindergarten

Helga Birgit Bjørnarå¹, Sveinung Berntsen¹, Saskia J te Velde¹, Liv Fegran¹, Aslak Fyhri², Benedicte Deforche³, Lars Bo Andersen⁴, Elling Bere¹

¹University of Agder, ²Institute of Transport Economics, ³Ghent University, ⁴Western Norway University of Applied Sciences

Introduction: Cycling for transportation may increase physical activity level and decrease car use, thereby favoring human health and the environment. The present study aims to assess the effect of an ongoing intervention (Sep 2017-June 2018), providing participants access to different bike types. Main outcomes are cycling amount (distance and time) and travel behaviour (frequency of cycling and driving to the workplace, kindergarten and grocery store).

Methods: A randomized cross-over trial is conducted, entailing that the intervention group ($n = 18$) in random order is equipped with an e-bike with trailer ($n = 6$), a longtail bike ($n = 6$), and a traditional bike with trailer

($n = 6$), each type for three months. Also, a control group ($n = 18$) is included, resulting in a convenience sample consisting of 36 parents of preschoolers (not cycling at study start), residing in Southern Norway. Cycling distance and time is measured with a bicycle computer, while frequency of cycling and driving to the workplace, kindergarten and grocery store, is mapped using a questionnaire.

Results: Baseline data revealed no differences between the intervention group and the control group for age, ethnicity, educational attainment, total time in moderate-to-vigorous physical activity, distance to selected destinations, or travel behavior. Results from the trial will be presented at the conference, exploring potential intervention effects for total amount of cycling and travel behavior.

Conclusion: Bike access may result in increased cycling and decreased car use in parents of children attending kindergarten.

External funding details: The study is funded by the Norwegian Extra-Foundation for Health and Rehabilitation, through the Norwegian Health Association.

Intervention mapping: Physical activity with socially disadvantaged women

Kathryn Brook, Andy Pringle, Jackie Hargreaves, Nicky Kime, Leeds Beckett University

Introduction: Socially disadvantaged women (SDW) have lower levels of physical activity (PA), health inequalities and poorer health outcomes. These are associated with social determinants of health, e.g. Socioeconomic position and ethnic minority. Developing effective behaviour change programmes for SDW is complex due to disparities such as limited income and/or culturally inappropriate settings. These intricacies are often overlooked in PA policy. Consequently, interventions aimed at SDW often fail to show adequate reach, adoption and/or maintenance of PA. Therefore, we aim to inform policy and practice by developing needs-led PA interventions with SDW using Intervention Mapping (IM). IM begins with a needs assessment and follows an iterative six step process for planning interventions.

Method: Needs assessment tasks involved regular researcher participation in local PA sessions with SDW. The researcher also conducted 17 semi-structured interviews with SDW and community PA practitioners on the topic of PA. This data was thematically analysed and used within the first step of IM: to create a logic model of the PA health problem.

Results: Data gathered from interviews shows PA variety and suitable opportunities in Leeds and surrounding areas are lacking for SDW. These insights have demonstrated that the needs of SDW are essential to inform IM, PA policy and practice.

Conclusion: IM begins with a needs-led approach when tackling the health problem of inactivity for SDW. IM will continue to be used to design a comprehensive tool for practice and inform PA policy for SDW.

The WalkJogSmile feel-good beginner running programme: A study of experiences of beginner running podcasts for optimising a new run-walking intervention for inactive people

Katy Kennedy, University of Surrey, UK

Introduction: Beginner run-walk podcasts are a free, accessible way for people to start running, with public health potential to increase physical activity levels in inactive populations. For example, the popular NHS CouchTo5K (C25K) programme uses run/walk intervals to build running fitness towards 30 minutes' continuous running at nine weeks. The aim of this study was to optimise a new run-walk intervention (the WalkJogSmile programme) to help inactive people begin running. WalkJogSmile has a

similar rationale to C25K, but includes innovative psychologically-based concepts to help people feel better during running, to improve short- and long-term adherence. Amongst other principles, WalkJogSmile uses short running intervals in early weeks, smoother increases in running duration than C25K, and a self-monitoring tool to help people monitor how they feel and adjust running accordingly.

Method: This was a longitudinal online diary study, with qualitative feedback structured around people's experiences of C25K or WalkJogSmile (both nine weeks, three weekly sessions), plus a quantitative enjoyment measure. Low-active participants ($n=20$) were emailed an online feedback questionnaire after each session.

Results: Feedback on both podcasts was positive. Some improvements suggested for C25K were already included in WalkJogSmile podcasts, and participants gave further useful suggestions to improve WalkJogSmile. C25K participants reported extra walking breaks compared with WalkJogSmile participants, indicating that shorter running intervals and self-monitoring in early stages were more beginner-friendly.

Conclusion: The WalkJogSmile programme was positively received, and participants gave useful feedback for optimising the programme. The next step is to examine long-term running success in a comparison with C25K.

Tripe intervention in obese adults from Portuguese Navy

Moisés Henriques¹, Daniel Neves¹, Mafalda Hipólito², Ana Teixeira³, Filipa Azevedo¹, Eduardo Mestre², Ana Nunes¹, Filipa Albergaria¹, Maria Diniz¹, José Silva⁴

¹Navy Medical Centre, ²Navy Physical Education Centre, ³Navy Supply Direction, ⁴Navy Health Direction

Introduction: Nowadays, overweight and obesity are a public health problem. Even in the national Navy population, overweight and obesity can reach prevalence of $46.5\pm 2\%$ and $12.2\pm 2\%$, respectively (CI 99%).

This study explains the organization and results of a triple intervention program in a group of obese adults from a national Navy.

Method: A twenty weeks program including medical evaluation (beginning and whenever necessary), nurse evaluation (every 2 weeks), nutritional support (every 2 weeks), psychological support (all weeks) and physical training (3 days a week, all weeks) was proposed to overweight or obese military that won't be absent during the program period. Fourteen obese adults were selected to engage the program and the objective was an individual weight reduction $>10\%$. A six months follow-up is planned.

Results: Thirteen adults finish the program. Only two of them reached the program objective and other two were near; one participant increased his weight 4%. Globally, the group lost 83,9 kg and there were gains in blood pressure values, cardiac frequency, body mass index, fat and lean mass percentages, and abdominal and hip perimeters.

Conclusion: This kind of program is very important to change unhealthy mentalities and lifestyles. The final results are, at least, encouraging because the participants improved some of their health indicators. Some enhancements will be considered in the next program edition to potentiate the good results. All military should be fit, so Navy health system must acknowledge the overweight and obesity problem and invest in prevention.

Us Mums Hull: Pre and post-natal physical activity programme

Andy McKee, Sophie Brown, Laila Lapse-Berga, Hull City Council

Us Mums Hull is a three year Sport England funded pre and post-natal physical activity intervention designed to engage sedentary female residents across the city.

The project aims to take advantage of this unique life stage / window of opportunity when health may be a priority for females and their family, offering a range of activities and sessions that remove perceived barriers towards participation within physical activity. Designed to bring together professionals from a health and physical activity background, key partners engaged range from the Hull & East Yorkshire NHS Trust, Public Health and Health Visiting alongside Hull City Council Healthy Lifestyles Team, local county sports partnership and physical activity providers plus the voluntary and community sector.

Us Mums Hull forms part of Hull's Health and Wellbeing Strategy 2014 - 2020 whilst contributing towards the city's weight management pathway and obesity life course model, ensuring residents have the best start in life and live healthier, happy, longer lives. The project has created a community of mums, building trust within the 'Us Mums' brand through the use of partnerships and engaging staff and to help participants take the step from contemplation to engagement.

Us Mums aims to engage 1705 females within physical activity over the course of the initiative. The project has appointed a research and evaluation partner who analyses all data from engaging participants, measuring physical activity levels and reporting back on sustained engagement.

External funding details: Sport England 'Get Healthy Get Active' investment over 3 years. Local authority match funding.

Theme: Interventions—children and young people

A family-based lifestyle programme to reduce the risk of developing Type 2 Diabetes in the future (PRE-START): A pilot randomised controlled trial (RCT)

Charlotte Edwardson¹, Emer Brady², Laura Gray¹, Deirdre Harrington¹, Ghazala Waheed¹, Melanie Davies¹

¹University of Leicester, ²University Hospitals of Leicester

Introduction: Younger populations are being diagnosed with type 2 diabetes (T2DM) due to increases in obesity and physical inactivity. Early intervention is needed. PRE-START is a lifestyle programme for young people at risk of T2DM and their parents/guardians. The aim was to conduct a pilot RCT of the PRE-START programme.

Methods: Families were recruited from the community in Leicester, UK. PRE-START involved 8 x 90 minute group workshops (what it means to be healthy, physical activity, sitting, a balanced diet, healthier breakfast, snacks, treats and fast food). A physical activity tracker (Garmin Vivofit3) was provided to self-monitor activity. Demographics, biomedical, anthropometrics and lifestyle behaviour (including objectively measured physical activity) were measured at baseline, 3 and 6 months.

Results: 54 families were recruited (27 intervention, 27 control; adolescent mean age: 13.15 ± 0.73 years, 52% female, 37% white; 61% overweight and obese). 33% families attended all workshops, 63% attended half and 22% did not attend any. 67% and 60% of families were assessed at 3 and 6 months respectively. $\geq 93\%$ of participants provided ≥ 4 valid days of accelerometer data at each time point. This study was not powered to detect differences in outcomes but there were trends towards differences between groups in moderate-to-vigorous physical activity (MVPA), sitting time, snack and fruit and vegetable consumption. Attendance data for change in MVPA indicated a dose response.

Conclusion: Young people and their families can be recruited but workshop attendance and retention was challenging. The data point to trends in positive changes in health behaviours.

External funding details: European Commission

A healthy school start plus for prevention of childhood overweight and obesity in disadvantaged areas through parental support in the school setting: A parallel group cluster randomised trial

Mahnoush Malek, Åsa Norman, Liselotte Schäfer Elinder, Emma Patter-son, Gisela Nyberg, Karolinska Institutet

Aim: To investigate the effects of a revised parental support programme for promoting healthy diet and physical activity to prevent overweight and obesity in children in disadvantaged areas.

Methods: Programme effectiveness will be compared to standard school routines. The 6-month programme (start August 2017), consists of four components: 1) Health information to parents; 2) Motivational Interviewing with the parents by the school nurse; 3) classroom activities for the children by teachers; and 4) a web-based self-test of type-2 diabetes risk by parents. This study includes 17 schools and 352 six-year-old children (155 intervention/197 control). Physical activity and sedentary time were measured objectively by accelerometry. Weight and height were measured by trained researchers. Outcomes are measured at baseline, at 6- and 18 months post baseline. A mixed-effect regression analysis will be performed.

Results: At baseline, mean age was 6.2 years (SD 0.3), mean weight 24.0 kg (SD 4.9) and mean height 119.2 cm (SD 5.4). According to IOTF classifications, 11.1% of the children had obesity, 17.2% overweight, 4.8% underweight and 66.9% normal weight. The mean prevalence of obesity among children in Sweden is 3-5%. Preliminary results on physical activity and sedentary time at 6 months will be presented.

Conclusions: The results are expected to contribute to evidence-based practice within student health services in Sweden and may reduce social inequalities in health.

External funding details: This project has received funding from the Swedish Research Council Forte, the Kamprad Family Foundation and the Sigurd and Elsa Golje's Foundation.

Are the school environment for physical activity and play time mediators of the effect of a school-based intervention on student's academic performance?

Kelly Silva¹, Valter Cordeiro Barbosa Filho²

¹Federal University of Santa Catarina, ²Federal Institute of Ceara

Introduction/Background: Special attention to the relationship between health and education has been explored in school-based interventions. The aim of this study was examining whether the perception of the school environment for physical activity (PA) and engagement in playing time are mediators of the effect of an intervention on academic score in Brazilian students.

Method: A cluster-randomized controlled trial was carried out in 2014 in Fortaleza, Brazil. Schoolchildren (11-17 years-old) from two intervention schools and two control schools were evaluated. The 4-months intervention included strategies focused on teacher training, environmental changes and health education. The standardized questionnaire evaluated school environment (mediator 1) and playing time (mediator 2). Academic performance was estimated considering grade-specific z-scores from standardized tests in mathematics at baseline and post-intervention (second semester with intervention). Multiple serial mediation analysis was used to investigate the direct and indirect effects; the mediation was confirmed when the product of coefficients and their 5000 bootstrapped confidence interval (CI) of 95% did not include zero.

Results: Data from 733 adolescents (intervention: 361 students; and control: 372 students) were included. There was no direct effect of the

intervention on academic score (c' coefficient=0.110; 95%CI: -0.378; 0.598), and a_1 , a_2 and d_{21} coefficients were statistically significant. Indirect effects showed that only the pathway intervention: school environment: playing time: academic scores was statistically significant (product of coefficients $a_1d_{21}b_2=0.010$; 95%CI: 0.001; 0.030).

Conclusion: The results suggest that school-based PA intervention can help academic performance, through changing the perception of the school environment and the playing among adolescents.

Associations of health-related quality of life with sedentary time and physical activity in children

Manuel Ávila-García, Pablo Tercedor, Nuria Baena-Ogalla, Maria Esojo-Rivas, Francisco Javier Huertas-Delgado

University of Granada

Introduction: According to the body of literature, health-related quality of life (HRQL) is associated with physical activity (PA) levels and sedentary time in children. The aim of this study was to analyse the association of HRQL with PA levels and sedentary time in children and separately by gender.

Method: A total of 262 children (54.3% boys, age: 8.5 ± 0.5) from 7 schools of Granada (Spain) participated in the study. To evaluate HRQL we used the Kindl-R children questionnaire. The sedentary time and PA intensity levels were assessed using a tri-axial accelerometer for seven consecutive days (Actigraph wGT3X-BT, Pensacola, FL, USA). Several multiple logistic regressions were used to analyse the relationship between HRQL dimensions and sedentary time and PA levels (light, and moderate-vigorous).

Results: We found significant associations only in girls. The self-esteem dimension was associated with higher values of light PA ($\beta=0.004$; 95%-CI=0 to 0.008; $p=0.029$). In addition, the school dimension was associated with less sedentary time ($\beta=-0.003$; 95%-CI=-0.05 to 0; $p=0.032$) and an increase of moderate-vigorous PA ($\beta=-0.008$; 95%-CI=-0.16 to 0; $p=0.04$).

Conclusions: The findings indicate that self-esteem dimensions positively influence daily light PA, and that there is an association between the school dimension and a decreased sedentary time and improvement in daily moderate-vigorous PA in girls. Thus, programmes focused on health-related quality of life (self-esteem and school) must consider the desirable effect over PA promotion in children.

External funding details: The PREVIENE Project was funded by the Spanish Ministry of Economy and Competitiveness (DEP2015-63988-R, MINECO, FEDER, EU).

Beyond Jonny's Story: A whole class physical activity intervention

Kristy Howell, Canterbury Christ Church University

Previously (2016), the authors Howells and Bowen were inspired by Collingwood et al.'s (2000) proposal that physical exercise can raise self-esteem and they investigated the potential impact of physical activity interventions for one case study child (Jonny) on his self-esteem and reading and numeracy academic levels. They found that Jonny had significant improvements to both his self-esteem and academic achievements.

In 2017, the researchers extended 'beyond Jonny's story' to investigate a year long, whole class physical activity intervention and if there were any opportunities and challenges in communication and working as a team through undertaking a new daily physical activity interventions of the 'The

Daily Mile' (The Daily Mile Foundation, 2017). In Holland and Scotland schools have already been undertaking a school running initiative of 'The Daily Mile', which includes children walking, running and jogging a mile a day within the school environments, playgrounds and fields. A mile a day has also been recommended within the recent Childhood Obesity Strategy (HM Government, 2016) as a way to encourage children to move to increase positive attitudes towards movement.

This paper will report on the whole class academic levels in numeracy and literacy, well-being levels, levels of communication, including speech and language that were developed through the daily physical activity interventions. It was also observed how handwriting skills were improved through having time and space to practice whilst walking/running. As the year progressed, the children identified how important the daily mile was to them and how they wanted to complete it.

Canadian 24-hour movement guidelines for the Early Years (0-4 years): An integration of physical activity, sedentary behaviour and sleep

Mark Tremblay¹, Jean-Philippe Chaput², Kristi Adamo³, Salome Aubert², Joel Barnes², Louise Choquette⁴, Mary Duggan⁵, Guy Faulkner⁶, Gary Goldfield², Casey Gray², Reut Gruber⁷, Katherine Janson⁸, Ian Janssen⁹, Xanne Janssen¹⁰, Alejandra Jaramillo Garcia¹¹, Nicholas Kuzik¹², Claire LeBlanc¹³, Joanna MacLean¹², Anthony Okely¹⁴, Veronica Poitras², Mary-Ellen Raynor¹⁵

¹CHEO Research Institute, ²Healthy Active Living and Obesity Research Group, ³University of Ottawa, ⁴Best Start Health Nexus, ⁵Canadian Society for Exercise Physiology, ⁶University of British Columbia, ⁷McGill University, ⁸ParticipACTION, ⁹Queen's University, ¹⁰University of Strathclyde, ¹¹Public Health Agency of Canada, ¹²University of Alberta, ¹³Canadian Pediatric Society, ¹⁴University of Wollongong, ¹⁵The Sandbox Project

Introduction: Novel guidelines for children of the early years were developed to respect and embrace the natural and intuitive integration of movement behaviours across the whole day (24-hour period).

Methods: The guideline development process was guided by the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument and followed the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) methodology. Four systematic reviews (physical activity, sedentary behaviour, sleep, combined behaviours) examining the relationships within and among movement behaviours and several health indicators were completed and interpreted by a Guideline Development Panel. Complementary compositional analyses were performed using data from the Canadian Health Measures Survey to examine the relationships between movement behaviours and indicators of adiposity. A stakeholder survey (n = 546), 10 key informant interviews, and 14 focus groups (n = 92 participants) were completed to gather feedback on draft guidelines and their dissemination.

Results: The resulting guidelines provide evidence-informed recommendations for combinations of light-, moderate- and vigorous-intensity physical activity, sedentary behaviours, and sleep that infants (<1 year), toddlers (1-2 years) and preschoolers (3-4 years) should achieve for a healthy day (24 hours). Proactive dissemination, promotion, implementation, and evaluation plans were prepared to optimize uptake and activation of the new guidelines.

Conclusions: These guidelines represent a sensible evolution of public health guidelines whereby optimal health is framed within the balance of movement behaviours across the whole day, while respecting preferences of end-users. Future research should consider the integrated relationships among movement behaviours, and similar integrated guidelines for other age groups should be developed.

Change4Life Sports Clubs

Chris Wright, Russell Cartwright, Youth Sport Trust

Change4Life Sports Clubs increase physical activity with inactive seven to nine year olds through multi-component approaches. They instill the confidence and competence in children to move and sustain improvement in healthy behaviours. They lift children out of inactivity and reduce the risk of non-communicable disease.

The clubs create a sense of belonging through exciting and inspirational environments using physical literacy and fundamental movement skill concepts. They are led by engaging deliverers and young leaders providing training, resources, equipment to ensure that they are sustainable and effective.

Key Findings:

- 67% increase in children achieving 60 active minutes every day
- Inactivity has decreased significantly with 7,500 lifted out of inactivity
- Wellbeing and individual development has increased significantly
- Positive impacts on children's confidence (99%), aspirations (92%), behaviour (67%), attendance (52%)

Unit Cost Analysis: Change4Life Sports Clubs cost £305 for every new child meeting CMO guidelines

Quality Adjusted Life Year and future activity analysis:

- The cost per QALY for the GROSS outcomes of Change4Life Sports Clubs is £3,385
- The cost per QALY for Change4Life Sports Clubs is significantly below NICE's threshold for value for money per QALY of £20,000.
- The cost per QALY for the GROSS outcomes of Change4Life Sports Clubs is better than walking buses (£4,008 per QALY), dance classes (£27,570 per QALY), free swimming (£40,462 per QALY) and community sports (£71,456 per QALY)
- The Change4Life Sports Clubs cohort are predicted to do an hour more physical activity per week at ages 13-15 than today's 13-15 year olds.

External funding details: Department of Health

Correlates of childhood independent mobility in Canada: Location, location, location

Negin Riaz¹, Sébastien Blanchette², Geneviève Leduc³, François Trudeau², Mark Tremblay⁴, Richard Larouche⁵, Guy Faulkner¹

¹University of British Columbia, ²Université du Québec à Trois-Rivières, ³Fillactive, ⁴Children's Hospital of Eastern Ontario, ⁵University of Lethbridge

Introduction: Children's independent mobility (CIM, e.g., children's freedom to travel without adult supervision) has declined dramatically over the past several decades. In order to reduce this decline it is important to examine the factors influencing CIM. This study aimed to examine the correlates of CIM in three regions across Canada (Ottawa, Vancouver, and Trois-Rivières).

Method: Thirty-seven elementary schools were recruited with a total of 1892 child-parent dyads responding to questionnaires. CIM was assessed by presence or absence of 6 mobility licenses (index scores from 0-6). Questionnaires also assessed child demographic information (e.g., age, gender), parent demographics (e.g., education level, gender), parental perceptions of social (e.g., informal social control) and built environment, fears of safety, and mobile phone ownership. Linear mixed-effects models were conducted to examine the association between individual, social, and environmental factors and CIM.

Results: 11% of the variance in CIM could be attributed to differences between regions. Proportion of children with no licenses was 28.7% in Vancouver, 21.4% in Ottawa and 6.3% in Trois-Rivières. Boys had significantly greater CIM than girls ($\beta = .09$) while a child's mobile phone ownership was positively associated with CIM ($\beta = .17$). Father's education level was inversely related to CIM ($\beta = -.08$). Not having concerns about strangers ($\beta = .13$) and low parental fear of traffic injury were also associated with CIM ($\beta = .27$).

Conclusion: Where children live influences opportunities for CIM. While correlates were similar to those previously reported in the literature, further investigation is required exploring the spatial heterogeneity of CIM in Canada and internationally.

Daily physical activity in lower secondary school: reception of a three year intervention programme

Sindre M. Dyrstad¹, Ina Stråtveit², Eivind Thoresen², Eva Leibinger¹

¹University of Stavanger, ²Tastaveden Secondary School

Introduction: For children and adolescents, it is well documented that regular physical activity (PA) is necessary for normal growth and development. Even so, only half of Norwegian 15-year-olds meet government's recommendation of 60-minute moderate to vigorous PA every day. School programs promoting PA could therefore be an important tool reaching this recommendation.

Purpose: To evaluate pupils' and teachers' reception of a school-based PA program implemented over a three-year period.

Method: This is a case study of one Norwegian school, implementing a daily PA program over 3 years for 13-15-year-old pupils in grade 8, 9 and 10. The implementation started with 8th grade in 2013, 8th and 9th grade in 2014, and all three grades (340 pupils) from 2015. The program consisted of 30 min of PA in three days/week conducted in days without physical education. Pupils in all grades answered a questionnaire about the PA-program in 2015 and 2017 with a response rate including 90- 98% of the pupils. Teacher response was also registered.

Results: In 2015, 89% of all pupils reported that they liked the PA-program well or very well. The corresponding number in 2017 was 95%. Pupils reported increased well-being, better social relationship, increased health and learning. Teacher response was also positive to the program.

Conclusion: The vast majority of the 13-15-year-old pupils responded highly positive to include PA into the school schedule. Success criteria were good organizing of the program, variation of activities, the inclusion of all pupils, and that pupils could participate in highly preferred activities.

Developing global 24-hour movement guidelines for the Early Years

Fiona Bull, Juana Willumsen, World Health Organization

Introduction: Physical inactivity is a leading risk factor for global mortality and a contributor to the rise in overweight and obesity. In 2010 WHO published Global recommendations on physical activity for health for three population-age groups, but did not cover children under 5 years. The important interactions between physical activity, sedentary behaviour and adequate sleep time on physical and mental health and wellbeing were recognized by the Commission on Ending Childhood Obesity in 2016 and they called for clear guidance on these three aspects of movement for young children.

Methods: In March 2017 WHO commenced the development of new guidelines on movement, sleep and sedentary behavior for children under 5 years following the GRADE protocols. Following approval of proposed

methods, an international group of experts formed the Guideline Development Group (GDG). The GDG held two meetings, first to finalize the PICO questions, scope of literature review and protocols, and second, to review the scientific findings and draft recommendations for external review. The process was supported by collaboration with experts in Canada and Australia and their extensive scientific work completed in 2016. Additional searches updated and expanded the languages of these existing reviews.

Results: The final global recommendations for the early years will be due for completion and launch in late 2018. Results from the development process as well as the global recommendations will be presented.

Conclusion: This new global guidance will fill a gap in the recommendations on physical activity and support developing national policy and actions for early years.

Development of a caregiver support intervention to promote healthy movement behaviours in early childhood: Amagugu Asakhula

Catherine Draper¹, Tamsen Rochat²

¹University of the Witwatersrand, ²Human Sciences Research Council

Family-based interventions to promote healthy movement behaviours in preschool children have not been rigorously developed or evaluated in low- and middle-income countries for this age group. The Amagugu Asakhula (AA) intervention was developed in South Africa (SA) to address this gap, and intends to strengthen the capacity of caregivers with preschool children to promote the health and development of preschool children in low-income SA settings. The intervention materials were adapted from the original Amagugu intervention (focussed on HIV-disclosure). Adaption of the AA intervention materials was based on extensive formative work in urban and rural low-income settings with preschool children: objective assessment of physical activity (PA), sedentary behaviour (SB) and sleep; assessment of preschool children's gross motor skills; parent-report of children's screen time (ST) and sleep; questionnaire on caregivers' perceptions regarding PA and ST; and focus groups with caregivers. The AA intervention is delivered by community health workers to individual female caregivers of preschool children over 6 sessions in the home environment. The content is framed around the health behaviours and factors within the home environment that can influence cognitive development in early childhood. These health behaviours include PA, ST, sleep and diet, and the intervention emphasises the caregiver's role in promoting these healthy behaviours. The feasibility and implementation of this intervention are currently being evaluated in a low-income setting in Cape Town. Results of this evaluation will be presented, and these results will guide further development of the intervention, including its scalability.

External funding details: DST/NRF Centre of Excellence in Human Development

Effect of a school-based physical activity program on health fitness in children

Felipe Araya-Ramirez¹, Inés Revuelta-Sánchez¹, María Morera-Castro¹, Carina Carranza-Torre²

¹National University, ²Exercise is Medicine, Costa Rica

Introduction: Obesity in children have increased dramatically in Costa Rica in the last decade. Childhood obesity has been associated with a higher risk of non-communicable diseases (NCDs) and physical inactivity is a risk factor for obesity and NCDs. School-based physical activity programs have proven to improve health fitness as well as reducing obesity in children.

Purpose: To examine the effect of a school-based physical activity program on health fitness in children.

Method: Two hundred twenty-seven children (age = 8.8 ± 1.8 years, height = 1.35 ± 0.12 m, weight = 32.8 ± 9.5 kg, BMI = 17.8 ± 2.9 kg/m², WC = 63.5 ± 9.2 cm, SBP = 100 ± 11 mmHg, DBP = 60.0 ± 9.6 mmHg and HR = 90 ± 14 bpm). Body composition, blood pressures, heart rate and Pacer were measured at the beginning and end of a six-week school-based physical activity program. Children also completed the PAQ-C and C-PAFI questionnaires.

Results: Children significantly decreased SBP by 6% from (100 ± 11 to 94 ± 11 mmHg, $p < .001$) and decreased WC 1% from (63.5 ± 9.2 to 62.7 ± 8.1 cm, $p = .004$). Body fat increased 0.4% from (20.7 ± 6.8 to $21.1 \pm 6.3\%$, $p = .037$). Children did not show significant changes in BW, BMI, HR, DBP, VO₂max and physical activity levels reported in the questionnaires.

Conclusion: Children decreased SBP and WC after the six-week school-based physical activity program with no improvement in body composition, aerobic capacity and physical activity levels.

Effectiveness of a family intervention to promote a healthy lifestyle in disadvantaged areas: A healthy generation

Gisela Nyberg¹, Matthias Lidin¹, Anja Nordenfeldt², Susanne Andermo¹, Mai-Lis Hellénus¹

¹Karolinska Institutet, ²The Foundation A Healthy Generation

Background: There are social inequalities in health already seen from an early age. The aim of this study was to evaluate the effects of a family intervention in disadvantaged areas.

Methods: Participants were 8 to 9-year-old children ($n=67$) and their parents ($n=94$). Four schools were included in this controlled study (2 intervention/2 control) from a socioeconomic disadvantaged area in Stockholm County. A foundation ran the intervention for 9 months in cooperation with the municipality and local organisations. Different physical activities, free of charge, were arranged once to twice a week where children and at least one parent attended. Weight and height were measured by standard procedures and BMI sds calculated according to a Swedish reference standard. Physical activity and sedentary time were measured objectively by accelerometry. Outcomes were measured at baseline (August 2016) and after the intervention (June 2017). Group differences were analysed with ANOVA analysis, adjusted for sex, monitor wear time and baseline values.

Results: A significant intervention effect ($p=0.02$), for the children was found regarding vigorous physical activity (VPA) during weekends (intervention group +12 minutes/control group ± 4 minutes). There were no significant differences between groups in VPA during the whole week, sedentary time or BMI sds.

Conclusion: This study shows that it is possible to influence physical activity in children through a family intervention programme. This finding may be an important contribution to the further development of effective strategies to promote physical activity in children in socioeconomic disadvantaged areas.

External funding details: The Swedish Heart-Lung Foundation and Skandia.

Evaluating motor competence interventions for children's physical activity, fitness, health and academic performance

Michael Duncan, Emma Eyre, Coventry University

Development of motor competence is a key pillar of school Physical Education (PE) curricula worldwide and a correlates of health enhancing physical activity (PA), yet a leading antecedent of low motor proficiency is likely caused by early or single sport specialisation, where bias is directed

towards more sport-specific activity at the expense of more global FMS development. There is thus a need to examine the efficacy of interventions aimed at enhancing motor competence in children. Such information is particularly important for exercise scientists, youth sports coaches, physical educationalists and public health practitioners. This session will outline results from 2 recent interventions that have used innovative approaches to create positive trajectories of health through motor competence in British children. In the first instance, data will be presented from a cluster randomised controlled trial, examining the effects of integrative neuromuscular training on process and product motor competence and physical self-efficacy, in 94 British children aged 6-7 years old. The second part of this lecture will present data from a randomised controlled trial on the effect of a combined movement and storytelling intervention on measures of motor competence, PA and academic achievement in British pre-schoolers. The lecture will then present evidence based recommendations for the design and implementation of motor competence interventions for health benefit and PA amongst children.

Evaluation of Active Kids: A universal voucher scheme to increase participation in children in New South Wales (NSW) Australia

Lindsey Reece¹, Bridget Foley², Bill Bellew², Phil Hamdorf³, Wayne Green³, Nivi Srinivasan³, David Cushway³, Adrian Bauman⁴

¹University of Sydney / Office of Sport NSW Government, ²SPRINTER, University of Sydney, ³Office of Sport NSW Government, ⁴University of Sydney

Most children in NSW Australia are insufficiently active, with 23% of children and 12% adolescents achieving physical activity recommendations for health¹. Evidence suggests the implementation of a voucher scheme that supports participation in sport and physical activity, could result in a population change of up to 25% when delivered through a multi-component strategy². From February 2018, the NSW State Government will allocate \$207 million over 4 years to deliver a universal voucher system to school-enrolled children aged 4.5-18 years old. Active Kids aims to reduce the barriers for participation through providing \$100 towards registration costs for children to participate in health-enhancing sport and physical activities outside of school, in weekend sport and structured physical activity programs. With mean state-wide expenditure on sport over \$800 annually, existing data suggests 25% of all NSW families' expenditure will be supported by the voucher, increasing to 30% in the most disadvantaged areas³. The complex pragmatic evaluation of Active Kids will adopt a quasi-experimental mixed-method design to assess program reach and implementation providing a cross-sectional view of individuals registering and redeeming a voucher. An evaluation cohort will be recruited to assess fine grained detail on desired health and physical activity behaviours. Outcomes will be stratified by registrant demographics (age, sex, and weight status, PA/sport status SES) to explore effects of Active Kids, adjusting for a wide variety of factors. The acceptability, engagement, and experience of the voucher scheme will be assessed from both the family and stakeholder perspective.

External funding details: Active Kids is funded by NSW government.

Evaluation of Project Spraoi: Ireland's first whole-of-school physical activity, FMS and nutrition intervention aimed at primary school children

Tara Coppinger¹, Con Burns¹, Edward Coughlan¹, Wesley O'Brien², Cian O'Neill¹, Jennifer Flack¹, Joan Dinneen¹, Jean O'Shea¹, Irene Hogan¹, Spraoi Research Team¹

¹Cork Institute of Technology, ²University College Cork

Background: Studies have shown that interventions based on increasing physical activity (PA) levels, reducing sedentary lifestyles and improving nutritional habits all pose protective mechanisms against obesity and its related disorders in youth. Yet, to date, there are no interventions being delivered in Ireland that concurrently target PA (including fundamental movement skills (FMS)), nutritional habits and sedentary time amongst school children.

Methods: To implement and evaluate Project Spraoi; a whole-of-school intervention that promoted PA (including FMS), health eating and sedentary time in 7 schools across Cork, Ireland. PA and sedentariness (accelerometry), FMS (TGMD-2) nutritional knowledge/behaviours (questionnaire), dietary intake (3 day food diary) body mass index (height, weight), blood pressure and cardiorespiratory fitness (20 metre run) were measured before (2014/15) and after (2015/16) programme completion (24 months). For comparative purposes, scores will be compared to a control group (n = 121) who did not participate in the intervention and to counterparts partaking in Project Energize, New Zealand.

Results/Conclusions: It is hypothesised that, for the first time in Ireland, evidence will support the delivery of a quality multi-component school-based programme to reduce sedentariness, increase and improve PA, FMS and fitness and promote healthy nutritional habits and a healthier weight status among primary school children.

Exploring 'Revaluation' as participative, strength-based, cultural approach to school-based physical activity interventionism

Fiona Spotswood¹, Sara Spear¹, Gareth Wiltshire², Liza Zhun Ying Liew¹, Andrew Darnton³

¹University of the West of England, ²University of Bath, ³AD Research and Analysis

In an attempt to increase population levels of physical activity, numerous policies and initiatives exist globally which target children in school settings. While individualistic behaviour change interventions have shown some success, there exists a wealth of literature from critical public health, pedagogy and sociology calling into question both the efficacy and harmful unintended consequences of such approaches. In an attempt to respond to these challenges, this paper advances an innovative approach to school-based physical activity interventionism by adopting a participatory, strength-based, cultural approach. Borrowing from the emerging method of 'Revaluation' currently being applied to healthcare research and sustainability programmes in England, Scotland and Northern Ireland, we describe how schools can be conceptualised as systems of on-going change involving pupils, school staff and parents situated within complex material and cultural contexts. Against this backdrop, Revaluation asks school staff to iteratively reflect on the value of their "whole school physical activity culture" and, in doing so, reveals the strengths, resources and capacities of the system. Furthermore, illuminating the system to its members provides a platform for co-produced change. Through reflecting on a pilot study using Revaluation with one primary school in Derbyshire, this paper argues that the approach has the potential to eschew pathologising inactivity, account for the diversity of school contexts and empower school staff to engage with new practices. We conclude by noting the strengths, limitations and potential scale-up of Revaluation as well as highlighting the need for further research before doing so.

Factors associated with successful implementation of the primary school physical activity initiative the Daily Mile

Gemma Ryde¹, Josie Booth², Ross Chesham¹, Naomi Brooks¹, Colin Moran¹, Trish Gorely¹

¹University of Stirling, ²The University of Edinburgh

Introduction: The Daily Mile (DM) is a primary school initiative that promotes short, daily bouts of ambulatory activity. The aim of this study was to assess factors associated with successful implementation of DM.

Methods: Four primary schools in central Scotland where DM had been implemented, including the primary school where it was first started, were recruited to the study. Semi-structured interviews with school staff who played a significant role in implementing DM were conducted. Interview discussions were digitally recorded, transcribed verbatim and analysed. Details relating to the schools grounds were also recorded.

Results: Three of the four schools were able to successfully implement DM. Schools that successfully implemented DM kept the same format with regards to duration (short, 15 minutes door to door), type of activity (walk, jog, run), and frequency (three to five days). Changing these features such as aiming to walk a whole mile daily or altering the activity type resulted in less successful implementation. Other aspects of DM delivery differed between schools and did not appear to negatively influence implementation success. These differences were largely to accommodate the schools physical environment and included the surface used, route management strategies and pupil visibility.

Conclusion: There are immutable features of DM that are key to its implementation success. The flexibility to adapt other aspects of delivery to suit different primary schools physical environment may further contribute towards the successful implementation of the initiative.

Health related quality of life in children: A healthy generation

Susanne Andermo¹, Gisela Nyberg², Matthias Lidin³, Anja Nordenfelt⁴, Maxine Lancelot², Mai-Lis Hellenius³

¹Karolinska Institutet, ²Karolinska Institutet, Department of Public Health Sciences, ³Karolinska Institutet, Department of Medicine, ⁴The Foundation A Healthy Generation

Introduction: There are social and gender inequalities in health, with increasing mental health problems especially among girls. Physical activity (PA) is associated with better health, but there is a lack of knowledge of PA interventions for families in disadvantages areas and the impact on health-related quality of life (HRQOL) in children. The aim of this study was to assess HRQOL in children after participation in the programme "A Healthy Generation".

Method: The programme is delivered in socio- economic disadvantaged areas in Sweden and offers PA and a hot meal or fruit twice a week from August to May to families with children in grade 2. Children (n = 67), aged 8-9 years, participated in this controlled study conducted in four schools, two control- and two intervention schools in Sweden. HRQOL was evaluated using the Pediatric Quality of Life Inventory (PedsQL) 4.0 at baseline and follow-up after the intervention. ANOVA and Linear regression, stratified by sex, were used to evaluate group differences and within group variation.

Results: There were no significant differences between intervention and control groups for physical, psychosocial or total score. There was a significant relationship between level of participation in "A Healthy Generation" and the physical domain among girls (r = 0.44, p = 0.01), but not for boys (r = -0.07, p = 0.58), in the intervention group.

Conclusion: The findings suggest that active participation in PA interventions may be important to increase HRQOL among girls. This knowledge can contribute to the development of such interventions in disadvantaged areas.

External funding details: The Swedish Heart-Lung foundation and Skandia

Implementation of comprehensive school physical activity programs in elementary schools: Be a Champion!

Justin Moore¹, Camelia Singletary¹, Glenn Weaver², Michael Beets², Russell Carson³, Russell Pate², Ruth Saunders²

¹Wake Forest School of Medicine, ²University of South Carolina, ³University of Northern Colorado

Background: Be a Champion! (BAC!) was designed to improve the implementation of comprehensive school physical activity programs (CSPAPs) for elementary school students. We tested BAC! in three schools to determine its feasibility and effectiveness to change teacher and youth behaviors compared to controls (n=2).

Method: An interventionist provided training, resources, and technical assistance to school "Champions" who directed assessment, planning and implementation of the CSPAP. Implementation monitoring was conducted to examine the impact on teacher and youth behaviors. Systematic observation tools (eg, SOPLAY, SOSMART) were utilized in conjunction with environmental audits and accelerometry in youth.

Results: Across the intervention year, implementation monitoring indicated few differences or changes in teacher behaviors observed between intervention and control schools, or between conditions over time. However, a lower percentage of intervention school boys (-9.4%) and girls (-9.4%) were observed sedentary compared to controls (P<.05), and this difference increased over time with a significant group-x-time interaction for girls (-9.4%) and boys (-7.5%) sedentary behavior across the school year. A larger percentage of youth were observed engaging in MVPA during recess (boys =+10.0%, girls =+10.2%, P<.01), afterschool (boys =+30.1%, girls =+21.8%, P<.01), and in the classroom (boys =+1.4%, girls =+1.4%, P<.05). Similarly, a smaller percentage of youth were observed sedentary during recess (boys =-18.2%, girls =-13.0%, P<.05), afterschool (boys =-7.1%, girls =-20.5%, P<.01), and in the classroom for girls (-3.8%, P<.05).

Conclusions: BAC! is a feasible and potentially effective means of streamlining the CSPAP implementation process, but additional research is necessary to increase implementation dose and fidelity to best-practices in PA promotion.

External funding details: Support: US-NIH award #R21HL121692

Is a change in the physical education activities sufficient to increase moderate-to-vigorous physical activity in children? Active Teaching Units

Francisco Javier Huertas Delgado¹, Victor Segura-Jiménez², Manuel Ávila-García³, Cardon Greet⁴, Pablo Tercedor⁵

¹PA-Help "Physical Activity for Health Promotion" research group. Teaching Centre La Inmaculada, University of Granada, Granada, Spain, ²Department of Teaching Physical Education, Arts and Music, Faculty of Education, University of Cadiz, Cadiz., ³PA-Help "Physical Activity for Health Promotion" research group. University of Granada, Granada, Spain., ⁴Is a change in the Physical Education activities sufficient to increase moderate-to-vigorous physical activity in children? Active Teaching Units, ⁵PA-Help "Physical Activity for Health Promotion" research group. Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain.

Introduction: Engaging in sufficient levels of physical activity (PA), especially at moderate-to-vigorous intensity, is a key to improve several health outcomes. Physical Education (PE) could contribute to total daily PA and higher levels of moderate-to-vigorous PA (MVPA). Consequently, the Spanish government has developed 2 sets of teaching units with 16 lessons

focusing on increasing PA during PE, called Active Teaching Units (UDAs in Spanish acronym). The aim of the UDAs was the achievement of the international recommendations by children: spending ≥50% of the PE lesson time in MVPA. The main purpose of this study was to compare whether children participating in UDAs spent more time in MVPA than those children participating in lessons with traditional methodologies.

Methods: A total of 366 Spanish children from 7 schools participated in this study. The students were divided into two groups: Traditional and UDAs. Each group received 16 Physical Education lessons during 8 weeks; the Traditional group received the usual lessons programmed by the teacher and the UDAs group lessons followed the UDAs.

Results: The children engaged in UDAs spent one minute of MVPA more compared to those engaged in Traditional (7.4 vs 6.3 minutes, p=0.021), and the percentage of children who accomplished the recommendations was 12.7% in UDAs and 13.2% in Traditional.

Conclusions: The differences found do not support that the ADUs increases the participation of children in MVPA compared with the traditional approach. It is necessary to rethink the way in which the PE is conducted in order to achieve the recommendations.

External funding details: This study was supported by a grant from the Spanish Ministry of Education, Culture and Sport [CAST17/00072] and the PREVIENE Project was funded by the Spanish Ministry of Economy and Competitiveness [DEP2015-63988-R, MINECO-FEDER].

Is it possible to modify the active commuting to school behaviour through an intervention programme? PRE-VIENE Project

Patricia Gálvez-Fernández¹, Manuel Ávila García², Pablo Tercedor², Francisco Javier Huertas Delgado³

¹University of Granada, ²A-HELP "Physical Activity for HEalth Promotion" Research Group, ³Teaching Centre La Inmaculada

Introduction: Active commuting to school increases daily physical activity in children. Understanding children's barriers towards active commuting to school is crucial to promote this behaviour. School-based interventions are convenient to change children's mode of commuting. The aim of this study was to analyse the effect of an eight-week intervention on the mode of commuting to school and the perception of barriers in Spanish primary 3 students.

Method: A total of 77 children (8-9 years) from two primary schools of Granada (Spain) participated in the study. They were divided into an intervention group (IG) (n = 46) and a control group (CG) (n = 31), each of them corresponding to a different school. The IG participants completed a total of eight weekly activities (duration of 1 hour). Both groups were evaluated using the PACO questionnaire about active commuting to/from school. The paired Student T-test was used to analyse the differences in the children's mode of commuting.

Results: No differences were found in the mode of commuting to/from school. Nevertheless, IG presented a lower increase in passive travels (0.3 ± 4.2; P=0.628) than CG (1.0 ± 4.9; P=0.272). The most common perceived children barriers toward walking reported before the intervention were 'distance' and 'children's preference'. After the intervention, the main barriers were parental concerns and environment (street condition).

Conclusion: It may be convenient to modify the intervention programme in order to increase active commuting to school. We must ensure the involvement of parents in the intervention and activities in the school neighbourhood.

External funding details DEP2015-63988-R, MINECO-FEDER, EU.

Opportunities for children's physical activity during the school summer holidays: Findings from Food and Fun Clubs in Wales

Kelly Morgan, Linda McConnon, Jordan Gowdin, Amy Bond, Jemma Hawkins

Cardiff University

Background: School summer holiday clubs are being delivered to primary-school aged children in deprived areas in Wales. This study examined the opportunities for physical activity at clubs and the usual practices of children during the summer holidays.

Methods: Ten Food and Fun clubs participated in 2016. Quantitative data (child and parent surveys; N = 196, N = 84) assessed the opportunity to provide children with physical activity. A sub-sample of children wore an accelerometer (N = 41) for 7-days to evaluate the opportunity for achieving 1-hour of moderate to vigorous activity (MVPA) at club. Child focus groups (N = 74) explored the usual activities children engaged in when the club was closed.

Results: In total 70% of children reported breathlessness or sweating when taking part in the sports/games sessions at the club and 93% of parents reported that the club helped their child to be more active over the summer holidays. Some children reported being directly inspired to take up a new sport or join a lunchtime or afterschool club following the summer holidays. Seventy-one percent of children achieved the recommended MVPA at club measured via accelerometry, with children engaging in more MVPA (+17 mins/day, $P < 0.001$) on average compared to non-club days. Over half of the children said they would normally stay at home, mostly watching television, playing game consoles or using phone and tablet devices if the club was not open.

Conclusion: Primary schools appear to provide a suitable setting for the delivery of physical activity opportunities during the school summer holidays.

External funding details: Welsh Local Government Association

Parental education and perception of outdoor play time in preschooler

Jorge Mota¹, Sandra Silva-Santos¹, Amanda Santos¹, Andre Seabra¹, Michael Duncan², Susana Vale³

¹CIAFEL-FADEUP, ²Department of Biomolecular and Sports Science, Coventry University, Coventry, West Midlands, United Kingdom, ³Department of Sport Sciences, High School of Education, Polytechnic Institute of Porto

Introduction: The purpose of this study was to analyze whether or not socio-economic position was associated with outdoor playtime during the week days (WK) and at weekend (WEND).

Methods: The sample consisted of 485 (girls; n = 223) healthy preschool children, aged 3 to 6 years, recruited from kindergartens located in the metropolitan area of Porto, Portugal. Physical Activity (PA) was assessed for 7 consecutive days by accelerometer. The time playing outdoors, during WK or WEND, was derived from parental report. Anthropometric data (weight and height) was collected following standardized protocols. Socio-economic position was assessed by Parental Education (PE), according to the Portuguese education system.

Results: Differences were found for time spent playing outdoor either WK or WEND but not for Total PA (TPA) in both genders. However, regression analysis showed that after adjustment for age, BMI and TPA in both sexes the associations were significantly established only between low PE (LPE) and high PE (HPE) group either at WK or WEND. However, no statistically significant association was found for boys at WK ($p = 0.06$).

Conclusions: Our findings suggest that socio-economic position may influence children's time in outdoor play activities especially at the weekend. This may have implications for future interventions with this age group.

External funding details: The Research Centre on Physical Activity Health and Leisure (CIAFEL) is supported by UID/DTP/00617/2013

Physical evaluation and intervention of primary school children in Leicestershire, UK

Alan Pearson, SAQ International LTD

The implicit aim of the programme is to introduce children of primary school age to movement exercises that will improve their movement skills, co-ordination, agility and reflexes and increase their activity levels. It has been designed to improve movement skills of children in Foundation and Key Stage one.

The providers anticipate that a range of potential benefits may occur including:

- Body measurements
- Physical movement ability
- Confidence/enjoyment
- Behaviour
- Academic improvement

Other intended impacts are:

- To create a positive experience of physical activity and movement
- To improve participants' confidence as well as sporting abilities
- To gain the interest and understanding of significant adults (e.g. teachers, parents, carers who are in a position to enable the child's physical development through skill mastery).

Evaluation: This evaluation comprises two parts. Firstly, it seeks to ascertain whether participants show an improvement in motor skills proficiency based on tests taken before and after their participation in the SAQ programme. It also compares the post participation results with those of children from matched schools who have not taken part in the SAQ skills training. Significant improvements were made in all intervention group physical evaluation tests. No significant improvements were made with controlled schools in all physical evaluations tests.

Legacy Findings: 87.5% of the 72 initial respondents expected an increase in level of pupil engagement in physical movement activity.

In summary, these results show that participants who took part in the SAQ programme outperformed the control group on all tests.

Potential of prediction and trend analysis of sport preferences in context with physical activity

Michal Kudlacek¹, Karel Fromel¹, Dorota Groffik², Zbynek Svozil¹

¹Palacký University Olomouc, Faculty of Physical Culture, ²The Jerzy Kukuczka Academy of Physical Education, Katowice, Poland

Background: Regular and adequate physical activity (PA) of youth and children depends on successful creation of friendly environment with respect to preferred PA. The aim of the study was (a) to analyze the status and trends in physical activities with specific respect to individual physical activities of youth in different educational and sports settings in context with PA, (b) to explore associations between increasing preferences of track and fields / running activities and meeting of PA recommendations.

Methods: The research was conducted in the period of 2007 to 2017. The overall research sample consisted of 16116 participants in the age of 14 to 26 years. Sport preferences survey was employed to explore preferences of

individual PA and IPAQ-long questionnaire was used to determine weekly PA.

Results: The biggest long-term stability in Czech and polish boys, as well as Czech girls, reports swimming and cycling, while in polish girls swimming and skating. The biggest increase of preferences is reported in track and fields / running activities, especially in Czech girls and boys. Both girls and boys, preferring track and fields / running meet PA recommendations significantly more than those who do not prefer these activities.

Conclusion: The knowledge of trends in preferred types of PA has predictive importance for promotion of physically active healthy lifestyle of youth as well as for creation of optimal conditions for implementation of popular types of PA.

Proficiency of fundamental movement skills in 5 –10 years old school children in Udupi district

Mayuri Gad, Nanded College of Physiotherapy and Research Center

Background: Fundamental Movement Skills (FMS) are the building block for the development of the core competencies(e.g., catch, kick, run). FMS has been shown to be the basic foundation for future sports and physical activity skills. Recent studies show that FMS is on low-level proficiency across all ages and males are more competent than females globally. No studies have investigated the competencies of FMS in Indian Children.

Methodology: Due to time constraints, two volunteering primary schools were selected through convenient sampling and included. 476 children of parent volunteers were included in the study. FMS competency was assessed using FMS manual which is proved for its validity and reliability in children across the globe. The FMS manual advocates eleven skills - run, kick, vertical jump, ball bounce, punt, dodge, leap, overhand throw, forehand strike, two hand side arm strike. Participant performed each skill for three trials, and mastery was checked with 6 ± 8 criteria for each skill fulfilled. Data analysis was done using chi-square and descriptive statistics in SPSS version 16.0.

Results & Discussion: 476 children (204 girls) completed the pertained skills allowed. 22% were age group 5-6, 30 were of 8 ± 9 ages, 44% were between 10 and above. Only There was a significant difference between males and females. Males were more competent than females.

Conclusion: We conclude that Indian Children exhibits poor proficiency of fundamental movement skills in spite of the skill nature whether locomotor or object handling. We recommend FMS teaching shall be a part of Indian Curriculum.

Promoting healthy weight in pre-school: co-production of an online training resource for multi-agency professionals

Daisy Bradbury¹, Lorna Porcellato¹, Hannah Timpson¹, Anna Chisholm², Shirley Goodhew³, Ruth Young³, Nabil Isaac⁴, Paula Mary Watson¹

¹Liverpool John Moores University, ²University of Liverpool, ³Blackburn with Darwen Borough Council, ⁴Cornerstone Practice and Health Care

Background: Despite calls for early prevention, healthy weight practices for 2-4 year old UK children are poorly developed. Practice is inconsistent, training is lacking, and many health professionals feel ill-equipped to discuss child weight issues with parents. This study aimed to co-develop an online training resource for multi-agency professionals to equip them with the confidence, knowledge and skills to promote healthy weight in pre-school children.

Method: Four participatory workshops were held with a multi-agency development group (health visitors, nursery nurses, children's centre staff, public health practitioners, GPs, academics), involving interactive

activities, problem-solving, and development of draft intervention content. Academics contributed evidence and theoretical information, practitioners contributed essential "on the ground" experience.

Results: An online training resource was co-produced to reflect the views of the multi-agency development group. Content was informed by Self-Determination Theory, with the aim of a) enhancing autonomous motivation in practitioners and b) equipping practitioners to foster autonomous motivation in parents. Modules included communication, behaviour change techniques, consequences of unhealthy weight, physical activity, nutrition, identifying weight issues, cultural factors and roles and responsibilities in managing pre-school child weight. Practitioners expressed a preference for messages to be relevant, practical and focussed, i.e. key points rather than lengthy information.

Conclusion: Co-production brings together multi-agency professionals to develop interventions that are evidence-based yet feasible to implement in practice. Future work will evaluate multi-agency engagement with the co-produced intervention, and effects on pre-school child weight management practices.

External funding details: Co-funded by Blackburn with Darwen Borough Council and Liverpool John Moores University.

Standing desks in a grade 4 classroom

Sharon Parry, Joyln Ee, Beatriz IR de Oliveira, Erin Howie, Joanne McVeigh, Leon Straker, Curtin University

Introduction: Excessive sedentary behaviour and insufficient physical activity are associated with higher rates of obesity, depression and musculoskeletal discomfort in children. Modifying school sitting time has the potential to positively influence the health of children. This study examined the impact of a standing desk intervention on children's standing and sitting time at school, sedentary time and physical activity during waking hours and musculoskeletal discomfort.

Method: Male participants (47 boys, aged 10-11 years) from a single Independent boys' school took part in a within-subjects crossover study. Participants were allocated either a standing desk or traditional seated desk for 21 days and then changed desks for an additional 21 days. Participants wore two accelerometers (thigh and hip mounted) and twice daily musculoskeletal discomfort ratings were collected during the last seven days of each condition.

Results: When students used standing desks, standing time was 21 minutes/school day greater ($P < 0.001$) and sitting time was 24 minutes/school day lower ($p = 0.003$) compared to sitting at traditional desks. There were no significant differences in overall sedentary time or physical activity during waking hours between the standing and sitting conditions. Participants were less likely to report musculoskeletal discomfort in the neck, shoulder, elbows and lower back when using standing desks (OR 0.52-0.74).

Conclusion: The use of standing desks significantly reduced sitting and discomfort and increased standing during school hours, although total waking sitting exposure did not change. Classroom standing desks have the potential to positively influence the health of children and develop good movement habits into adulthood.

Teacher-perceived barriers and facilitators for using classroom-based physical activity: Results from a mixed methods study

Louise Stjerne Knudsen, Thomas Skovgaard, Thomas Bredahl, University of Southern Denmark

Introduction: Since 2014, it has been mandatory for all Danish state schoolteachers to integrate, on average, 45 minutes of daily physical

activity (PA). In general, teachers have a positive perception of using classroom-based PA and find it beneficial for students' health, well-being and academic performance, however barriers for fully integrating PA remain. The purpose of this study was to explore teacher-perceived barriers and facilitators for using classroom-based PA among Danish schoolteachers.

Method: The study uses a mixed methods approach. A survey, asking participants to identify barriers and facilitators for using classroom-based PA on a one to five ranking scale. Five factors were selected; time, resources, competences, relevance and support. In a subsequent in-depth interview respondents were asked to elaborate on the survey findings. 206 state schoolteachers and teacher assistants across subjects, year, age, experience, and gender answered the survey. Nine teachers recruited from the survey sample were interviewed.

Results: Respondents identified time and resources as key barriers, and time and relevance as the two most important facilitators for using classroom-based PA. Results from the interviews supported the survey findings, however they also indicated that factors such as lack of support (e.g. from management and colleagues), logistics and physical space are key barriers for using classroom-based PA.

Conclusion: The findings from this study pinpoint key teacher-perceived barriers and facilitators for integrating classroom-based PA. Such findings can help frame new research questions and inform stakeholders, such as school management, decision-makers and subject advisers, on innovative ways to foster, for instance, teachers' motivation.

The development of a theoretical model for a green exercise intervention to reduce stress and improve well-being in primary school children

Lucy Smith, Carly Wood, University of Westminster

Introduction: In the UK an increasing number of children are experiencing stress; with little resilience to stressful life events. Green Exercise (GE) (physical activity whilst exposed to nature) has been demonstrated to improve resilience and reduce stress in adults; however, there is a lack of research exploring whether GE can improve resilience in children. Additionally, the potential mechanisms by which GE might improve resilience are not fully understood. This projects' aim is to develop a theoretical model which unravels these mechanisms. This could be used to create an evidence based GE resilience intervention for children.

Method: This study uses an ethnographic design. Two primary schools have been selected for in depth observations via a case study methodology; these schools already advocate GE via forest schools, nature play grounds, and movement in nature. A rich understanding of how these may improve resilience, the mechanisms by which they do this and an identification of potential barriers will be acquired through lesson observations and focus groups with students, parents and teaching staff. Other nature based settings and schools using a nature based curriculum will be visited.

Preliminary Results and Conclusions: Qualitative analysis that identifies themes generated through constant comparison thematic analysis will be presented. These themes will update the current theoretical understanding of how green exercise can serve as a school based resilience intervention for children.

The effectiveness of active play brain development in children 6 to 9 years old

Watchara Sroykham, Preechapawan Triponywasin, Watchara Sroykhum, Panya Kaimuk, Yodchanan Wongsawat Mahidol University

Due to the physical inactivity is gradually increasing, especially in children, because of the behavioral changes in technology usage. In Thailand, children use mobiles or tablets more than 13.1 hours a day. For this reason, Thai health promotion foundation of Thailand have campaign to reduce the ratio of sedentary lifestyle by promoting play in children. The brain activity between before and after playing in children is utilized to inspire their parents. This helps parents to understand the importance of developing in learning and motor skills. In this study, the electroencephalogram (EEG) during before and after playing from 100 males and 100 females children nationwide were analysed. All children were assigned to play the same activities which consisted of 4 stations. All proposed tasks related to the developmental skills in children such as team rope jumping. EEG was collected in the same period of the day. The results suggested that there was a significant increase ($p\text{-value} < 0.05$) beta power between before and after playing which presented to increase in brain activity in frontal, central, and occipital area. According to this, the children with active lifestyle have more development in brain activity than sedentary lifestyle.

The effects of text messaging interventions to improve physical activity and sedentary behaviour in youth: A systematic review

Kim Ludwig¹, Duncan Buchan¹, Rosie Arthur¹, Hollie Fountain², Nicholas Sculthorpe¹

¹University of the West of Scotland, ²Edinburgh Napier University

Background: The use of text messages (SMS) to change health behaviours in youth is particularly interesting due to the need for novel, more effective intervention approaches. Previous reviews have examined the effect of technology-based interventions on health but evidence regarding the impact of just SMS on physical activity (PA) and sedentary behaviour (SB) is missing. Thus, this systematic review aims to assess the effectiveness of SMS interventions for improving PA and SB in youth.

Methods: Authors systematically searched electronic databases. Citations were sifted and piloted forms used for data extraction. Eligible studies had to be of randomised controlled or quasi-experimental design, incorporate SMS, participants aged between 10 and 19 and at least one PA or SB outcome. Use of theory and risk of bias were also assessed.

Results: Thirteen studies reporting on 11 interventions were eligible for inclusion. Interventions were conducted in schools, online or face-to-face. Studies were of high heterogeneity with regards to participant characteristics, intervention content and outcome measures. Findings were equivocal with regards to intervention effectiveness. Seven interventions resulted in an improvement for PA and six for SB. All studies were judged to be of high risk of bias for at least one item.

Conclusions: This review shows promising results. However, due to high heterogeneity of design and outcome measures, conclusions as to which specific intervention elements are linked to increased effectiveness cannot be drawn. More rigorous studies are needed to explore the relationship between intervention effectiveness and specific components of SMS interventions, such as message content.

The impact of the 'Beat the Street' physical activity intervention on active travel to school in Ireland

Aneta Kuczyńska, Barry Lambe, Niamh Murphy, Waterford Institute of Technology

Introduction: Levels of active travel to school are very low in Ireland. Gamification may be an effective approach to increasing walking and cycling in schoolchildren. 'Beat the Street' is a real-life walking and cycling game where users accumulate points using swipe card technology.

The main purpose of this study was to measure the impact of this gamification physical activity intervention on the mode of travel to school.

Methods: The intervention ran for 7 weeks commencing in October 2017 in 16 primary schools in Waterford City, Ireland. Seasonally matched repeat cross-sectional surveys were collected in all intervention schools and at two control schools at baseline (November 2016) and follow-up (November 2017).

Results: A total of 1289 (n = 1166, intervention; n = 123, control) and 1293 (n = 1191, intervention; n = 102, control) school-children (10.90 ± 0.715) completed self-report surveys at baseline and follow-up, respectively. There was no change in active travel to school, however, there was a trend towards change, albeit modest, in the proportion that actively traveled home from school. There was a 5% increase in active travel home from school in the intervention group. This represented an absolute increase of 10% compared with the control group (CI -3.64, 23.82).

Discussion: Gamification may be an effective approach to increase walking and cycling home from school in primary school children. To augment the intervention effect, gamification projects should be combined with a broader suite of intervention measures that address infrastructure provision and car restriction measures

Understanding motor competence in children and young people

Susana Vale¹, Jorge Mota²

¹High School of Education, Polytechnic Institute of Porto, ²CIAFEL, Faculty of Sport, University of Porto

Understanding interactions between biological and environmental factors and motor competence in Portuguese pre-schoolers. Motor competence is considered the degree of skilled performance in variety of motor tasks as well as the movement quality, coordination, and control underlying a particular motor outcome. The term motor competence also relates to a mastery of skills in different domains: motor, cognitive and social. The preschool years are particularly critical in terms of developing motor competence, which are fundamental to a physically active lifestyle in later life. Researchers recognize that the development of motor competence during early childhood is determined by the complex interaction between biological factors, and the environmental conditions in which a child lives and grows. However, despite this recognition, there remains the degree to which motor competence, defined as gross motor skill competency, encompassing FMS, motor coordination and motor fitness, impacts on physical activity and health during the preschool years. This lecture will explore and analyse the interactions between biological factors (e.g., age, sex, weight status) and environmental conditions (school, home, PE classes and recess time) with motor competence during the preschool years. Providing an up to date overview of this topic is key for public health specialists, exercise scientists and physical educationalists to developing interventions designed to enhance PA and health during the pre-school years.

External funding details: FCT grant: SFRH / BPD / 81566 / 2011

Urban Forest Health Intervention Program (UFHIP) to promote physical activity and reduce risk behaviours among adolescents at risk

Riki Tesler¹, Pnina Plaut², Ronit Endvelt³

¹Ariel University, ²Technion, ³Haifa university

Background: Recent years have shown increasing use of the term “adolescents at risk”, describing adolescents who are or might be in

situations of physical, mental, or spiritual danger. Inactivity and risk behaviors among adolescents have been gradually increasing in recent years, in Israel and elsewhere. The Urban Forest Health Intervention Program (UFHIP) aims to use physical activities to strengthen personal and social defensive factors and reduce risk factors among adolescents.

Methods: The UFHIP was implemented at the Hila Youth Advancement Center in northern Israel. Pre- and post-intervention questionnaires were administered at the center. Adolescents studying at the Hila Center who did not participate in the program served as a control group and completed the questionnaires concurrently. In total, there were 76 participants, 53 in the research group and 23 in the control group.

Results: The findings indicate that the UFHIP met most of its aims. A statistically significant positive change was found in the behavior of adolescents in the intervention group with regard to physical activity habits in a forest environment, reduced risk behavior patterns involving abuse of psychoactive substances, diminished reports of psychosomatic symptoms, and higher quality of life. No similar change was observed in the control group.

Conclusion: In light of the research findings, the UFHIP is an efficient program. It is recommended that the program be continued and expanded to other centers for the advancement of youth at risk throughout Israel, while increasing the variety and number of activities provided.

Theme: Interventions—Older Adults

A novel technology-supported intervention to reduce sedentary behaviour and physical inactivity in older adults

Cindy Gray¹, Victoria J Palmer¹, David Loudon², Ruth Hunter³, Sally Wyke¹, Nanette Mutrie⁴, David Blane¹, Douglas Maxwell², Francis Bain⁵, Claire Fitzsimons⁴

¹University of Glasgow, ²PAL Technologies, ³Queens University Belfast,

⁴University of Edinburgh, ⁵Paths for All

Introduction: Being sedentary is associated with poorer cardiometabolic, musculoskeletal and mental health in older adults; whilst physical activity (PA) is associated with improved disease risk and better physical functioning. Older adults typically spend 65-80% (8.5-9.6 hours) of their waking day sedentary, and many do insufficient PA. Interventions targeting sedentary behaviour (SB) and physical inactivity are therefore a priority for this age group. We aimed to develop a novel technology-supported intervention to encourage older adults to sit less and move more.

Method: A person-based approach using think-aloud focus groups at four half-day workshops with community-dwelling older adults to: iteratively optimise a novel, pocket-worn SB/step count sensor and associated feedback; and develop resources to motivate older adults to improve their SB and PA. Detailed fieldnotes were analysed thematically.

Results: Most participants were enthusiastic about the pocket-worn sensor. They enjoyed reviewing their SB and step count history, and some reported trying to change their behaviour. Simple visualisations were the most popular form of SB/step count feedback. Motivating factors included better physical functioning and health: most participants described how ‘listening more’ to their body (e.g. feeling stiff after sitting too long) would help them break up sitting and move more in their daily lives. Self-improvement also emerged as a key motivator, as did finding activities that were enjoyable and/or purposeful (e.g. with other people).

Conclusions: Optimised versions of the SB/step count sensor and intervention resources are currently undergoing feasibility testing ahead of a full randomised controlled trial.

External funding details: Funded by Chief Scientist Office for Scotland

Effects of physical inactivity on body composition of older people: A meta analysis

Stev Popovic, Dusko Bjelica, University of Montenegro

The purpose of this study was to analyse the studies that investigated the effects of physical inactivity on body composition of older people. This investigation subject included the studies published in the period from 1990 to 2017 that have been focused on the effects of physical inactivity on body composition of older people older than 50. Three electronic databases (MEDLINE, Scopus, and Web of Science) were searched for original research articles available until December 2017. Results of this study indicated that the benefits of physical activity on positive changes in body composition of older people were determined within the fitness programmes that were combined with an adequate nutrition. On the other hand, it is important to emphasize that the adequate duration of the fitness programmes for older people would last over 12 weeks in order to identify positive results, while the frequency of the training sessions would span from 3 to 4 times a week. The positive results would also be reached if the intensity of the exercises would be increased up to 80% of One-Rep Max, while each exercises would be repeated from 8 to 12 times. Findings from this study demonstrate that the proper physical activity might positively affect body composition in older people. However, these findings should be taken into consideration carefully, largely due to the reason there were a number of non-standardized research protocols, as well as various approaches for research in past decades.

Exploring the new participant experience and effect of Lincolnshire's 'Vitality': A community-based physical activity programme for older adults

Geoff Middleton¹, Robyn Hambrook¹, Daniel Bishop¹, Lee Crust¹, David Broom²

¹University of Lincoln, ²Sheffield Hallam University

Introduction: Physical activity (PA) benefits older adults. The study aim was to examine the effect of 'Vitality': a community-based group physical activity programme for older adults and explore user experiences.

Methods: An intervention group, representing new Vitality members (n16, mean age: 69.5 ± 6.5 years), and a control group (n16, mean age: 63 ± 6.3 years) were tested before and after an 8-week period on a range of 1) physical measures: body mass, body mass index, resting heart rate, systolic and diastolic blood pressure, 6-minute walk (6 MWT), 30-second sit to stand, 30-second arm curl, 8-foot up and go (8UG), chair sit and reach (CSR), back scratch, and 2) psychological measures: self-efficacy for exercise, physical activity enjoyment and the quality of life. Semi-structured focus groups were undertaken to explore the facilitators and barriers to attending.

Results: There was an interaction between groups and from baseline to 8-weeks in the intervention group the following measures improved: body mass, 73.3 (±8.6) to 71.8 kg (±8.5); 6 MWT, 430.5 (±38.1) to 473.5 m (±37); 8UG, 6.5 (±1) to 6.0 s (±1.1); the CSR, -2.3 (±11.2) to 0.6 cm (±10) (all P < 0.05). No differences were found with the other outcomes. Key themes highlighted facilitators; unique and bespoke, retirement transition, perceived improvements, offer of support networks. Barriers were; misconceptions and assumptions, inconsistent opportunities, accessibility and availability of classes.

Conclusion: Participation in Vitality led to several physical and functional benefits for older adults. Importantly, the programme did not regress any aspects of physical or psychological health.

External funding details: Funded by Leisure in the Community Ltd

Heart rate variability in older adults undergoing exergames and aerobic exercise training: A randomised controlled trial

Alexsander Guimaraes, Federal University Santa Catarina

Introduction: The heart rate (HR) suffers normal and expected changes, known as heart rate variability (HRV). The HRV indicators have been used to evaluate exercise-related cardiovascular adaptations. This study investigated the effects of the training program with exergames and aerobic exercises on HR and HRV.

Methods: Twenty-seven older adults (60.3 ± 3.7 years) completed 12 weeks of training. The training program with exergames (n = 13), was conducted using games that simulate sports activities through the Xbox 360 Kinect™ (Kinect Sports Ultimate Collection). The aerobic training program (n = 14), cycle ergometers and treadmills, with moderate intensity (40-60% of HR reserve) exercise were used. The HR and HRV indicators were collected at rest and during execution of a battery computerised cognitive assessment "Cogstate Battery" (executive function, psychomotor function, visual attention, short-term memory, working memory and delayed recall), before and after training programs.

Results: There was no significant difference on HR and HRV indicators during the rest and overall cognitive battery performance, after 12 weeks of training with exergames or with aerobic exercises. The exergames group showed less sympathetic activity during performance in the visual attention test than in resting after training. Participants of the aerobic group presented greater sympathetic activity during the performance in the executive function test than in resting after training.

Conclusion: The HRV indicators showed a change during the performance of cognitive tests in relation to resting values. However, resting HR and HRV time and frequency indicators (at rest and during cognitive tests) did not change after 12 weeks of training.

Implementing strength and balance exercise programmes for the prevention of falls in older people: Implementing the Falls Management Exercise (FaME) Programme; an implementation toolkit

Elizabeth Orton¹, Natasher Lafond¹, Clare Timblin¹, Hannah Carpenter¹, Dawn Skelton², Philippa Logan¹, John Gladman¹, Stephen Timmons¹, Carol Coupland¹, Derek Ward³

¹University of Nottingham, ²Glasgow Caledonian University, ³University of Derby

Background: Falls in older people are a leading causes of unintentional injury. Due to an ageing population, injuries are likely to increase unless more is done to reduce older people's falls risk. Strength and balance exercise programmes are recommended by the National Institute of Health and Care Excellence and Public Health England's Falls and Fragility Fractures consensus statement to prevent falls in older people. However, the commissioning of such programmes is inconsistent across England.

Implementation toolkit: The PHISICAL study was designed to study the implementation of FaME in a range of different settings in England and an output of this study is an implementation toolkit for commissioners and providers. The toolkit gives evidence-based and practical advice for local areas to put in place strength and balance programmes. It includes sections on topics such as developing a business case, service specification and cost calculator, workforce considerations, publicity materials such as posters, elected member briefing and case studies and also results from the PHISICAL implementation study on the factors that improve fidelity and uptake of programmes.

Conclusions: The implementation toolkit provides evidence-based information on how to commission and provide a group-based strength and balance training programme in the community.

External funding details: The research was funded by the NIHR Collaboration for Leadership in Applied Health Research and Care East Midlands (CLAHRC EM).

Oomph! Wellness: Taking physical activity to older people in the community

David Terrace, Ben Wilkins, Oomph! Wellness

Oomph! Wellness is a social enterprise dedicated to improving the life of older people. We are using our learning from seven years of delivering physical activity in care homes to deliver opportunities for older adults to be active in their community.

Our concept is simple; we utilise the assets and skills already in the community to provide fun, sustainable and inclusive physical activity for older adults. We achieve this by training and supporting staff, volunteers and older people in extra care, sheltered accommodation and day care settings to lead physical activity sessions. The instructors receive a qualification, equipment and a tablet to record participation. We providing each venue with new games and activities, central and local account management, signposting to local physical activity and arranging peer events.

We are expanding our catalogue of sports by working with sporting organisations to offer more choice to individuals, recognising the variety of abilities within community settings. We have learnt that variety and competition are key elements in maintaining attendance. Encouraging social interaction as part of the group also helps to maintain adherence.

The key outcome of an Oomph! session is a smile. Sessions are designed to be fun whilst working on strength and balance. The other outcomes we have seen are increased physical functionality and quality of life (11% increase on EQ-5D scores). Through our partnership with Sport England we aim to get 27,000 over 55 adults inactive in the community on a sustainable basis.

External funding details: Funding received from Sport England's Active Ageing Programme.

Physical activity and sedentary behaviour outcomes from a feasibility cluster: Randomised controlled trial of an aquatic exercise program for people with dementia

Toby Pavey, C Neville, J Nikles, E Fielding, E Beattie, R Dawsonm, QUT

Introduction: Residential aged care facilities, care for a growing number of older adults experiencing significant dementia-related problems. There are insufficient scientifically tested, cost-effective, non-pharmacological, dementia-specific interventions designed to improve behavioural, psychological and physical symptoms of dementia. This study assesses the physical activity and sedentary behaviour outcomes of the aquatic exercise intervention ± the Watermemories Swimming Club.

Methods: A feasibility study for a cluster-randomised controlled trial with two groups. The exercise participants undertook an aquatic exercise program in twice weekly, 45 minute sessions for 12 weeks, using trained accredited swimming/aqua aerobic instructors. Controls received usual care. At each data collection (pre and post intervention), participants wore a GT9X actigraph accelerometer on their non-dominant wrist. Raw data was processed using the GGIR R-software package. Outcome variables sedentary, light and moderate-to-vigorous physical (MVPA) were analysed using factorial ANOVA.

Results: Twenty-two participants (average age 83.9 years) provided physical activity data at both time-points (exercise n=11; control n=11). There was a significant interaction for MVPA ($f_{1,20} = 5.1$, $p = 0.036$). Participants in the exercise group significantly increased their moderate-to-vigorous physical activity (minutes) from baseline (mean 7.6, SD8.0) to post-intervention (mean 11.0, SD9.0; $p = 0.002$). There were no significant differences for sedentary or light physical activity.

Discussion: Although there were only small increases in MVPA for the exercise group, these small changes may be important as a non-pharmacological aid to improve the health and behavioural symptoms of dementia. Further studies with larger samples sizes will provide further assessment of the effects of exercise interventions in this population.

External funding details: Queensland Health

Physical activity program titled 'Senior-friendly municipality' as a good practice example

Palacky University Palacky - Faculty C.¹, Jana Pelclová², Martin Sigmund³, Jana Hodonská²

¹Palacky university, ²Palacký University Olomouc, ³AC BALUO - Palacký University, faculty of physical culture

Introduction: The project 'Senior-friendly municipality' was launched in cooperation of the Baluo Application Centre (AC BALUO), Faculty of Physical Culture at the Palacký University and the Olomouc city. It aimed to promote active lifestyle in older population through a physical activity program, follow-up monitoring and description of the program participants' adherence.

Methods: Older adults from the Olomouc city were invited to participate in 10-weeks free-of-charge active program in the AC BALUO in October and November 2017. AC BALUO offered the broad spectrum of physical activities (PAs) for 75-90 minutes once a week and the participants were allowed to combine them. Besides variety of PAs, the participants could also visit a physiotherapist and take part in the measurement of body composition. At the end of the program, the participants were offered to continue.

Results: Overall, 236 older adults aged 57-89 years entered the program. On average, 110-185 people attended a single session. 129 older adults participated in slightly reduced offer of PAs (price 50 CZK ≈ 2 EUR) between 1st December 2017 and 13th February 2018. Out of those, 80 older adults continued in their participation since the initial program and 49 were registered newly.

Conclusions: The preliminary results indicate that similar projects might promote interest in physical activity among older adults. In the upcoming stages, we will aim to investigate older adults' motives for participation in the physical activity program and, in contrast, what made the others cease their participation.

Strength and balance in mature recreational golfers: Preliminary findings

Maria Stokes¹, David Wilson¹, Paul Muckelt¹, Dinesh Samuel¹, Beatrice Sankah¹, Carly McKay², Sean Ewings¹, Roger Hawkes³, Andrew Murray⁴, Martin Warner¹

¹University of Southampton, ²University of Bath, ³European Tour Performance Institute, ⁴Univesrity of Edinburgh

Introduction: Older people are not active enough; of adults aged over 75, only 9% of men and 6% of women meet recommended physical activity guidelines. Participation in golf is associated with health benefits and increased life expectancy. However, possible related changes in muscle

strength and balance are unknown. The long-term aim is to provide evidence to support golf as an exercise on prescription for people with chronic conditions, and as an activity which reduces the chance of disability.

Method: An ongoing cross-sectional study is aiming to recruit over 250 participants, including male and female golfers and non-golfers aged 18-30 and over 65 years. Strength measurements of upper and lower limbs and respiratory muscles are made using portable devices. Muscle size is measured using ultrasound imaging of upper and lower limb, and trunk muscles, as size is known to correlate closely with strength. Static and dynamic balance assessment involves timed Single Leg Stand (eyes open and closed); Functional Reach (maximum distance of reach forward beyond arm's length); and the Star Excursion Balance Test.

Results and Conclusion: Preliminary results indicate lower strength and balance ability in the older age groups, as expected, but less so in golfers. Age- and sex-specific associations between playing golf and strength/balance outcomes will be determined from the full data set. The findings from this study will inform a prospective intervention study to examine the effectiveness of golf for improving strength and balance.

External funding details: Acknowledgement: Funded by The R&A

Theme: Measurement and Surveillance

A comprehensive survey of physical activity in a Thai medical school using the Medical School Physical Activity Report Card (MSPARC)

Wattanapisit Apichai¹, Surasak Vijitpongjinda¹, Udomsak Saengow¹, Waluka Amaek², Sanhapan Thanamee³, Prachyapan Peichuay¹

¹School of Medicine, Walailak University, ²School of Architecture and Design, Walailak University, ³Thasala Hospital, Nakhon Si Thammarat

Introduction: A comprehensive understanding of physical activity (PA) is different among settings. This study presented PA-related metrics in a Thai medical school using a newly developed tool-the Medical School Physical Activity Report Card (MSPARC).

Method: A mixed methods study was carried out. The prevalence of PA (≥ 150 minutes/week of moderate- to vigorous-intensity PA) and sedentary behaviours (SB) (≥ 8 hours/day of sedentary time) among medical students were analysed using data from the Global Physical Activity Questionnaire (GPAQ). Patterns of use, perceived quality, and accessibility of walkable neighbourhoods; bicycle facilities; and recreational areas were surveyed. PA promotion programmes, education, and investment related to PA promotion were reviewed from the medical school documents.

Results: One hundred and thirty-eight students (49.5%) were physically active, but 71.7% met criteria for SB. Male students were more active (61.8 vs. 42.4%) and less sedentary (65.7 vs. 75.1%) than female students. Among PA-related facilities, bicycle facilities were considered as the lowest quality and accessibility. Most PA promotion programmes were sports clubs and sport competitions. Twenty-five-hour PA education was taught throughout the 6-year curriculum, which provided minimal PA counselling training. The medical school funded 2,136.14 Baht/student/year (US \$64.34) in PA promotion, or 2.4% of the annual tuition. The MSPARC presented the summary of the findings by using simple infographics, and short texts.

Conclusion: Insufficient PA and SB among medical students should be addressed as a priority. Environments and policies relating to PA should be emphasised.

External funding details: Walailak University (grant number WUDPL60001)

Assessments of physical literacy in children aged 3-7 years: A series of systematic reviews

Hannah Goss¹, Cara Shearer², Elizabeth Durden-Myers², Zoe Knowles², Lynne Boddy², Lawrence Foweather²

¹Liverpool John Moores University, ²Liverpool John Moores University

Introduction: Physical literacy is the motivation, confidence, physical competence, knowledge and understanding to value and participate in physical activity for life. Current assessments are debated, presenting the need for an authentic physical literacy assessment, that is feasible for use in research and practice. The aim of this study was to systematically review existing assessments relating to physical literacy, suitable for use with 3-7 year old children.

Methods: In accordance with Preferred reporting Items for Systematic Reviews and Meta-Analyses or Protocols guidelines; MEDLINE (via PubMed), ScienceDirect, SPORTDiscus, Scopus, PsycINFO, and Education Research Complete, were searched between 12 May 2017- 4 November 2017, using a predefined search strategy. Using predefined inclusion criteria, two independent researchers screened studies and completed data extraction. The Consensus-based Standards for the selection of health Measurement Instruments checklist or the National Institute for Health and Care Excellence quality appraisal checklist were used to appraise methodological quality of both quantitative and qualitative studies respectively. Feasibility and acceptability of each assessment was also evaluated.

Results: From the 7548 search results, 145 studies were included (cognitive n = 4, affective n = 61, physical n = 75). A number of assessments were relevant to more than one domain and are included in multiple reviews.

Conclusion: These findings will be published as part of a series of systematic reviews examining age-related assessments within each of the physical literacy domains (affective, cognitive, physical). This comprehensive analysis will inform the development of a holistic physical literacy assessment tool for young children.

Association of physical activity and physical fitness with academic achievement in adolescents

Jose Ribeiro¹, Joana Tavares², Vasco Pereira², Tiago Matos², Maria Araujo², Jorge Mota³

¹Faculty of Sport - University of Porto (NIF501413197), ²Faculty of Sport - University of Porto, ³Faculty of Sport - University of Porto - Research Centre in Physical Activity, Health and Leisure

Background/Aim: This study goals are to associate physical activity (PA) and physical fitness (PF) with academic achievements (AA) in adolescents, along with the comparison of PA and PF by gender and also correlate the variables with the body fat percentage (BF), waist circumference and BMI.

Methods: Sample was composed by 373 teenagers, 10-18 years old, 56.0% females. A questionnaire was used to assess adolescents' socio-demographic and anthropometric characteristics, an academic evaluation sheet for determining AA, a Tanita's scale for assessing weight, BMI and BF, a stadiometer for height; accelerometers (GT3Xs) for PA and fitness-gram for PF (cardiorespiratory fitness -CRF).

Results: An association was observed between AA and PA, particularly vigorous PA ($r = 0.176$; $P < 0.01$), and between AA and PF ($r = 0.200$; $P < 0.01$). The average result of moderate to vigorous PA (MVPA) falls short of WHO recommendations (≥ 60 min/day). Nevertheless, MVPA were more frequently engaged by males (56,61 min.), when compared with females (35,36 min.; $P < 0.001$); the same was observed regarding PF (45,29 vs 25,29 laps; $P < 0.001$). We also found an association between

PA, particularly VPA, with lower percentage of BF, and PF with lower percentage of BF, lower waist circumference and lower BMI.

Conclusions: Vigorous PA and higher levels of CRF are associated with higher scores of AA, and with lower levels of BF, BMI and waist circumference. More vigorous PA are associated with higher levels of CRF, suggesting the need of more VPA to achieve benefits, than just suggesting “lower levels of PA”.

External funding details: Grant FCT- FCOMP-01-0124-FEDER-028619 and CIAFEL supported by: UID/DTP/00617/2013.

Body mass index (BMI), eating habits, physical activity and health perceptions among University students: Comparison between the years 2009 and 2015

Liat Korn, School of Health Sciences, Ariel University

Introduction: Body mass index (BMI) among students from studies around the world reveals that obesity has become prevalent during academic years. Intensive studies and stress can damage a healthy lifestyle and have an impact on health. Our objective was to examine the changes occurred between 2009 and 2015 in reported BMI, eating habits, and physical activity and health perceptions among undergraduate students at Ariel University.

Methods: Students completed an anonymous questionnaire based on self-report in two samples (N=980) 2009, and N=768 in 2015. Approximately 75% of the samples in the two samples were women, and the average age in both samples was 27 (St. 6.6 and 6.1, respectively).

Results: Significant decrease ($P < 0.01$) in the “obesity” category of BMI reported in men and women in 2009 Compared to 2015 - 7.0% of the subjects were obese in 2009, compared with 5.5% in 2015; healthy eating habits - 41.4% in 2015 compared with 34.1% in 2009. Physical activity reported by 57.1% of the sample ($P < 0.01$) compared with 65.6% in 2015.

Conclusions: There was a significant improvement between 2009 and 2015 in the healthy lifestyle of students at the University of Ariel - in reducing obesity, healthy eating habits, Physical activity and health perceptions. Further studies are needed to understand the reasons for this - health supply to the student and improved perception of health in the general population.

Comparison of objective and subjective physical activity data for physical activity promotion

Hideyuki Namba, Nihon University

Introduction: Recently, wearable device health management systems have made remarkable progress. Measurement of physical activity has various methods according to purpose such as accelerometer, GPS or subjective evaluation. This research is to clarify the problem of measurement method from the viewpoint of compliance and validity.

Methods: Twelve healthy volunteers (18±21 years, 6 men and 6 women) participated in the study. All participants were recorded using a web-based physical activity measurement system (24WEB) over 1 week. At the same time, a wrist type GPS was attached and a triaxial accelerometer (ACC) was attached to the waist.

Results: The 24WEB had an input rate of 28.6% when the input condition was 70% or more a day. The ACC had an attachment rate of 27.1% when conditioned on wearing more than 10 hours a day. In the case of wearing at least 1 hour a day, it was 71.8% wearing rate. The wristwatch type GPS had an attachment rate of 84.4% when 500 steps or more a day. The correlation coefficient between the 24WEB and the ACC in energy consumption was $r = 0.770$ ($p < 0.01$) for the wearing rate of 10 hours or more, but if wearing

for 1 hour or longer, $r = 0.514$ ($p < 0.05$). The correlation coefficient between the 24 WEB and the wrist type GPS was $r = 0.506$ ($p < 0.05$).

Conclusion: It can be said that the reliability of subjective data and objective data is strongly affected by compliance in addition to measurement error.

Cross-cultural translation of a Spanish version of the Dogs and Physical Activity- DAPA tool.

Paula Ramirez Muñoz, Juan Araque, Borrero Camila, Laura Herrera, Andrés Pita, Yesica Rodríguez, Universidad Industrial de Santander

Introduction: Walking with dogs could be a strategy for achieving physical activity recommendations among their owners. This behavior may vary between countries due to sociocultural and environmental differences. In Colombia there is neither valid nor reliable instrument that allows the evaluation of this association. The Dog and Physical Activity (DAPA) tool is considered a comprehensive and reliable instrument for measuring dog owners' physical activity and the context-specific factors that affect this behavior.

Purpose: To perform the cross-cultural translation of the Dogs and Physical Activity (DAPA) tool questionnaire into Colombian Spanish, and to analyze its facial validity.

Methods: The DAPA tool was translated from English to Spanish following a standardized forward and backward translation protocol, according to international recommendations for questionnaire adaptation by certified translators. A group of experts was selected to assess the semantic, idiomatic and cultural equivalence of the instrument.

Results: The equivalence among the expert group for each item varied between 89.4% and 92.4%. During the phase of cultural adaptation, in question 11 regarding the likelihood of factors that might affect walking with a dog, the option “the shorter days in winter” was adjusted because Colombia is in the tropical zone and does not have seasons. During the pilot test no adjustments had to be made to the questionnaire.

Conclusions: A Spanish translation and cross-cultural adaptation of the DAPA tool for use in Colombia was carried out. Prior to use, it is necessary to evaluate its psychometric properties to obtain a valid tool for the Colombian context.

Dynamic accuracy of the GPS receiver Holux RCV-3000 in different active transport modes

Michal Vorlice¹, Jan Dygrýn¹, Lukáš Rubín¹, Josef Mitás¹, Jasper Schipperijn²

¹Palacký University Olomouc, ²University of Southern Denmark

Physical activity (PA) is an important factor affecting the physical and mental health of humans. Development of cheap and small GPS devices has made it possible to determine the spatial location of physical activity, which is a field that has received more attention the past decade. However, GPS devices differ in spatial accuracy. The aim of this study is to verify the dynamic accuracy and validity of the Holux RCV3000 GPS device in different transport modes.

Testing of the GPS device took place on a two-kilometer long route, which included various types of environment. A total of 30 trips (10 walk, 10 run and 10 bike trips) were conducted on this route.

For walking and running, 14% of the GPS points fell within a 1-meter buffer from the centerline. For cycling, this was one fifth of GPS points. A 2.5m buffer encompassed about half of all recorded GPS points (walking 51.5%, 44.6% running and 63.3% cycling). For a 10m buffer, 90.67% was included on average (91.5% walking, 88.3% running and 92.2% cycling).

Our results show that more than half (51.52%) of all GPS points recorded by the Holux GPS device were located within 2.5 meters of the predicted position. Over 90% of GPS points were located within 10 meters.

The dynamic spatial accuracy of Holux RCV3000 was good and we feel that is a valid instrument for spatial localization of physical activity. However, there are special environmental conditions which can compromise the GPS signal and dramatically change accuracy.

High impact program evaluation: Measuring student, faculty, institution and community outcomes

Helen Brown¹, Grace Goc Karp²

¹Univeristy of Idaho, ²University of Idaho

Background: High-impact educational practices have been shown to contextualize content for students, to encourage active learning, and enhance student engagement, improve student retention and prepare students for future careers. Students engaged in high impact practices work closely with faculty members and outside community, organization and school constituents to enhance healthy active lifestyles and environments. Studies suggest active learning can deepen student learning and make that learning last (Cruce, Wolniak, Seifert & Pascarella, 2006). Student engagement is a critical feature of collegiate quality. There is a limited research evaluating the impact of high impact of active learning for physical education and health students, and greater paucity on the impact of the practices on the faculty and community constituents involved.

Methods: Brown and Goc Karp provide a model of high-impact education practice evaluation based on four engagement themes: Academic Challenge, Learning with Peers, Experiences with Faculty and Campus Environment (NSSE). Student evaluation measures include objective, affective and skill assessment using a variety of tools and indicators. Institutional and faculty evaluands consider development of scholarly products, research and outreach engagement, professional development and institutional changes. Community outcome evaluands consider sustainable policy, system and environmental changes, enhanced capacity and partnerships.

Impact of different evaluation methods on the dropout rate of objectively detected physical activity on age specific subgroups: Results from the Motorik-Modul-Study (MoMo)

Alexander Burchartz¹, Bastian Anedda², Doris Oriwol², Claudia Albrecht², Alexander Woll²

¹Karlsruhe Institute of Technology (KIT), ²Karlsruher Institut für Technologie - KIT

Introduction: In order to determine physical activity in free-living conditions the most common used objective method is accelerometry. This study analyzed the different technical methods and their outcomes evaluating accelerometer data in the large-scale epidemiological MoMo study. MoMo marks the first nationwide objective collection of data on physical activity and sedentary behavior of German children, adolescents and young adults.

Method: The accelerometer sample size in MoMo from the latest survey from 2014-2017 is n=1.971 (4-18 years). Wearing ActiGraph accelerometers GT3X+/wGT3X-BT movement behavior was objectively registered for one week. Effects on the dropout rate were analyzed with different epoch lengths (EL), non-wear-time (NWT) definitions, different valid day/week criteria and intensity-classification-algorithms.

Results: Recording is in EL of 1s with the possibility to convert into 5s, 10s, 15s, 30s and 60s for future analysis. For the NWT Calculation the

Choi-Algorithm was chosen because of the constancy in detecting NWT whereas Troiano shows variance up to 3% in NWT with different EL. Valid day criteria is 8h of recordings (+13% valid data compared to 10h) on four weekdays and one further weekend day when wearing the device for 7d. Four different intensity classification algorithms (Evenson, Hängii, Romanzini, Sasaki) were validated for the different age groups (5-8, 7-11, 12-18, adults).

Conclusion: Because there is no general consensus, these results will help researchers to make more suitable decisions for data processing criteria before and after data collection using the GT3X/+ accelerometer in large-scale epidemiological studies.

External funding details: Federal Ministry of Education and Research, funding reference number: 01ER1503

Mode of commuting, physical activity, energy expenditure and steps in the trips to and from the school in Spanish adolescents: the PACO project

Palma Chillon¹, Sergio Rosado-López², Manuel Herrador-Colmenero², Cristina Cadenas-Sanchez², Yaira Barranco-Ruiz², Manuel `vila³, Maria Paula Santos⁴, Emilio Villa-González²

¹University of Granada, PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain., ²PROFITH "Promoting FITness and Health through physical activity" research group, Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain., ³Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain., ⁴Research Centre in Physical Activity, Health and Leisure Faculty of Sport, University of Porto, Portugal

Introduction: Active commuting to school (ACS) can increase in a 20-30% the daily amount of moderate-to-vigorous physical activity (MVPA) in youths. However, there are few studies analyzing the physical activity (PA) and the energy expenditure of the trips to/from the school. Thus, the aims were: to quantify objectively the PA levels derived from each mode of commuting (walking, vehicle and mixed transport), and to analyze the association between ACS with PA, energy expenditure and steps in adolescents.

Method: A total of 18 Spanish adolescents (girls = 12) aged 15 years old wore an accelerometer and GPS during 1 week. The web-based tool PALMS combined both GPS and accelerometer data and categorized the PA levels (i.e., sedentary, light and moderate-to-vigorous) and the mode of commuting to/from the school. Energy expenditure (METs) and number of steps were also measured. Logistic regression analyses were used to analyze the associations between ACS (active vs. passive) with PA, energy expenditure and steps, controlled by total PA time and increased ground elevation.

Results: A total of 115 trips were detected. The percentages of light PA were similar for all modes of transport (25-35%), whereas the percentage of MVPA was higher in walking trips (55%). Participants choosing active modes of commuting were more likely to have higher increased METS (OR: 5.497, p=0.013) and higher number of steps (OR: 1.004, p=0.029) than those choosing passive modes of commuting.

Conclusion: The ACS may have a particular relevance to increase PA levels, energy expenditure and steps in adolescents.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R and DEP2015-63988-R; MINECO/FEDER, UE]]

More active preschool children in PE lessons accumulate significantly more moderate and vigorous physical activity during school time

Juliana Kain¹, Bárbara Leyton¹, Johana Soto-Sánchez²

¹University of Chile, ²Universidad de Playa Ancha, Valparaíso

Introduction: The Chilean Ministry of Sports initiated a national programme in 2014 which consists in hiring specialists to provide 3 PE lessons/ week to low income preschool children during the school year.

Objective: to compare MVPA accumulated by the most active versus the least active children during PE lessons and during school time, by gender.

Methodology: in 2015, this programme was implemented in 92 preschools. We selected a sample of 532 five y olds from 66 preschools. 4-5 children wore accelerometers (Actigraph GT 3X) during a school day which included a PE lesson. PA intensity was determined with Butte cut points. Results shown originate from 164 lessons and correspond to one child during one school day. We categorized the children into the most active and least active ones by percentile MVPA accumulated during PE lessons (P75 and P25 respectively) and compared MVPA accumulated by each group during PE lessons and school time, in each gender, using t-tests.

Results: In PE classes, P75 vs P25 boys accumulate 56.8 and 16.7% MVPA, while girls accrue 47.1 and 11% respectively ($P < 0.001$); during school time, these % were 18.6 and 12.1% for boys and 13.9 and 9.3% for girls ($P < 0.01$). Girls accumulate significantly less MVPA both during PE lessons as in school time

Conclusion: more active children surpass the recommended MVPA during PE lessons and accumulate significantly more MVPA during school time. It is important to find out why some children are inactive (especially girls) and address those issues.

Physical activity levels of older adults in residential care

Niamh Spratt-O'Shea, Hugh Lane, Institute of Technology Carlow

Introduction: Physical activity has been shown to steadily decline with increasing age among older adults (aged 60+) in Ireland. Research has shown that older adults in residential care are mostly inactive; this inactivity has a negative effect on physical fitness and quality of life. The purpose of this study is to assess physical activity levels of older adults in nursing homes within a county in the south-east of Ireland, as to date no such research has been undertaken on this population.

Methods: Ten nursing homes have been selected to take part in the study. The Physical Activity Survey for the Elderly (PASE) will be used to assess physical activity levels. The validity and reliability of the PASE questionnaire has been established in a number of studies on older adults and has been deemed a valid measure of physical activity in this cohort.

Results: PASE consists of 12 questions related to various forms of physical activity carried out over the previous seven days. Scores will be calculated from pre-determined weights and frequency given to each type of activity. The activity weight will be multiplied by the frequency and a total PASE score will be obtained.

Conclusion: Conclusions regarding the physical activity levels of older adults in nursing care will be established from the PASE questionnaire results.

Reliability and agreement of the Spanish version of the Dogs and Physical Activity (DAPA) Tool

Paula Ramirez Muñoz, Diana Díaz, Marycielo López, Kiara Martínez, Celeste Peñuela, Universidad Industrial de Santander

Introduction: Several studies around the world indicate that having a dog is related to their owners' walking time. DAPA tool is the most widely used questionnaire to evaluate factors related with dog owners walking. A cross-cultural Spanish translation of DAPA tool was made in Colombia, and it is necessary to assess its psychometric properties.

Purpose: To assess the reliability and agreement of the DAPA tool Spanish version.

Methods: The DAPA tool Spanish version was filled out by 91 dog owners, and a week later they filled it out again. For categorical data, Cohen's kappa (κ) or Weighted kappa and percentage agreement were used. For continuous data, Intraclass Correlation Coefficients (ICC) with 95% confidence intervals (95% CI), Bland±Altman plots and limits of agreement (LoA) were calculated.

Results: The test-retest reliability was good for 68.5% of the items with ICC or Kappa's ranged from 0.86 to 0.92 (almost perfect) and 26.6% of items from 0.41 to 0.60 (moderate). With the Bland and Altman methodology, for "times per week walking with your dog" the mean of differences was 0.121 (SD 3.3) and LoA range was -6.41 to 6.65; for "total time a week walking or jogging with your dog" mean of differences was 12 (SD 119.2) and LoA range was -221.7 to 245.7.

Conclusions: We concluded that DAPA tool showed good reliability and agreement. The questionnaire can be used in Colombian population to provide a standardized measure of factors that affect dog owners' walking with their dogs.

Reliability of a parents' questionnaire to assess the behaviour of commuting to and from school: The PACO project

Maria Jesus Aranda-Balboa¹, Marina Fernández², Irene Esteban-Cortejo³, Emilio Villa-González⁴, Berta Murillo-Pardo⁵, José Manuel Segura-Díaz⁴, Romina Gisele Saucedo⁴, Yaira Barranco-Ruiz⁴, Manuel Herrador-Colmenero², Francisco Javier Huertas-Delgado⁶, Palma Chillón⁴

¹University of Granada PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ²PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ³Center for Cognitive and Brain Health, Department of Psychology, Northeastern University, Boston. PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ⁴PROFITH "PROmoting FITness and Health through physical activity" research group. Department of Physical Education and Sport, Faculty of Sport Sciences. University of Granada. Granada., ⁵Faculty of Health Sciences. University of San Jorge. Villanueva de Gállego., ⁶Teaching Centre La Inmaculada. University of Granada. Granada.

Introduction: The aim of this study was to analyse the reliability of a parents' questionnaire to assess the children's mode of commuting, autonomy, distance to school, and the parents' mode of commuting to work.

Method: A total of 165 parents (mothers $n=124$) of children and adolescents (aged 9.9 ± 2.4 years) completed twice a questionnaire separated 14-days, from February to May of 2016. The reliability of the Behaviours of Commuting to and From School Questionnaire (i.e. children's mode, autonomy, distance for commuting to school, and parents' mode of commuting to work) were examined calculating kappa and weighted kappa coefficients in a test-retest design.

Results: The results showed a good reliability (ranging from 0.81-1.00). There was a very good agreement for the mode of commuting to

($k=0.962$) and from school ($k=0.973$), the father' ($k=0.908$) and mother's mode of commuting ($k=0.913$). Additionally, there was a good agreement (ranging from 0.61-0.81) for the accompaniment on the way to school ($k=0.703$), and from school ($k=0.728$), distance ($k=0.619$) and time from home to school ($k=0.639$).

Conclusions: The Behaviours of Commuting to and From School Questionnaire is a reliable tool to assess the children's and parents' mode of commuting to school and work, reported by parents. This questionnaire will be useful to administrations and researchers to guarantee an accurate measurement when implementing effective intervention programmes to increase the rates of active commuting to school.

External funding details: This study was supported by the Spanish Ministry of Economy, Industry and Competitiveness [DEP2016-75598-R (MINECO/FEDER, UE)], and "I+D+i research staff contract, within the framework of the national youth guarantee system" funded by the Junta de Andalucía and the European Social Fund of the European Union.

Self-reported physical activity is not a valid method for measuring physical activity in 15 year old South African boys and girls

Makama Andries Monyeke¹, Sara J Moss², Han C.G Kemper³, Jos W.R Twisk⁴

¹M.A. MONYEKE, ²Physical Activity, Sport and Recreation Focus Area; Faculty of Health Sciences, North-West University; Potchefstroom 2520, South Africa, ³Amsterdam Public Health Research Institute, VU University Medical Centre, Amsterdam, The Netherlands, ⁴Department of Clinical Epidemiology and Biostatistics and EMGO-institute, Vrije Universiteit Medical Centre (VUmc), Vd Boeorchststraat 7, 1081 BT Amsterdam, Netherlands

Valid instruments for the assessment of physical activity remains a challenge in field studies. This study determine the level of agreement between objectively measured physical activity by ActiHeart® and the international physical activity questionnaire short form (IPAQ-S) among adolescents attending schools in the Tlokwe Local Municipality, South Africa. A total of 63 boys and 45 girls aged 15 years were participants in Physical Activity and Health Longitudinal Study (PHALS). Objective physical activity (PA) was measured by a means of ActiHeart® for seven (7) consecutive days. Subjective physical activity was assessed with self-reported IPAQ-S. Objective PA indicated that 93% of the participants were inactive and only 6% highly active. IPAQ-S showed that 24% were inactive with 57% active. A non-significant correlation ($r=0.11$; $p=0.29$) between ActiHeart® measure of activity energy expenditure (AEE) and total physical activity (IPAQ-S) was observed. Cohen's Kappa (k) show poor agreement between the two measurement instruments, $\kappa=0.011$, $P<0.005$.

External funding details: This material is based upon work supported financially by the National Research Foundation (NRF) and Medical Research Council of South Africa (MRC).

Disclaimer: Any opinion, findings and conclusions or recommendations expressed in this material are those of the authors and therefore the NRF and MRC do not accept any liability in this regard.

The risk of musculoskeletal disorders (MSDs) associated with sitting and sleeping time during workdays, presenteeism, work engagement and common mental health issues in a sample of UK Heavy Goods Vehicle's (HGV) drivers: The SHIFT Study

Veronica Varela-Mato¹, Stacy Clemes¹, James King¹, Fehmidah Munir²

¹Loughborough University, ²Loughborough University

Objective: to explore the risk of having musculoskeletal disorders (MSDs) associated with sitting and sleeping time during workdays, presenteeism, work engagement and mental health in a sample of UK HGV drivers.

Methods: 88 male drivers participated in this cross-sectional study. Multinomial logistic regression analysis was performed to explore the associations between two or more MSDs and work engagement, common mental health and well-being, presenteeism, sleep hours on workdays, work hours per day and sitting time at work

Results: MSDs are associated with sitting time on workdays (OR 3.16), long hours at work per day (OR 3.24) and per week (OR 2.79), severe sleep deprivation (OR 16.81), presenteeism (OR 3.13), low work dedication (OR 0.35), low absorption (OR 0.47) and borderline or abnormal score of depression (OR 17.34) compared with the reference categories.

Conclusion: good practices within the logistics sector to improve lorry drivers working environment and common mental health and well-being issues are required to reduce the likelihood of multi-site MSDs.

Validity of accelerometers for measuring sedentary behaviour in older adults: A systematic review

Kristiann C Heesch¹, Robert Hill¹, Nicolas Aguilar-Farias², Jannique van Uffelen³, Toby Pavey¹

¹Queensland University of Technology, ²Universidad de la Frontera, ³KU Leuven - University of Leuven

Introduction: Accelerometers were initially developed to measure physical activity, but they are now designed to also capture sedentary behaviour (SB). Consequently, the evidence of the validity of the ActiGraph, the most assessed accelerometer for measuring SB, is growing. However, studies that have assessed the validity of the ActiGraph for measuring SB in older adults have not been systematically reviewed.

Method: A systematic review of articles reporting the validity of ActiGraph accelerometers for measuring SB in adults aged ≥ 60 years was conducted.

Results: Eleven studies were identified. In all, an ActiGraph was worn on the hip. The most valid estimates of SB are provided by analysis of ActiGraph data using 60-second epochs and a vertical magnitude cut-point of <200 counts per minute or using 30- or 60-second epochs with a machine learning algorithm. A non-wear algorithm of 90+ consecutive zeros is indicated.

Conclusion: Studies of the validity of the ActiGraph for measuring SB in older adults come to different conclusions about the time older adults' spend in SB because researchers differ in how they set up ActiGraph data for analysis (e.g., epoch length, non-wear algorithm, number of hours and days of wear for data to be included). Moreover, it appears that some decisions, like the selection of a non-wear algorithm, may need to be made specifically for older adults. As more studies are conducted in this field, consensus around these decisions can be reached. This will result in better comparisons of results from studies that measure the validity of these accelerometers.

Wear compliance, sedentary behaviour and activity in free-living children from hip-and wrist-mounted ActiGraph GT3X+ accelerometers

Gillian McLellan, Duncan Buchan, Rosie Arthur, The University of the West of Scotland

This study examined the compliance of children wearing wrist- and hip-mounted ActiGraph GT3X+ accelerometers and compared estimates of sedentary behaviour (SB) and physical activity (PA).

One hundred and eighty-eight 9-12-year-old children wore a wrist- and hip-mounted accelerometer for 7 days. Data were available for 160 (hip) and 161 (wrist) participants. Compliance was analysed using 9 different wear-time criteria. Output comparisons were compared against one wear-time criteria (any 4 days at 10-hours per day). Time spent in SB and PA was calculated using R-package GGIR.

Wear-time for the wrist (15.6 to 17.4 h.d⁻¹) was significantly greater than the hip (15.2 to 16.8 h.d⁻¹) across all wear-time criteria (all $P < 0.05$). Moderate-strong associations were found between time spent in SB ($r = 0.39$), LPA ($r = 0.33$), MPA ($r = 0.99$), VPA ($r = 0.82$) and MVPA ($r = 0.81$) between the two device placements (All $P < 0.001$). The wrist device detected more minutes in LPA, MPA, VPA and MVPA whereas the hip detected more minutes in SB (all $P = 0.001$). Estimates of time in SB and all activity outcomes from the wrist and hip lacked equivalence.

The GT3X+ when worn at the wrist promotes greater compliance than at the hip. Minutes in SB and PA calculated from raw accelerations at the hip and wrist provide contrasting estimates and cannot be directly compared. Further calibration and correction factors may facilitate the comparison of findings in studies that estimate time spent in SB and PA intensities captured from the wrist and hip.

Weekly physical activity levels in university students living on and off-campus

Chelsea L. Orduno, Christopher A. Chandroo, Joel D. Reece, Brigham Young University Hawaii

Introduction: In order for organizations to determine appropriate health promotion programs, it is recommended that they first conduct a needs assessment for their organization. The purpose of this study was to determine whether or not students at a diverse university in the rural pacific are meeting physical activity (PA) recommendations of 150 minutes per week of moderate to vigorous activity.

Methods: A convenience random sample of students ($N = 150$) completed the International Physical Activity Questionnaire (IPAQ-Short Form) via Qualtrics. The survey also included specific demographic questions.

Results: Eighty-four percent of students were meeting weekly PA recommendations. There was no significant difference in total minutes of PA per week between those living on-campus (441.0 ± 394.1) compared to off-campus (477.1 ± 364.6 , $p = 0.582$). Walking minutes per week were significantly higher for students living on-campus (735.7 ± 892.1) compared to off-campus (424.5 ± 393.0 , $p = 0.006$). Finally, minutes of PA per week were significantly higher for domestic students (492.6 ± 380.8) compared to international students (334.3 ± 367.4 , $p = 0.032$).

Conclusion: These results demonstrate that this particular university has a very active student body. This type of information can be helpful for universities to consider when constructing the built environment of a university. Future research may confirm if these patterns of PA are consistent among other universities and determine additional factors of university life that can influence PA. In addition, future study of walking traffic patterns among students may help to develop friendlier pedestrian walkways on and around campuses when designing infrastructure.

Theme: Mechanisms

Part of the MOVement: A mechanism for mobilizing Cheshire and Warrington to reduce inactivity

Anne Boyd, Eloise Glithero, Active Cheshire

Social movement theories suggest social movements succeed through effective mobilization of individuals, organisations, cultures and/or

political systems. Social movements refer to deliberate, voluntary efforts to organize individuals to achieve enough group influence to make changes.

As the lead body for physical activity in Cheshire and Warrington, and the named county sport partnership mandated to act as a local agent on behalf of Sport England, Active Cheshire are in prime position to promote and influence movements for change, leading the fight against inactivity locally.

In 2016 it became evident that despite decades of significant national and local investment into the sector, levels of physical inactivity remained high and stagnant. According to Active Lives Survey January 2017 release, 166,000 (22.1%) people were doing less than 30-minutes a week of physical activity in Cheshire and Warrington. Responding to this stagnation, Active Cheshire launched a mechanism for behaviour change in the form of #PartOfTheMOVement.

The #PartOfTheMOVement campaign utilised promotional messaging, face-to-face engagement, and notable events/conferences to influence external individuals and organisations to join in tackling the problem of inactivity.

Following two successful conference events, and 18 months of campaigning, Active Cheshire successfully encouraged approximately 1000 organisations and individuals to become #PartOfTheMOVement.

This amounted to the development of a Physical Activity Task Force where cross-sector partners and stakeholders came together to co-develop a local strategy, the Blueprint to Tackle Physical Inactivity in Cheshire and Warrington. The strategy looks to be co-delivered by those who have joined the MOVement in the fight against inactivity.

Shared Records: A gateway to reducing barriers to activity referral schemes

Elanor Reynolds, WLCT

Inspiring healthy lifestyles secured access to shared health records, to improve patient experience and streamline referral processes for health professionals. This innovative approach was made possible with technical support from Clinical Commissioning Group colleagues, backing from commissioners in Public Health and by developing trusting relationships with referring professionals.

This unique development improves access for patients into our Activity Referral Scheme and other targeted programmes that support participants with disabilities, mental health conditions, dementia and frailer older adults to become more active.

Access to 'Share to Care' data improves participant safety and reduces risk, as we can view a patient's up to date medical history rather than relying on information on referral forms, making consultations more efficient and effective. Unnecessary interaction with Health Professionals is reduced, with less need to chase missing information.

"This innovative way of accessing patient's records will ensure a smoother transition and decrease time constraints on the Health Professional looking to refer patients to supported physical activity. This will also provide detailed information for the referral instructor to offer an informed and tailored approach to participant physical activity design. This will help with identifying patients with early signs of manageable health conditions where lifestyle can have a significant effect on outcomes." (Dr John Morgan Wigan GPwSI in Physical Activity)

We are working on the next step in this development, to trial moving from a referral to a signposting system to further reduce the burden on Health Professionals and make it easier for patients to become more active.

Theme: Mental health

Impact of locomotive disorders on the correlation between depression and physical activity/inactivity in community-dwelling elderly

Rei Ono¹, Shunsuke Murata¹, Jun-Ichi Omata², Tatsuya Endo³, Koji Otani⁴

¹Kobe University Graduate School of Health Sciences, ²Fukushima Medical University, ³Fukushima Medical University Aizu Medical Center, ⁴Fukushima Medical University School of Medicine

Introduction: Locomotive disorders (LD), a decline in motor function and ADL, are increasing with aging. Despite realizing the importance of LD in elucidating the correlation between depression and physical activity/inactivity in the elderly, the effect of LD remains unclear.

Method: This cross-sectional study aims to investigate the impact of LD on the correlation between depression and physical activity/inactivity in community-dwelling elderly (age ≥ 75 years). We examined 845 community-dwelling elderly (mean age: 79.8 ± 3.7 ; females, 52.7%) who were registered in a Japanese rural area. We defined depression as the geriatric depression scale ≥ 5 , physical activity as moderate-intensity physical activity times/week, physical inactivity as sedentary time/week using the Japanese version of the International Physical Activity Questionnaire, and LD as ADL disabilities by a self-reported questionnaire (Geriatric Locomotive Function Scale-25, ≥ 16). We performed statistical analyses using multiple regression stratified by LD, depression as the outcome variable, physical activity and physical inactivity as explanatory variables, and age, sex, BMI, alcohol consumption, smoking status, education level, and living alone as confounding variables.

Results: Among all, we identified 259 with depression and 271 with LD. The physical activity correlated with depression regardless of LD [odds ratio, 0.63; 95% CI: 0.53–0.75]. Although physical inactivity correlated with depression (1.22, 1.02–1.47), the relationship did not in stratified analysis by LD (LD: 1.14, 0.84–1.55; no LD: 1.14, 0.88–1.47).

Conclusion: LD might confound between depression and physical inactivity but not between depression and physical activity.

External funding details: This study was supported by a grant from the Japanese Orthopaedic Association

Improving mental health in colleges through physical activity

Kirstie Hickson, AoC Sport

Concerns around mental health and wellbeing are increasing throughout all education settings and whilst the Government has started to address this in schools, very little has been identified for colleges. The average college has 185 students with disclosed mental health conditions and in addition to this 81% of colleges have reported having 'significant numbers' of students who have undisclosed mental health difficulties.

Sport and physical activity is effective in improving mental health and wellbeing, particularly with mild to moderate depression as well as anxiety. Activity can be used effectively in both preventative programmes and as interventions. The Government strategy Sporting Future and Sport England's strategy Towards an Active Nation recognise the role of sport and physical activity in improving mental health.

AoC Sport has established a project involving 30 further education colleges in England using the Short Warwick Edinburgh Mental Wellbeing

Scale (SWEMWBS) to assess the impact of their physical activity interventions for students with mental health difficulties. Activity levels of the participants are also being recorded to understand whether the amount of activity has an impact on the levels of mental wellbeing.

In addition to support this evidence we will be further analysing four colleges' projects to share learning from the interventions and why they were successful. Interviews with a sample of participants will be carried out to gather qualitative data to support the findings from the SWEMWBS. The data will be collated by June 2018 and the findings will be shared at the AoC Sport conference.

Life satisfaction and physical activity in adolescents

Lukas Jakubec¹, Karel Frömel¹, Petr Valach²

¹Palacký University Olomouc, ²University of West Bohemia

Introduction: The quality of life is also influenced by person's life satisfaction (LS) and physical activity (PA). This study assessed whether different levels of LS and well-being (WB) were associated with different types of performed adolescent's PA and with meeting PA guidelines.

Methods: The research project involved 368 girls and 228 boys in age 15 ± 19 years from 16 secondary schools in different regions of the Czech Republic. The Bern Subjective Well-Being Questionnaire for Adolescents and WHO-5 Well-Being Index were used to assess the LS and WB level. The weekly PA was self-reported on the International Physical Activity Questionnaire-long form and objectively measured by pedometer.

Results: The results indicated significant differences in vigorous PA between boys with different level of LS. Boys and girls with higher WB level realized more recreation PA compared to their peers with lower WB level. On top of that, girls with higher WB level realized significantly more moderate, vigorous and overall PA. Boys with higher LS level had 2.29 times greater chance to meet the PA recommendation of 20 minutes of vigorous PA in three days a week compared to their peers, while girls with higher WB level had 1.87 times greater chance to meet the recommendation of 11,000 steps per day.

Conclusion: Positive satisfaction from realized PA and meeting PA guidelines are essential for LS in adolescents. The comprehensive analysis of these associations can radically determine adolescent's health.

External funding details: The research was supported by the Czech Science Foundation under the grant No. 13-32935S.

Physical activity, a crucial determinant of mental health and quality of adolescent life: A cross sectional study in college going females

Baskaran Chandrasekaran, Hiral Chauhan, Fiddy Davis, Manipal University

Background: Increasing suicidal attempts and poor peer relations suggest that Indian college females are in a state of increasing mental stress. Evidence suggests that physical activity is reduced considerably in college going women and this may link to poor mental health and academic performance in them. The physical activity is proved to lessen the prevalence of mental health and improved quality of life. The present study aimed at relating physical activity to mental well-being and quality of life in female college students of India.

Methods: This cross-sectional study was approved by Institutional Ethics committee (NCT03153189). 120 female students of a University were screened and administered questionnaires investigating self-esteem, sleep, physical activity, body fat and quality of life. Physical activity levels were then correlated with mental health and quality of life measures. The data was analysed through SPSS 16.

Results and Discussion: Only 72 volunteers completed the questionnaires and body fat measurements. Mental health variables ($r=0.83$, $p=0.043$) and Quality of life ($r=0.61$, $p=0.037$), showed a moderate significant relation to physical activity respectively. Physical activity proposed to improve mental health through central regulation of hypothalamus, endorphin and sympathetic adrenal axis and body image thereby improving quality of life in college.

Conclusion: Physical activity may be a crucial determinant of mental and physical wellbeing.

Pupils' experiences of autonomy, competence and relatedness in a physical activity intervention

Anne-Didde Holt, Søren Smedegaard, Charlotte Pawlowski, Thomas Skovgaard, Lars B. Christiansen, University of Southern Denmark

Introduction: Physical activity at school can be beneficial to all children's psychosocial well-being, if an inclusive and supportive environment is created. The purpose of this study was to investigate how pupils experienced a school physical activity intervention based on Self-Determination Theory and to assess how it affected the pupils' sense of competence, autonomy and relatedness.

Methods: The multicomponent intervention comprised recess, in-class activities and PE and lasted one school year. Two grade four classes (ages 9 $\pm$ 10) and two grade six classes (ages 12 $\pm$ 13) at two participating schools were selected for a qualitative case study. Ten semi-structured focus group interviews were carried out, involving 36 pupils. The data were analysed based on the principles of deductive content analysis.

Results: Findings showed that the pupils' sense of relatedness was central to well-being and influenced their sense of competence and autonomy. Changing the physical activity climate to focus on competence development instead of competition was challenging, but resulted in positive experiences, especially for pupils with limited motivation. Finally, while being given influence and choice evidently promoted the sense of autonomy, some pupils felt uncomfortable with a responsibility involving others.

Conclusion: The findings from the current study support the basic principles of SDT, and point to some practical challenges in implementing a SDT-based PA intervention in a Danish school setting. A socially inclusive environment was found to be crucial to pupils' well-being at school, and influenced the sense of both competence and autonomy.

External funding details: Funded by the non-profit foundation TrygFonden

The experiences of people with severe and enduring mental illness engaged in a physical activity programme integrated into the mental health service

Margot Hodgson¹, Heather McCulloch¹, Ken Fox²

¹Avon and Wiltshire Mental Health Partnership NHS Trust, ²University of Bristol

Objectives: Regular physical activity can be beneficial for people with severe and enduring mental illness (SEMI). However there is little information about how this might be initiated and maintained. This work reports findings from qualitative research, the aim of which was to identify factors influencing adherence to an activity programme and the perceived effects of physical activity on well-being.

Methods: Seventeen people (18 - 65 years) with SEMI were recruited from an established physical activity programme (specifically designed for mental health service users). One-to-one semi-structured interviews were recorded, transcribed and member checked. Thematic analysis was

adopted to extract perceptions about programme participation, its benefits and drawbacks.

Results: Results indicated that a combination of the mental illness and effects of medication were the main barriers to participation. The main enabling factors to participation were the support of the mental health staff and the organisation and structure of the physical activity sessions. Emerging themes illustrate the benefits of physical activity in enhancing mental wellbeing, physical health and in providing social opportunities.

Conclusion: This qualitative research demonstrates that a physical activity programme integrated into the mental health service and supported by partnership working can address several of the unique barriers faced by this population. Through the provision of opportunity, appropriate support and structure of the sessions, people with SEMI can take part in sustained regular physical activity. Outcomes indicate benefits to mental well-being which can assist in recovery of those with SEMI and help with adherence to the programme.

The prevalence of wellbeing, resilience and physical activity among third level pre-service teacher educators in Ireland

Niamh O'Brien, Wesley O'Brien, University College Cork

Introduction: In Ireland, 14% of university students report severe depression and anxiety, while another 25% report mild depression and anxiety. Globally, one-third of adults do not achieve the recommended levels of physical activity (PA), with 32% reporting to achieve PA guidelines in Ireland. This research assesses gender differences in wellbeing, resilience and physical activity among a sample of third level pre-service teacher educators.

Methods: Using self-report questionnaires ($n=128$; 29% male, 71% female), students' well-being, resilience and PA levels were measured with the Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), WHO-5 Wellbeing Index, Brief Resilience Scale (BRS) and a single question on weekly level PA. Data were analysed using t-tests and chi-square test.

Results: Findings suggest 73% of students are not meeting the recommended PA guidelines. A further 21.1% report poor emotional wellbeing. An independent sample t-test observed significant differences between gender and PA levels ($P<0.0001$). Males report higher levels of PA participation. No significant difference in mental wellbeing ($P<0.491$), and resilience ($P<0.870$) were observed between gender. Chi-square analysis suggested no association between physical activity levels and wellbeing ($P<0.303$), however, a significant association between resilience and PA emerged ($P<0.01$).

Conclusion: Current results support the literature regarding low levels of mental health and PA among the young adult population in Ireland. More males than females report participating in higher levels of PA. There appear to be no differences in wellbeing and resilience between genders. Findings highlight the need for intervention to increase PA, positive mental health, and resilience among young adults.

Theme: Physical Activity in Clinical Care Settings

A multicomponent exercise trial for advanced prostate cancer: A study protocol

Malcolm Brown¹, Marie Murphy², Suneil Jain¹, Joe O'Sullivan¹, Gillian Prue¹

¹Queen's University Belfast, ²Ulster University

Background: Prostate cancer (PCa) is the most common cancer in men with approximately 1,100 diagnosed annually in Northern Ireland, of which 16% are advanced cases. Advanced PCa presents a considerable disease burden but promising evidence is emerging that exercise may improve several disease and treatment-related outcomes, however empirical evidence remains limited. This trial will examine a moderate intensity, home-based exercise program in men with advanced PCa.

Methods: 30 men diagnosed with advanced PCa will be recruited. Eligible patients will be screened and undergo medical evaluation. All men will receive a 12-week multicomponent, self-managed, home-based exercise intervention with 24-week follow-up. This progressive exercise program will consist of moderate intensity (55-70% maximum heart rate) walking and strengthening exercises. At baseline, 12 and 24 weeks outcome measures will be determined (height, weight, hip and waist circumference, physical fitness and quality of life) as will 7 day accelerometer assessment. Behavioural change consultation and continued support will be provided. The primary endpoint relates to the feasibility, accessibility and acceptability of the intervention (via semi-structured interviewing of participants, non-participants and co-investigators). Secondary endpoints will examine skeletal-related events, pain, fatigue, physical function and quality of life. Quantitative data will be analysed for mean changes from baseline using paired sample t-tests.

Results: The results will provide an indication of the intervention feasibility and data to inform a future, larger, phase III randomised control trial.

Conclusion: We propose this study will measurably impact quality of life in men with advanced PCa.

External funding details: HSC Public Health Agency Research and Development Division.

Chronic effects of reducing sitting time on glucose metabolism: Systematic review and meta-analysis

Rachel Climie¹, Elisabeth Winkler², Megan Grace³, Nyssa Hadgraft³, Lorena Romero⁴, Neville Owen³, David Dunstan³, Genevieve Healy², Paddy Dempsey⁵

¹INSERM, U970, ²University of Queensland, ³Baker Heart and Diabetes Institute, ⁴Alfred Health, ⁵rachellawson@ukactive.org.uk

Introduction: High volumes of time spent sitting are associated with an increased risk of cardiovascular and all-cause mortality. However, many studies are underpowered to determine whether there are beneficial effects to be gained from minimising sitting time over the longer term. By pooling data from previous studies, and to provide a synthesized evidence-base for informing future research, we aimed to determine the chronic intervention effect of reducing sitting time on glucose metabolism in the general population.

Methods: Online databases were searched for studies published up to March 2017, reporting a chronic (≥ 1 week) intervention to reduce sitting time and at least one glycemic outcome measure. Meta-analyses using fixed-effects models, or random-effects models (DerSimonian-Laird) for heterogeneous outcomes, were used to summarise the pooled intervention effects for each outcome, relative to control conditions.

Results: We identified nine interventions reporting effectiveness for glucose, five for insulin and five for HbA1c. Most lasted less than 12 months. Sitting time interventions had a homogeneous and significant pooled effect (net of control) on insulin (-4.419 pmol/L, 95% CI: -6.558 , -2.279 , $P < 0.001$) concentrations and effects that were heterogeneous and non-significant on glucose (-0.069 mmol/L, 95% CI: -0.14 , 0.002 , $p = 0.056$) and HbA1c (-0.111% , 95% CI: -0.337 , 0.116 , $p = 0.339$).

Conclusions: Longer-term interventions to reduce sitting time have significant, albeit modest effects on insulin, but non-significant effects

on glucose and HbA1c. Further longer term intervention trials are required to better understand the chronic effects on glycemic metabolism markers of reducing sitting time.

Correlation between sedentary time and diabetes mellitus in community-dwelling elderly with locomotive disorders

Rei Ono¹, Shunsuke Murata¹, Jyun-Ichi Omata², Tatsuya Endo³, Koji Otani⁴

¹Kobe University Graduate School of Health Sciences, ²Fukushima Medical University, ³Fukushima Medical University Aizu Medical Center, ⁴Fukushima Medical University School of Medicine

Introduction: Exercise is advocated for prevention and treatment of diabetes mellitus (DM). Cases of locomotive disorders (LD), which mean a decline in motor function and ADL, are increasing with aging; however, exercising for the elderly with LD is challenging. This cross-sectional study aims to investigate the correlation between sedentary time and DM in community-dwelling elderly with LD.

Method: We examined 381 elderly (>65 years; mean age: 77.8 ± 6.0 years; females, 260) with LD who registered at Fukushima Prefecture and attended the special health checkup in 2017. Sedentary times/week was defined using the Japanese version of the International Physical Activity Questionnaire. DM was defined as HbA1c $>6.5\%$ in a health checkup and/or drug use for hyperglycemia. LD was defined as ADL disabilities per a self-reported questionnaire (Geriatric Locomotive Function Scale-25, ≥ 16). We performed statistical analyses using logistic regression, DM as the outcome variable, sedentary time as the explanatory variable, and age, sex, BMI, alcohol consumption, smoking status, moderate-intensity physical activity times/week, and depression as confounding variables.

Results: In this study, 63 of 381 patients were identified with DM. The logistic regression analysis revealed a correlation between longer sedentary time and DM [<300 min (ref), $300-360$ min: odds ratio (OR), 2.3; 95% CI: 0.7-7.4; $360-480$ min: OR, 3.5; 95% CI: 1.2-10.1; ≥ 480 min: OR, 2.9; 95% CI: 1.0-8.0).

Conclusion: A reduction in sedentary time of elderly with LD could decrease the incidence of DM.

External funding details: This study was supported by a research grant from the Japanese Orthopaedic Association

Efficacy of a physical activity intervention on physical activity levels of patients with chronic low back pain (PAY-BACK trial): study protocol for a randomised controlled trial

Crystian Oliveira¹, Marcia Franco¹, Tatiana Damato¹, Fernanda Silva¹, Giulia Araujo¹, Bruna Azevedo¹, Caio Cantarella¹, Priscila Morelhao¹, Cynthia Gobbi¹, Diego Christofaro¹, Rafael Zambelli²

¹Sao Paulo State University, ²Universidade Federal de Minas Gerais

Background: Exercise therapy has been endorsed by recent clinical practice guidelines as a treatment of patients with chronic low back pain. However, these interventions are not effective in increasing the physical activity (PA) levels of patients with chronic musculoskeletal pain which may provide better improvements and sustained effects. One limitation is that these programmes did not focus on changing patients' behaviour toward an active lifestyle. Therefore, we will investigate the efficacy of a PA intervention compared to a control intervention on increasing PA at short-term, intermediate-term, and long-term follow-up in patients with chronic low back pain.

Methods: We will invite patients with chronic low back pain in Presidente Prudente, Brazil to participate in this study. Exercise therapy will be provided for all participants. Participants allocated to the PA group (n = 80), they will receive wellness coaching to increase PA and a wearable device tracker. Participants allocated to the control intervention (n = 80) will attend to placebo coaching sessions with the physiotherapist encouraging the talk about low back pain problems but without any therapeutic advice and a placebo wearable device tracker. PA measured objectively, disability and pain will be the main outcome measures of this study.

Discussion: We will test if our proposed intervention promotes an active lifestyle reducing the risk of developing cardiovascular diseases and contributing to a better prognosis of low back pain's patients.

Integrating evidence based pedometry for adolescents into the physical activity on prescription (PAP) model in Sweden

Anders Raustorp, University of Gothenburg / Linnaeus University

Background: In Swedish primary care, licensed professionals, i.e. physicians, physiotherapists and nurses, can prescribe PA if they have knowledge about the patient's current state of health, how PA can be used for promotion, prevention and treatment and are trained in patient-centred counselling and the PAP method. In a randomised controlled trial, PAP significantly improved body composition and reduced metabolic risk factors. Since 2015 this model includes adolescents.

To lower barriers, tools for implementation and structures for delivery must be readily available. Examples include handbook FYSS (www.fyss.se), the PAP model and the use of evidencebased pedometry.

Methods: In the improved understanding of the unique measurement and motivational proprieties of pedometers as behavior change tools, Tudor Locke et al (2009) outline an evidencebased model of hardware (i.e. scientifically validated pedometer) and software (i.e. researchbased indices to interpret data, as step/day recommendations, including BMI reference standards for pedometer determined steps/day).

Results: Previously published BMI reference standards indicate 12000 steps/day for young adults and 12000-15000 steps/day for children. By extrapolation, 12000 steps/day was decided for adolescents.

Discussions: Strength (individualised hands on method starting with baseline and goal to aim for) as well as limitations (how to interpret intensity and the step function in consumer devices) will be discussed.

It's been life changing: Perceived benefits of participation in the 'Live Active' exercise referral scheme

Faye Prior, Margaret Coffey, Penny Cook, Anna Robins, University of Salford

Introduction: Exercise referral schemes (ERSs) aim to increase the physical activity levels and health outcomes of people with chronic health conditions. To date, the efficacy of ERSs has been inconclusive and largely based on quantitative evaluations which fail to appreciate the full spectrum of potential benefits. The aim of this study was to address gaps in the literature by using qualitative enquiry to understand how participants perceive to have benefitted from an ERS.

Methods: Semi-structured interviews were conducted with 30 participants who had been engaged in the 6-month long 'Live Active' ERS (Tameside, UK) for 6-12 months. Purposive sampling was used to ensure a balance of age, gender and medical conditions. Interviews were analysed using framework analysis.

Results: The benefits of participation were appreciated by most in a wide ranging manner. Key themes to emerge included: becoming physically active,

physical and mental health benefits, social benefits, and adjunct benefits such as changes to medication. The extent of improvement in outcomes was often perceived to be limited by existing health conditions and their unpredictable nature. Most participants predicted that without the referral they would not have made successful attempts at becoming physically active.

Conclusion: This study adds to emerging research, finding that participants experience a wide range of benefits which go beyond those traditionally measured by evaluations. Future evaluations should consider using methods which capture the full spectrum of potential benefits for a more representative evaluation of impact.

External funding details: The authors thank Sport England and Tameside Public Health for funding this evaluation.

Love Activity, Hate Exercise? A co-produced national physical activity campaign from The Chartered Society of Physiotherapy, UK.

Sara Hazzard¹, Anna Lowe²

¹Chartered Society of Physiotherapy, ²SHU

Background: The Chartered Society of Physiotherapy wanted to develop a physical activity (PA) campaign to engage both members and patients - aged 40 years and older who may be inactive and have co-morbidities.

Methods: Firstly, we developed an expert professional advisory group, ran workshops and explored the perceived role of physiotherapy in PA. The creative team then developed a range of concepts to test on the target population of inactive people with long-term conditions.

Findings: The expert advisory group identified the unique role of the physiotherapist was to help people with one or more barriers to become more active. Insights from the co-production process include patients don't call it public health and the word exercise is a turn off. Patients reported that pain and fear were major barriers and that fear of aggravating symptoms prevented activity.

Physiotherapists were perceived mainly as "repairers of injury" reassurers, referrers, advisors and pain relievers. However, patients felt open to the discussion about PA if it was raised with empathy and recognised their limitations.

Based on these insights the name "Love Activity, Hate Exercise?" was chosen reflecting the ethos which is that PA doesn't have to mean sweating in gyms or aggravating symptoms. It can be manageable and fun even in the presence of multiple barriers and complexities, physiotherapists can enable more active lives.

Conclusion: In Feb 2018 we designed robust campaign benchmark measures. In May 2018 we launch to members and in July 2018 we launch to the public.

Physical activity as constituent part of osteoporosis treatment

Rustam Talishinskiy¹, Jamila Gurbanova², Kamalya Rustamova²

¹Traumatology and Orthopaedics Institute, ²Institute of Obstetrics and Gynecology

Many researchers indicate that lack of exercise is a major cause of chronic diseases including osteoporosis. We established and used method with ultrasound densitometry, which was helpful for primary diagnostic of risk group.

Treatment methodic included physical exercises and medical therapy. Physical exercises were prepared for all age groups. It consists coaching on exercises bikes and aerobics exercises. There was difference in intensity of exercises according to patient's age. Main task of exercises was strengthening of vertebral column.

There was used non-invasive ultrasound densitometer with 3 probes for examination of different bones (radius, tibia and phalanx of thumb) for diagnostic, screening and monitoring of osteopenia and osteoporosis. We have observed by densitometry 3 250 female patients (middle age 52, 6±1, 0 y.o.) trying to detect osteoporosis in postmenopausal syndrome stage on period from January 2009 till July 2017. There were 1 577 (48,5%) cases with osteoporosis and 1 088 (33,5%) cases with osteopenia. There weren't pathological process in 585 (18,0%) cases.

Densitometry examination of patients was interpreted by special computer program; also computer program predicted percentage possibility of fracture. Physical activity was indicated as important part of treatment. Physical exercises course continued 3 months. All patients didn't interrupt exercises after finish of treatment. Successful results of treatment demonstrated efficiency of treatment and importance of physical activity. Difference in intensity of exercises made possible to strengthening of vertebral column in patients. As result it was possible decrease clinical manifestation of osteoporosis.

Physical activity in individuals with early signs of hip/knee osteoarthritis: A feasibility study

Prasath Jayakaran¹, Meredith Perry², Cathy Chapple³, Treharne Gareth⁴, Jean-Claude Theis⁵, David Baxter³, Leigh Hale³

¹University of Otago, ²School of Physiotherapy, University of Otago-Wellington, ³School of Physiotherapy, University of Otago, ⁴Department of Psychology, University of Otago, ⁵Dunedin School of Medicine, University of Otago

Introduction: Osteoarthritis (OA) of hip/knee significantly impacts daily activities. Undertaking physical activity is a challenge in later stages of OA, with significant pain and disability reinforcing fear of movement and reducing self-efficacy. This study aimed to identify individuals with early signs of OA in the community and test the feasibility of a walking programme to improve their self-efficacy.

Method: A single-blind randomised controlled trial (RCT) design was used to test the feasibility of a 6-week walking programme. Participants aged 40-75 years were sampled from the New Zealand electoral roll database. A total of 225 respondents reported undiagnosed early signs of hip/knee OA; and N=33 enrolled in the RCT. After baseline assessment participants were randomised into the following three intervention groups: tailored physiotherapy (G1=12); tailored physiotherapy + walking programme (G2=11) and usual care (G3=10).

Results: The mean (SD) age of participants was 60 (7) years. At least 50% of the participants in G1 and G2 completed all appointments for the 6-week intervention. The dropout rate for follow-up assessment at 6 weeks and 12 weeks was high (45 and 58%). The mean self-efficacy scores (max 20) at baseline and six weeks were G1 = 15.87 and 16; G2 = 16.85 and 11.5; G3 = 16.16 and 17.

Conclusion: Feasibility of a future trial with the same design is questionable due to the issues with recruitment and retention of participants with early hip/knee OA. Preliminary data suggests that the treatment package has the potential to modify self-efficacy.

External funding details: The study was funded by the Jack Thompson Arthritis Research Fund of the Otago Medical Research Foundation and the Lottery Health Research Grants, New Zealand

Physical activity referral to cardiac rehabilitation, leisure centre or telephone-delivered consultations in post-surgical people with breast cancer: A mixed methods process evaluation

Gill Hubbard¹, Anna Campbell², Abi Fisher³, Michelle Harvie⁴, Wendy Maltinsky⁵, Russell Mullen⁶, Elspeth Banks⁷, Jackie Gracey⁸, Trish Gorely⁵, Julie Munro⁵, Godze Ozakinci⁹

¹University of the Highlands and Islands, ²Edinburgh Napier University, ³UCL, ⁴University of Manchester, ⁵UHI, ⁶NHS Highland, ⁷NCRI consumer forum, ⁸Ulster University, ⁹University of St Andrews

Background: Physical activity (PA) programmes effective under 'research' conditions may not be effective under 'real-world' conditions. A potential solution is to refer patients to existing community-based PA services.

Methods: A process evaluation of referral of post-surgical patients with early stage breast cancer to cardiac rehabilitation exercise classes, leisure centre with 3-month free membership or telephone-delivered PA consultations for 12 weeks.

Results: In Phase I, 30% (n=20) of eligible patients (n=20) consented, 85% (n=17) chose referral to leisure centre, 15% (n=3) cardiac rehabilitation. In Phase II, 32% (n=12) consented, 25% (n=3) chose leisure centre, 75% (n=9) telephone-delivered PA consultations. Walking at light intensity for about an hour was the most common PA. All Phase I participants received an induction by a cardiac rehabilitation physiotherapist or PA specialist from the leisure centre but only 50% of Phase II participants received an induction by a PA specialist from the leisure centre. There were observed improvements in self-efficacy for PA, quality of life, fatigue and fear of recurrence in Phase I but not Phase II. Four themes were identified from qualitative interviews about programme choice: concerns about physical appearance, travel distance, willingness to socialise, and flexibility in relation to doing PA. travel distance, socialising, relevance, and flexibility. Four themes were identified about facilitators and barriers for engaging in PA: feeling better, feeling ill, weight management, family and friends.

Conclusion: Further work to improve intervention fidelity and participant engagement in higher exercise intensities to maximise health benefits.

External funding details: Breast Cancer Now and Chief Scientist Office

Relaxation and exercise in lymphoma survivors (REIL Study)

Suchita Hathiramani¹, Ruth Pettengell², Hannah Moir³, Ahmed Younis¹

¹Kingston University and St. George's University of London, ²St. George's Healthcare NHS Trust, ³Kingston University

Purpose: Cancer survivors commonly report complaints including fatigue, pain, depression and decreased quality of life (QoL). Although evidence suggests that both exercise and relaxation can significantly improve such symptoms, there is no consensus on which intervention is more effective. This paper presents the REIL (Relaxation and Exercise In Lymphoma) Study Protocol. This study aims to compare the effect of two interventions on QoL in lymphoma survivors.

Methods: Eligible participants (n=36) will be randomised to an exercise or relaxation home-based programme to perform at least three times per week. The primary outcome measure is QoL, assessed by the European Organisation for Research and Treatment of Cancer QoL Questionnaire Core 30 (EORTC QLQ-C30). Secondary outcome measures include body composition, cardiovascular status, pulmonary function, strength, functional exercise capacity, well-being and psychological status. Total duration of the study will be 12 weeks and outcome measures will be assessed at baseline, 6 weeks and at the end of the study.

Results: Results from this study may inform development of effective care pathways for the increasing population of cancer survivors in general, and lymphoma in particular.

Conclusion: Care pathways that address common complaints of cancer survivors will potentially prevent long-term complications, and help in a smooth transition from being a cancer patient to a fully-functioning

member of society. This may lead to reduced use of healthcare resources by this population.

Self-management of physical activity by the use of step registration in type 2 diabetes: Six months results of the RCT Sophia Step Study

Jenny Rossen¹, Maria Hagströmer², Agneta Yngve³, Kerstin Brismar², Unn-Britt Johansson⁴

¹Karolinska Institutet, ²Sophiahemmet University, ³Karolinska Institutet, ⁴Uppsala University, ⁵Sophiahemmet University

Background: Regular physical activity is central in type 2 diabetes. Sophia Step Study is a two-year randomized controlled trial aimed at evaluating the impact of two levels of pedometer intervention intensity on cardiometabolic control and physical activity (Clinical Trial NCT02374788). The aim of this study is to present six months results on physical activity.

Methods: Individuals aged 40-80 years with type 2 diabetes were recruited and randomized to one of three intervention arms. Group A participants were offered a pedometer and a website to register steps, physical activity on prescription, motivational interviewing (4 occasions) and group consultations (7 occasions). Group B participants were offered pedometers and a website to register steps. Group C participants were offered standard care. Physical activity was evaluated using ActiGraph GT1M accelerometers.

Results: By November 2016, physical activity data at baseline and six months was provided from 84 participants: 34 in group A, 28 in group B and 22 in group C. Mean (SD) age was 64 (8) years, 62% men. Improvements in physical activity were seen with significant changes ($P < 0.005$) between respective intervention group and control group. Mean (SD) daily step change was 1245 (2159), 1564 (2433) and -570 (1965) steps in group A, B and C, respectively. Similarly, mean change in daily moderate-to-vigorous physical activity was 5.5 (17.3), 11.6 (24) and -5.4 (13.4) minutes/day in group A, B and C, respectively.

Conclusion: Pre-term results show that step registration only, or combined with counselling, have potential to increase physical activity after six months intervention.

Supporting brief intervention advice for physical activity

Brian Johnson, Public Health Wales

Introduction: Brief interventions are effective in supporting behaviour change in primary care. However, primary care professionals require specific knowledge to optimise their limited time within consultations, when promoting physical activity.

Hypothesis: Providing structured information to Primary Care professionals increases the likelihood of subsequent brief intervention.

Methods: Primary care professionals in Wales have had access to a web-based physical activity toolkit since 2013. Summaries of evidence relating the benefits of physical activity to different diseases are presented along with brief principles of motivational interviewing and links to further reading and resources. The toolkit has been promoted via lectures, newsletters and handouts over the last 4 years.

In 2015 a targeted handout was given to delegates at the cardiology network lectures in Wales, highlighting the benefits of cardiac rehabilitation.

Results: Data from the 2016 National Audit of Cardiac Rehabilitation showed a 17% increase in the uptake of cardiac rehabilitation in Wales; far higher than the neighbouring countries of England and N.Ireland. An association between the enhanced education of professionals and the uptake of cardiac rehabilitation is difficult to prove due to the multiplicity of factors.

Conclusion: The evidence behind brief interventions, their place in modern practice and their effectiveness will be explored in the study.

To ensure the next generation of doctors can advise patients on physical activity for both the treatment and prevention of chronic disease

Chris Rufford, Barts and The London School of Medicine

Physical inactivity has been called 'the greatest public threat of the 21st century'. The health costs of inactivity are massive. The United Kingdom is three times as inactive as Holland and twice as inactive as France. Exercise can be used to both prevent and treat chronic disease as well as improving surgical outcomes. Relatively small amounts of exercise have been shown to have dramatic affects [150 minutes of moderate exercise weekly] so if we could get more people to reach the minimum requirements we could save the NHS an estimated £18 billion a year. The knowledge of the physical activity guidelines recommended by the chief medical officer in most medical schools is poor.

Since 2012 fourth year medical students have attended a two hour lecture/workshop as part of the musculoskeletal module where they look at statistics relating to inactivity and the physiology of how exercise both prevents and treats chronic disease as well as improving surgical outcomes. Working in small groups using real clinical case scenarios they learn how to write a structured prescription with brief interventions tailored to the individual using behaviour change counselling and motivational interviewing which they can use in their consultations. Later simulated patients with chronic disease are used to practice consultation skills under the supervision of general practice Tutors.

Evaluation is performed using online feedback at the end of the musculoskeletal module. Physical activity prescribing is also part of the 4th year end of year OSCE assessment.

Using integrated care to advance healing and promote wellbeing for leg ulcer patients in the community

Saul Bloxham¹, Sam Vaughn¹, Michelle Fogg², Karen Lillie², Gary Shum¹, Theresa Mitchell², Rebecca Gordon¹

¹Plymouth Marjon University, ²Livewell Southwest

Introduction: Leg ulcers tend to manifest in older age adults that are living in social isolation and suffering from loneliness. Estimated UK Incidents rates and costs to NHS community nursing services are significant and likely to underestimate the problem's true extent. Examples of community services, general practice and 3rd sector collaboration for leg ulcer management are required to deliver the NHS 5 year forward view.

Methods: Nine leg ulcer patients aged over 65 years volunteered to pilot a new service where all aspects of patient care were delivered in the community from a UK University's Sport & Health Centre. Nurses tended to patient clinical needs after which patients immediately joined a 1-hour, 12-week group wellbeing class designed to encourage social integration, active movement, nutritional guidance and relaxation techniques. Classes were delivered by a certified Sport Therapist with support from University students.

Results: Pre-post programme improvements were identified for leg ulcer healing (80%) aerobic fitness (15% - 6-minute walk), ankle mobility (53%), timed up and go (11%), balance (Berg -10%), wellbeing (11% - Warwick and Edinburg), pain (VAS - 20%), and flexibility (59% - Chair sit and reach). Patients reported increased social confidence and improved understanding of leg ulcer self-management and prevention. Healed patients did not want to exit the service citing the transformational educational and social benefits.

Conclusions: Our integrated model of care shows promise to augment conventional treatments and healing rates, whilst also encouraging better self-management and disease prevention through improved social integration, feelings of empowerment, wellbeing, physical fitness and functional mobility.

Which factors influence patients with chronic low back pain meeting physical activity and sedentary recommendation?

Crystian Oliveira, Tatiana Damato, Fernanda Silva, Marcia Franco, Diego Christofaro, Cynthia Gobbi, Priscila Morelhao, Rafael Pinto, Sao Paulo State University

Background: Physical inactivity (PA) and sedentary behaviour influence patients with chronic low back pain (LBP). The first step in proposing an intervention to change the inactive lifestyle is to understand what factors that together influence this behaviour. Therefore, the aim of this study was to investigate which characteristics might influence the PA and sedentary behaviour in chronic LBP.

Methods: One hundred seventy-one patients with chronic LBP were included in this analysis. At baseline assessment, a trained assessor administered the questionnaires, during the interview collecting the following information: demographic and anthropometric characteristics, as well as, clinical data (i.e. pain intensity, disability, fear of movement and depression). The PA and sedentary behaviour objectively measured with an accelerometer. Logistic regression analysis was performed to investigate which factors influence both behaviours. The Human Ethics Committee of São Paulo State University approved this study (CAAE36332514.0.0000.5402).

Results: The sample was predominantly women (67.2%), and the median duration of symptoms was 12 months (Interquartile Range: 6.0- 48). The multivariable logistic regression showed a significant association of being physically active with female gender, lower body mass index, higher exercise levels and lower time spent in sedentary activity. Regarding the sedentary behaviour, we identified a significant association of being sedentary with higher occupational PA, education level equivalent to primary level and higher depression.

Conclusion: This study demonstrated that modified factors influence PA behaviour and sedentary behaviour instead of clinical aspects. Future strategies should consider these factors when designing interventions aiming at increasing PA levels of patients with chronic LBP

Theme: Policy

A focus on physical activity can help avoid unnecessary social care

Scarlett McNally¹, David Numan², Anna Dixon³, Mahiben Maruthappu⁴, Kenny Butler⁵, Muir Gray⁶

¹East Sussex Healthcare NHS Trust, Eastbourne DGH, ²Centre for Evidence-Based Medicine, Nuffield Department of Primary Care Health Sciences, University of Oxford, ³Centre for Ageing Better, ⁴Cera, ⁵UKactive, ⁶Oxford University Hospitals NHS Trust

The UK has a massive growing need for social care, with catastrophic knock-on effects on NHS hospital bed-usage. Physical activity reduces the need for social care; we reported this new concept in a 2017 BMJ paper. With a growing elderly population, the financial imperative to reduce social care spending should drive central/local governments, organisations, families and individuals to make changes needed in environments and expectations to support physical activity.

We analyse new data showing 'chair rise time' improvements with simple training, reducing current/future need for assistance.

We present new concepts:

- An older person taking up exercise can "drop a decade" to have the fitness level of someone a decade younger.
- Ageing is different from lack of fitness
- Loss of fitness can be reduced at any age and any level of disability
- Social care for over-65s costs the UK around £100 billion annually.
- Each person's need for social care is based on what they can do, eg their ability to get to the toilet in time
- Healthcare should not be passive. Physical activity should be designed into schedules.

We reinforce concepts highlighted by one of us (in Exercise, miracle cure):

- Physical activity prevents and treats disease, better than many drugs
- The message must be clear and simple

We reiterate previous concepts:

- Over-40s health worsens each decade on average by one condition ± most conditions amenable to primary and/or secondary prevention with exercise.
- The least active (25% of UK adults) gain most from starting.

References on www.scarlettmcnally.co.uk (BMJ paper and Exercise).

An investigation into the adoption and use of Public Health guidance by professional football club community schemes.

Andy Pringle, Stephen Zwolinsky, Leeds Beckett University

Introduction: Research confirms the impact of health improvement delivered for communities in professional Football Club Community Trusts (FCCT), yet no study has investigated the adoption and use Public Health (PH) guidance.

Method: This study investigates the use of PH guidance in 72 FCCT. Data were collected using (i) an online survey completed by FCCT managers (n = 34/47.2%) and (ii) semi-structured interviews with a sub-sample managers, (n = 11/32.3%).

Results: Most FCCT managers were male (n = 23/67.7%) & white British (n = 30/88.2%) and from Championship (n = 12/35.2%), League 1 (n = 13/38.2%) and League 2 clubs (n = 9/26.5%). All FCCT (n = 34/100%) provided physical activity and most provided diet (n = 31/91.2%), smoking (n = 20/58.8%) and alcohol (n = 19/55.9%) interventions. Regarding awareness of PH guidance, 58.8% (n = 20/34) were aware of Public Health England/Local PH guidance, 41.2% (n = 14/34) were aware British Heart Foundation, 38.2% (n = 13/34) NICE guidance and 29.4% (n = 10/34) football-charity PH guidance. Most, 76.5% (n = 26/34) of managers' reported using PH guidance. Regarding motives, 84.6% (n = 22/26) said that it 'was good practice', 65.4% (n = 17/26) said that 'it helped with planning', 34.6% (n = 9/26) said it 'was a requirement of funding' and 23.1% (n = 6/26) said it was because they 'had used it before'. 80.8% (n = 21/26) used PH guidance for programme design, 69.2% (n = 18/26) delivery, 57.7% (n = 15/26) needs assessment and 50% (n = 13/26) evaluation. Interviews with managers identified barriers to the adoption of PH guidance, including accessibility, awareness and relevance.

Conclusion: This study provides novel insights into the use of PH guidance within FCCT.

External funding details: Funding received from the Football League Trust/support from the Institute of Sport, Physical Activity and Leisure

Development of the evaluation framework for the Finnish Schools on the Move programme 2016-2018

Tuija Tammelin¹, Minna Paajanen², Nina Halme³, Timo Ståhl³, Tommi Vasankari⁴, Arja Säkslahti⁵, Kaarlo Laine¹, Tuija Tammelin¹

¹LIKES Research Centre for Physical Activity and Health, ²Ministry of Education and Culture, ³National Institute for Health and Welfare, ⁴UKK Institute, ⁵University of Jyväskylä

Finnish Schools on the Move (FSM) is a national action programme aiming to create more active and pleasant school days and to ensure one hour of daily physical activity for all students. Main themes include supporting learning, enabling student participation, increasing physical activity and decreasing sitting. FSM is funded by the Ministry of Education and Culture and is organised by the National Board of Education, regional state administrative agencies and various other organisations. FSM is a priority government programme with 21 million euros in financial support from the Ministry of Education and Culture for FSM to operate in municipalities in 2016±2018. The objective of the government is to expand the programme across the country. In 2010 programme began with 45 schools, and at the begin of 2018 total of 2,053 schools (84% of all schools) were registered to the programme. An evaluation framework was created to provide details on the development of the programme. Data will be collected from different national sources, including registers and surveys for municipalities, school staff and principals, and monitoring of physical activity and physical functioning capacity amongst students. Data will be combined and presented at both national and regional levels. This evaluation project is part of a pilot study related to the digitisation of government subsidising processes in Finland aiming to build an information system for applying, subsidising, supervising and evaluating the overall effectiveness. The presentation discusses the development of the evaluation framework and the progress of the programme.

External funding details: Ministry of Education and Culture, Finland

Is 20 Plenty For Health? Methods for an evaluation of the 20 mph/30kph speed limit in Edinburgh and Belfast on a range of public health outcomes

Ruth Jepson¹, Ruth Hunter², Andrew J Williams³, Karen Milton⁴, Charlie Foster⁵, Mike Kelly⁶, Graham Baker¹, Kieran Turner¹

¹University of Edinburgh, ²Queen's University Belfast, ³University of Exeter, ⁴University of East Anglia, ⁵University of Bristol, ⁶University of Cambridge

Transport has the potential to promote health, through enabling greater access and encouraging physical activity, and also to impact on health negatively, through causing road traffic collisions and influencing exposure to noise and air pollution.

A range of methods and approaches are used in the evaluation.

1. Natural experimental, and before and after designs are used to evaluate effectiveness on a range of outcomes including: casualties; cycling and walking; driver perceptions and behaviours; and liveability. Quantitative data for evaluating effectiveness are drawn from a range of sources including Local Authorities, Sustrans (a sustainable transport charity), Routine Police Data and researcher collected data.
2. Qualitative methods (interviews and focus groups) are employed to: test and refine the programme theory; explore implementation; and learn more about transferability to different settings. Documentary analyses and social media analyses are also used to add to our understanding of key drivers and factor involved in decisions to implement speed limits in other parts of the UK, and whether they were successful or not.
3. Modelling and economic methods are used to test cost-effectiveness.

We will present an overview of the methods used and some of the challenges of undertaking such a complex evaluation of a community-wide public health intervention.

External funding details: This project was funded by the NIHR PRP programme (project number 15/82/12)

Evaluation of the 20mph/30kph speed limit policies in Edinburgh and Belfast: Exploring the political decision making processes

Karen Milton¹, Charlie Foster², Mike Kelly³

¹University of East Anglia, ²University of Bristol, ³University of Cambridge

The decision to implement city-wide 20mph speed limits has the potential to impact the behaviour and travel choices of whole communities. Understanding the key events and decisions which led to the 20mph policies in Edinburgh and Belfast is critical to describing the key levers for change and learning lessons which might have application beyond Edinburgh and Belfast. Decisions such as those which led to these policies are driven by a range of factors. One is the evidence. However, a whole range of other factors are also important. The politics of such decisions are especially germane to understanding "how" implementation occurred, the degree to which it was or was not effective and the consequences of its implementation.

We conducted a document analysis to map the decision making processes which led to the 20mph policies in Edinburgh and Belfast and to situate contemporary events within a broader context. The primary sources were the Council committee reports from Edinburgh and Belfast. We used a snowballing approach to identify other sources, including research evidence, policies, and official announcements. Each document was analysed using directed qualitative content analysis. We will present the key findings of this analysis, including key milestones along the decision making process, the types of evidence considered to be most influential, and key considerations for helping to shape political decision making to reduce speed limits in other cities.

External funding details: This research was funded by a grant from NIHR grant number 15/82/12

Health-enhancing physical activity in Europe. The history, the role and the future of HEPA Europe: The European Commission and HEPA Europe 2009-2013

Brian Martin¹, Willem van Mechelen²

¹Canton of Zurich, ²Department of Public and Occupational Health, VU University Medical Center, Amsterdam

In 2008 the EU Working Group 'Sport & Health' approved the EU Physical Activity Guidelines, to be confirmed in the same year by the EU Member State Sport Ministers. The guidelines were written by a group of experts having close ties with the HEPA Europe network. They summarized the benefits of physical activity and made a case for the added value of having a single European guideline. It was argued that a cross-policy approach is needed to enhance physical activity levels and the following policy areas were listed: sport; health; education; transport, environment, urban planning and public safety; working environment, and services for senior citizens. The EU guidelines devoted attention also to topics like indicators, monitoring and evaluation, as well as public awareness and dissemination. During the period 2009-2013 there was a close dialogue between the Sport Unit of the EU and HEPA Europe. This dialogue was instrumental in bringing about the EU 2011 Communication 'Developing the European Dimension in Sport', in which the European Commission recognized the concept of HEPA and in which they stated that the implementation of national physical activity guidelines should be further developed. Following a proposal from the Commission, the Council in November 2013 adopted a Recommendation on HEPA across

sectors, the first ever in the field of sport, which is currently being implemented. The close dialogue between the EU and the HEPA network has been valuable to both parties. In this presentations barriers and facilitators to such dialogue will be discussed.

Helsinki – Mobile and healthier city for all

Kaisa Laine, Culture and Leisure

Introduction: The new strategy of the City of Helsinki 2017-2021 is highlighting the role of city as a promoter of exercise and wellbeing. Helsinki aims to be a moving and healthy City for all and has approved reducing inactivity as an essential goal. For increasing daily based activity, exercise and wellbeing The City has setup up a cross-sectoral program, 2017-2021, to get exercise as a tool for different administrations. The challenge is how schools, the environmental services, the museum and cultural services, for example, can promote activity by various means for the inhabitants. One of the interest is to increase community participation and inclusion to service planning.

Method: The main goals are 1) create targeting intervention activities to specific population groups such as children, elderly people or people with different cultural background 2) activate local neighborhood communities to create a unique sporting culture 3) create, activate and promote urban and green space interventions for example; family days, festivals or smaller scale group activities such as guided walks.

Results and Conclusions: Multi-professional co-operation and creating a networks for cooperation is challenging. The common goal creating co-operation and new models to increase activity. It helps to find common understanding and adds to communality. The benefits of the program and cooperation are shown in the long run.

Impact of physical activity promotion on Thai's physical activity: Evaluating health promotion policy implemented by Thai Health Promotion Foundation, Thailand

Piyawat Katewongsa¹, Pairoj Saunum², Niramon Rasri²

¹Mahidol University, ²Thai Health Promotion Foundation

Introduction: Thai Health Promotion Foundation (ThaiHealth) is an autonomous state agency in Thailand that has a mission to inspire, and empower individuals and organizations to enhance healthy capability, society, and environment of the Thai population. Over the last decade, ThaiHealth has promoted physical activities through the Physical Activity Promotion Plan, the programs have reached all age groups at the national, local, and community level.

Methods: This study aims to examine impacts of physical activity promotion policy implemented by ThaiHealth on physical activity among Thais. Data from the Thailand Physical Activity Surveillance System jointly conducted by Mahidol University, and ThaiHealth were employed. Data were drawn from a probability sample of 7,478 cases aged 18 years and over who lived in 13 provinces of Thailand in 2016.

Results: The results show that % sufficient MVPA among samples who participated in ThaiHealth's activities are higher than non-participated samples (74.8% and 60.2%). Independent sample t-test also confirmed that samples who attended the program had a higher MVPA than those who did not participate (mean = 130.45 and 105.35) ($t = 4.879^{***}$). Samples who were given opportunities to involve in the community level program significantly had higher MVPA than those who joined the mass campaign program (mean = 172.33 and 126.02) ($t = 8.766^{***}$).

Conclusion: Physical activity promotion policy implemented by ThaiHealth significantly increase the MVPA of Thais. Despite the successful programs, continues effort should be made in addressing remaining

challenges, especially in extending the coverage of participation and community-based activities.

Implementing policies promoting active and healthy lifestyles in Israeli Health Promoting Schools: An ecological approach

Riki Tesler¹, Tanya Kolobov², Yossi Harel Fisch²

¹Ariel University, ²Bar Ilan University

Introduction: One of the most significant factors in the health process conducted in health promoting schools is the determination of a properly structured school wellness policy outlined by the school principal. This policy includes charting the school's needs, setting procedures, and developing and promoting health promotion programs.

Method: The current study focused on differences in the implementation of nutritional policy and of policy encouraging physical activity among principals of health promoting schools versus non-health promoting schools. In order to examine the research questions, the statistical analysis was based on Israeli data from the 2014/15 HBSC-WHO cross-national survey conducted on 149 schools, of which 16.1% had been health-promoting schools for more than one year and 83.9% were non-health promoting schools. In addition, 56.5% of schools in the sample were elementary schools, 21.1% junior high schools, and 22.4% high schools.

Results: The findings indicated that principals of health promoting schools showed higher application of nutritional policy ($T = 2.96$, $P < 0.01$) and policy encouraging physical activity ($T = 3.10$, $P < 0.01$) versus schools not recognized as health promoting. Moreover, female more than male principals were found to apply policy encouraging physical activity ($T = 3.03$, $P < 0.01$). Nonetheless, no differences were found in the application of nutritional policy and physical activity by school type (elementary, junior high, high schools).

Conclusion: The current findings enhance understanding of school principals' essential role in joining the network of health promoting schools and of the intensity of relationships between school-related research variables and the principals.

Learning how to get more people living active lives, improving inclusivity in sport and physical activity and improving wider outcomes at population level through a place based whole system approach

Chris Perks, Naomi Shearon, Ruth Alleyne, Sport England

Introduction: Sport England is working with 12 locations in England to understand whether systematic, replicable and sustainable improvements in activity can be achieved at population level.

Method: Inactivity is a complex problem. The wider determinants of activity are linked to individual attitudes and behaviours, people's social environment, the influence of organisations, our physical environments and the policy of government.

For lasting change at scale, 'interventions' must be made together into the 'layers' of the system and designed around the people/groups we are trying to reach.

12 local delivery pilots will test out new approaches to population level change in activity levels and address the stubborn inequalities that exist. The pilots bring together multiple 'actors' in communities to encourage faster and more effective change. The focus is on those furthest from being active aiming to make activity an easier choice.

What will be shared: We are at the start of a four-year journey working collaboratively within a whole systems framework. An early focus is on the

whole system mindset and leadership behaviours required. Evaluation and learning is at the heart of our approach. The session will share our experiences and learning so far, reflect on the wider challenges of population-level behaviour change and opportunities to move from single solutions to action across multiple systems and players. This is about listening to what local communities need and empowering them to do things differently.

The session will seek international views and stimulate discussion to help share learning between different countries, organisations and sectors.

Living it up? Evaluating the potential impact of a new apartment design policy on health and well-being

Sarah Foster¹, Paula Hooper², Clover Maitland¹

¹RMIT University, ²University of Western Australia

Introduction: Apartment construction surpassed traditional detached housing in Australia for the first time in 2016. This change is supported by health promotion agencies, as increases in residential density underpin the destinations that encourage active living. However, the rapid construction of apartments has ignited concern about apartment design quality. In response, the Western Australian government will introduce a new apartment design policy in 2018, with minimum standards to create more functional and healthier dwellings. This study benchmarks current apartment development in Perth against the incoming policy aspirations.

Methods: Apartment buildings in Perth (n=22, 3+ storeys, built 2006-2016) were sampled from areas with different levels of socio-economic disadvantage and access to destinations. Building residents completed a survey (n=315), including questions on their apartment and health behaviours and outcomes. Building plans were used to create policy-specific objective measures to benchmark apartments against the incoming policy, and GIS was used to assess the neighbourhood context.

Results: Preliminary results reveal the Perth apartment market is delivering a product that caters to a specific population (respondents were predominantly young adults, singles/couples without children). Policy-specific objective measures reveal little diversity in the apartment stock (e.g., just 5% of apartments had three bedrooms); but average apartment sizes achieve the new policy minimum standards (e.g., one bedroom apartment mean = 49m²; Design WA minimum = 47 m²).

Conclusion: By bench-marking the delivery of an apartment design policy, and testing its impact on health, this study will assess the potential health and well-being benefits of a policy shift towards more comprehensive apartment design guidance.

External funding details: DE160100140

Mapping the historical development of physical activity and health research

Andrea Ramirez Varela¹, Michael Pratt², Jenine Harris³, Jesse Lecy⁴, Deborah Salvo⁵, Ross Brownson⁶, Pedro Hallal¹

¹Global Observatory for Physical Activity GoPA!, Federal University of Pelotas, ²Global Observatory for Physical Activity GoPA!, University of California San Diego, ³Prevention Research Center in St. Louis, Brown School, Washington University School of Medicine, Washington University in St. Louis, ⁴Arizona State University, ⁵The University of Texas Health Science Center at Houston, School of Public Health in Austin, ⁶Department of Surgery and Alvin J. Siteman Cancer Center, Washington University School of Medicine, Washington University in St. Louis

Introduction: Physical inactivity is a global priority. Since the first epidemiologic studies were published in the 1950s publications and

research groups have increased greatly. The historical development has been described, but without a quantitative research approach.

Objective: Provide a historical reconstruction of the development of the physical activity and health (PAH) research field since 1950, identifying the most influential articles over time.

Methods: A structured literature review using formal citation network analysis (method to study connections between articles) was conducted. A list of influential PAH publications identified by experts was used to build a citation network of 141 publications representing the backbone of the field. Data were extracted for these studies and the network was analyzed and displayed.

Results: The field began in the 1950s in Europe and North America, focused on health outcomes. Objective measurement and policy research influenced the progression to built environment and global surveillance work. The most influential PAH publications were: The first population based PA guidelines for Americans (Pate 1995); The first population based study with accelerometers (Troiano 2007); A systematic review on PA and health (Powell 1987); The first peer reviewed study in the field (Morris 1953); and, a systematic review of effective PAH interventions (Kahn 2002).

Conclusions: This study is the first to quantitate the development of the PAH research field, identify fundamental ideas cited over time, and note knowledge and communication gaps for research and practice. These results will help to strategically guide future research and public health practice for PAH.

Multisectoral approaches in physical activity Intervention development: Healthy Ireland Demonstration Project

Kwok Ng¹, Catherine Woods¹, Fiona Mansergh², Kevin McCarthy³, Donal O'Shea⁴

¹University of Limerick, ²Department of Health, ³Department of Education and Skills, ⁴University College Dublin

Introduction: Following the Helsinki statement on Health in all Policies, "Healthy Ireland" is the national framework for improved health and wellbeing in Ireland. Different priorities among sectors in an all government approach can be challenging to operationalise. Therefore, coalition theory in the health-related interventions could be used to detangle the responsibilities of the various departments. The purpose of this study is to examine the documentation from the National Physical Activity Plan (NPAP) and Obesity Policy and Action Plan (OPAP) and identify how the Department of Health (DoH) and Department of Education and Skills (DES) work together within coalition theory.

Method: The NPAP, OPAP were analysed through discursive content techniques and viewed through the lens of coalition theory. A deductive approach towards the themes of 1) organisational reward expectations, 2) assets that can be brought into coalition, 3) roles for decision making, and 4) the context, were used.

Results: There were many components of the NPAP within the OPAP, highlighting strong potential of distribution of resources and needs. This was exemplified whereby Departments have their own specific agendas that overlap. The NPAP and OPAP were led by the DoH, although the DSE had a stronger force in work related to youth.

Conclusion: Multi-sectoral approaches to health promotion are needed. Other Departments, including Transport, Tourism and Sport could create stronger coalitions for deliverables. The focus on children makes it important for education to be involved with curriculum programs for adolescents, as well as an insight into health work and others.

Pay to Play: Perceptions of sports participation fees policies among US high school athletic directors

Amy Eyler, Cheryl Valko, Natalicio Serrano, Washington University in St. Louis

Background: Participation in high school athletics is associated with increased physical activity and other psychosocial benefits. Budget cuts resulted in shifts of financial responsibility for sports participation from schools to students referred to as “Pay to Play” policies. The purpose of this study was to explore sports participation fee policies in U.S. high schools through a multi-method study.

Methods: State laws related to school fees were collected and analyzed. Twelve key informant interviews were conducted with state and district athletic directors and the information was used for quantitative survey development. The survey was sent to athletic directors to assess presence of sports participation fee policies, accommodations or waivers to the policies, and their general perception of how the fees impact student athletics.

Results: Eighteen states have school fee policies laws. One state (CA) prohibits fees. Key informants reported a wide variance in policy structure and implementation. All reported that districts have waivers or sliding fees for low-income students. There was an overall acceptance of fees as an alternative to eliminating sports programs. Over 900 athletic directors (27% RR) completed the quantitative survey either online or via paper. (Currently being analyzed and will be completed May 2018)

Conclusion: Sports fees in U.S. high schools are widespread and vary in scope and implementation. Although most schools have provisions for low-income students, students not qualifying for financial assistance might be impacted. Longitudinal studies are needed to identify the effect of Pay to Play policies on student athletics and longer term adolescent outcomes.

Physical activity and sedentary behaviour legislation in Canadian childcare facilities: An update

Trish Tucker¹, Leigh Vanderloo²

¹University of Western Ontario, ²SickKids

Introduction: Within the Canadian childcare sector, physical activity and sedentary behaviors are not legislated at a national level. Efforts have been undertaken to identify factors within childcare facilities which support and deter physical activity and sedentary behaviors. The purpose of this study was to provide an amended review of the legislative landscape, at the provincial and territorial level, regarding physical activity and sedentary behaviors (via screen-viewing) in Canadian childcare centers.

Methods: Provincial/territorial childcare acts and regulations were collected; documents were reviewed with a focus on sections devoted to child health, physical activity, screen time, play, and outdoor time. An extraction table was used to facilitate systematic data retrieval and comparisons across provinces/territories.

Results: Of the 13 provinces and territories, 8 (62%) have updated their childcare regulations in the past 5 years. All provinces provide general recommendations to afford gross motor movement; but the majority give no specific requirements for how much or at what intensity. Only 3 provinces explicitly mentioned daily physical activity while all provinces/territories required daily outdoor play. One province made mention of screen-viewing.

Conclusions: The variability in childcare regulations results in different physical activity requirements across the country. By providing high-level targets for physical activity recommendations, by way of provincial/territorial legislation, staff would have a baseline from which to begin

supporting more active behaviors among the children in their care. Future research is needed to support translating physical activity policies into improved activity levels among young children in childcare and the role of screen-viewing in these venues.

Physical activity instructors profile in elderly groups of Bucaramanga, Colombia

Luis Gabriel Rangel Caballero¹, Diana Katherine Sandoval Estupiñan², Juan Carlos Sánchez²

¹Universidad Santo Tomás, Bucaramanga, ²Santo Tomás University

Introduction: Level of knowledge in exercise science is important to guarantee the proper design of training programs. The objective of this study was to establish the academic degree of physical activity (PA) instructors and to determine differences in the implementation of two safety parameters before initiating an exercise program in the elderly.

Method: Analytical cross-sectional study in 115 instructors of elderly groups. Variables were analyzed in frequencies or central tendencies measures according to its nature. Fischer exact test was utilized to establish differences in the categorical variables of interest and significance level was of $p \leq 0.05$.

Results: 18.22% of instructors have an academic degree in PA sciences. 9.5% of individuals with academic degree and none of those without it implemented a selection method of aptitude for PA, $P < 0.05$. 40% of those who had formal training in PA in the elderly and none of those who didn't have it implemented this parameter, $P < 0.01$. 19% of those with academic degree and 4.2% of those without it met the criteria with the medical exam, $P < 0.05$. 4% of those who had formal training in PA and 66% of those who didn't have it required this parameter before initiating a program, $P < 0.05$.

Conclusion: Most of PA instructors didn't meet the criteria in relation to the implementation of safety parameters before initiating an exercise program; however, individuals with academic degree and formal training in PA had a higher frequency of implementation.

Population perspectives on health professionals and venues involved in physical activity promotion

Lise Gauvin¹, Marie-Hélène Mayrand², Geetanjali Datta²

¹Centre Hospitalier de l'Université de Montréal/Université de Montréal,

²Centre de recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM)

Introduction: Interventions aimed at increasing physical activity must reach broad segments of the population across settings to produce a population impact. We examined population choices regarding the health professionals most qualified and the venues most suitable for physical activity interventions as well as variations across socioeconomic and health characteristics.

Methods: We conducted an online survey among residents of a large Canadian city ($n = 1183$) that were recruited by a polling firm during the winter of 2016. Respondents identified the three health professionals or volunteers they viewed as most qualified and the three venues they believed to be most suitable for offering high-quality, effective programs aimed at increasing physical activity. We computed age- and sex-weighted proportions of respondents' choices regarding health professionals/volunteers and venues. We performed unweighted, multivariate logistic regression analyses to identify socioeconomic, health, and lifestyle correlates.

Results: Results showed that kinesiologists were chosen as the most qualified for offering PA programs (70.6%). Community based venues (94.8%) were chosen as most suitable followed by health services locations (63.8%) and

digital applications (42.5%). Individuals with no more than high school, lower family income ($\leq \$25000$), and non-Western immigrants were more likely to perceive individuals other than kinesiologists as most qualified and health services locations as most suitable. Poor self-rated health was associated with choosing health services locations as most suitable.

Conclusion: There are substantial variations in choices for health professionals and venues to promote physical activity. These correlate with lower education, income, immigrant status, and health.

External funding details: CHUM research centre research development fund.

Social inequalities in favourability to built environment transformations

Lise Gauvin¹, Marie-Hélène Mayrand², Geetanjali Datta²

¹Centre Hospitalier de l'Université de Montréal/Université de Montréal,

²Centre de recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM)

Introduction: Transforming built environments (BE) to make them more conducive to physically active lifestyles is a promising strategy to reduce the burden of chronic diseases. We examined population-level agreement with BE transformations and variations as a function of socioeconomic, health, and lifestyle characteristics.

Methods: Residents of a large Canadian city ($n=1183$) were surveyed online by a polling firm during the winter of 2016. Participants rated their level of agreement to seven hypothetical changes to BE in their residential area and provided information about socioeconomic, health, and lifestyle characteristics. We computed age- and sex-weighted proportions of respondents indicating that they would completely agree with different types of BE transformations. We performed unweighted, multivariate logistic regression analyses to identify social inequalities.

Results: Results showed that 29.7%, 15.6, and 5.1% of the population were in complete agreement with (i) providing more sports facilities/bike lanes; (ii) street closures/traffic calming/increasing public transit through gas taxes, and (iii) fines to pedestrians/cyclists for violating the traffic code, respectively. Having no more than a high school education was associated with lower likelihood of complete agreement with street closures/traffic calming/increasing public transit but greater likelihood of complete agreement to fines whereas being an immigrant was associated with greater likelihood of complete agreement with all BE transformations. Women were more likely and individuals older than 55 years were less likely to express complete agreement to providing more sports facilities/bike lanes.

Conclusion: Strong support for BE transformations varies substantially across socioeconomic characteristics.

External funding details: CHUM Research Centre research development fund.

The London Agreement on Golf and Health

Andrew Murray¹, Nanette Mutrie², Foster Charlie³, Paul Kelly², Liz Grant²

¹Mr, ²University of Edinburgh, ³University of Bristol/ ISPAH President

Increasing physical activity is a key strategy for reducing the burden of NCDs, as articulated in the WHO Global Action Plan for the prevention and control of NCDs, and the Bangkok Declaration on Global Health and Sustainable Development.

The opportunity for golf to contribute to these strategies and the United Nations Sustainable Development Goals was noted by public health, policy, and golf industry leaders in 2016, noting that golf can provide physical activity for persons of all ages, can confer many health and wider

benefits while providing potentially powerful advocacy and support for increasing physical activity more widely. Actions to support environments that reduce physical inactivity can provide social and nature connection provide benefits and can also significantly reduce healthcare costs, increase economic productivity and provide effective return on investments in sectors such as health, leisure, tourism, and major events.

We share the London Agreement of Golf and Health, having achieved consensus using Delphi process to improve understanding of the health benefits and health issues associated with golf and the commitment of the global golf industry to show support for the aims of the WHO Global Action Plan, and UN Sustainable

Development Goals: This consensus shares concrete actions that can be taken by golfers, potential golfers, the golf industry/ facilities and decision makers to improve health, and equality of access highlighting collaborative, international opportunities.

External funding details: The R&A and World Golf Foundation provided funding for Dr Andrew Murray's PhD.

What contribution could a voucher scheme make to population-wide adoption of a sport subsidy voucher scheme amongst Australian children?

Lindsey Reece¹, Carol McInerney², Bridget Foley³, Xiaoyan Lu⁴, William Bellew³, Adrian Bauman³

¹University of Sydney / Office of Sport NSW Government, ²NSW Ministry of Health, ³University of Sydney, ⁴Australian Sports Commission

Participation in sport contributes to health enhancing levels of leisure-time physical activity. In Australia, 2.5 million (55%) children aged 0-14 years are active in organised sport outside of school at least once a week. A dose-response relationship was observed for participation rates by SES, with 44% of children in the most disadvantaged areas participating at least once a week compared to 62% in the least disadvantaged areas. Costs of participation is a frequently cited barrier by parents that negatively influences participation. With potential for a 25% relative increase in population participation, sports vouchers have been widely implemented across Australia.

The value of individual state vouchers and the average across Australia were used to calculate the proportion of total annual expenditure supported by sports vouchers. To understand the participation profile, participation rates using national Ausplay survey data (Australian Sports Commission 2016), and were estimated by age, sex and socio-economic index (SEIFA) at state and national level for children aged 0-14 years.

Six states and territories implemented sports vouchers from 2011-2018, with a median subsidy value of AU\$150. Nationally, the median annual expenditure for sport was AU\$500 (IQR [AU\$220, AU\$1,000]) with girls' expenditure (AU\$570) substantially higher than boys. Almost one third of annual sport expenditure was met by the proffered sports vouchers. The proportion increased with disadvantage, rising to over 40% in the most disadvantaged communities.

Collectively, this reinforces the potential value of sport voucher programs to target children in the most disadvantaged areas to promote participation in sport.

Theme: Settings-based interventions

A qualitative evaluation of a workplace health and wellbeing program

Sarah Costigan¹, Toni Hilland², Megan Teychenne¹

¹Deakin University, ²RMIT

YourLife is a workplace health and wellbeing program. This existing program was developed to provide employees with opportunities to improve their health during work hours. YourLife is made up of 3 key categories (Health, Wealth and Wellbeing) each designed to provide a variety of initiatives to impact employees positively. This study explores Health and Wellbeing categories. This study aims to gather in-depth information to evaluate the experiences of staff offered a workplace health and wellbeing program.

Program feasibility will be assessed based on: number of staff offered the program and agreed to be involved, retention rate and adherence. Program acceptability will be evaluated in two phases: employees will be invited to complete a short online questionnaire (phase one) and can also opt to participate in a one-on-one phone interview with a researcher (phase two) to discuss their experiences and perceptions of the program. For quantitative data (online questionnaires) data analyses will be performed using SPSS. For qualitative data (interviews) Nvivo software will be used to facilitate thematic analyses exploring perceived feasibility and acceptability of the program. Preliminary results will be presented.

There is the potential to gain significant insights into this health promotion program delivered in a real-world setting. Findings from this study will have the potential to provide useful evidence to inform future development of workplace health and wellbeing programs.

A randomised-cluster feasibility trial developing a standing habit within desk-based workers

Martin Lamb¹, Rob Copeland¹, Simon Till², Jeff Breckon¹

¹Sheffield Hallam University, ²Sheffield Teaching Hospitals

Introduction: Sedentary behaviour (SB) has been linked to a number of negative health consequences (Wilmot et al, 2012) and is highly prevalent within workplaces (Clemes et al, 2014). Desk-based workers have been targeted to reduce SB through making environmental changes to the workplace (Neuhaus et al, 2014); nevertheless reductions in SB have typically not been sustained. This may be due to the habitual nature of sitting and challenges of breaking habits. The present intervention aimed to develop standing habits within the workplace to reduce workplace SB.

Method: A randomised-cluster feasibility trial was conducted with two work teams (n = 27). The intervention group participated in a workshop to discuss and highlight standing behaviours that they already perform in the workplace and cues to help initiate these behaviours. Participants were then encouraged to repeat the behaviours and self-monitor for 10-weeks to develop a standing habit. Activity was objectively measured using Run-scribe accelerometers at baseline, week 10 and 15.

Results: Sitting reduced by 30 minutes/8-hour working day in the intervention group, there was no change in the control group. Self-reported habit strength did not change over the 15-week period.

Discussion: This was the first study to encourage standing behaviours already performed within the workplace as a way to reduce workplace SB. Participants reported that they felt the intervention was feasible and acceptable for the workplace, not disrupting their work priorities. This is promising as encouragement of similar standing behaviours already performed in the workplace, could be implemented in any organisation at little cost.

Active Bucks: Engaging and retaining inactive residents in self-sustaining activities

Sarah Preston¹, Tom Burton¹, Chris Gregory²

¹Buckinghamshire County Council, ²Leap

Active Bucks provides a population-level, evidence-based approach to increasing activity levels of residents, particularly the least active. It ensured significant community engagement was undertaken to deliver activities that residents wanted, increasing the likelihood of success and sustainability of the activities. Key partners from across the county, including district councils, the NHS and the community sector, have played an important role to shape and promote the programme.

3248 residents were engaged in the community engagement phase, resulting in 193 six month activity programmes commissioned over 18 months. Engaging 3922 unique participants in a wide range of activities from more traditional (e.g. running, dance and walking football) to activities by stealth (e.g. bushcraft, dog agility and wildlife photography) where activity wasn't the primary reason for involvement.

84% of adults and 89% of children didn't meet the CMO guidelines for physical activity, with 29% of adults and 46% of children being inactive, when they started. 34% of participants were retained for 50% of the sessions available, no benchmarking currently exists for retention across a 6 month programme of activity. 64% of activity programmes that completed were sustained past the end of the funding period. Wider benefits for participants have also been demonstrated with increases in mental wellbeing and social cohesion.

Active Bucks has demonstrated that engaging the community to understand what activities they want to engage with, and then commissioning a model based on this with sustainability at its core is effective at engaging and retaining those that are the least active.

Active Everyday: A physical activity referral scheme for people affected by cancer

Liam Humphreys¹, Gabriella Frith¹, Helen Speake¹, Helen Crank¹, Lindsey Reece²

¹Sheffield Hallam University, ²University of Sydney

Introduction: More people are living longer with or beyond cancer but they are not necessarily living well. Enabling people to be physically active at all stages of treatment can improve both clinical and quality of life outcomes. The purpose of this publication is to share experiences of running a city-wide physical activity service for individuals living with and beyond cancer.

Methods: Active Everyday implemented the Macmillan Physical Activity Behaviour Change Model. Through Active Everyday people affected by cancer are enabled to self-manage their physical activity via specialist advice from trained specialists, and signposting to appropriate physical activity options available locally.

Results: 200 people affected by cancer have been referred to the Active Everyday project, through referrals from health professionals, community workers, and self-referrals. The project collects follow-up data at three and six months. The project team have encountered issues with regular referrals, engaging people from BME backgrounds, and collecting follow-up data.

Conclusions: Implementation of a community based city-wide physical activity pathway may have different challenges than trials based on clinical or primary care pathways. The complexity of a person's journey through cancer treatment poses a number of challenges to the successful implementation of a referral model. Where possible, the impact of new strategies should be measured, and referral successes and challenges should be shared with those planning similar pathways.

External funding details: Macmillan Cancer Support fund the Active Everyday project

Active for Health: A programme linking NHS rehabilitation services to community based physical activity

Gabbi Frith¹, Rebecca Atchinson², Simon Nichols¹, Amy Roden², Rob Copeland¹, Lindsey Reece³

¹Sheffield Hallam University, ²Rotherham Metropolitan Borough Council, ³University of Sydney

Background: Rotherham 'Active for Health' (AFH) is a robust programme of physical activity (PA) interventions and academic evaluation, linking NHS rehabilitation services to community PA. The programme offers LTC specific PA across seven pathways including; stroke, COPD, cancer, falls prevention, MSK, cardiac and heart failure. This pragmatic evaluation will assess the extent that AFH supports and sustains PA levels in people with a LTC.

Method: Patient outcome measures were taken at baseline, 3, 6 and 12 months. These included; self-reported PA levels, quality of life (QoL) and NHS service use. Qualitative interviews assessed patient experiences of AFH. The interviews included a semi structured interview based on the Patient Activation Measure (PAM). Process evaluation was captured through semi structured interviews with key stakeholders and capture the feasibility and acceptability of the programme. Project development has been monitored through interviews with all key partners using a logic model at project start, 18 months and 36 months.

Results: Patients engaged in the evaluation November 2015 - January 2018 include; baseline $n=971$, 3 months $n=511$, 6 months $n=307$ and 12 months $n=121$. Stakeholders engaged in the programme evaluation include; local authority, leisure providers and clinicians ($n=17$).

Conclusion: AFH offers a promising long term solution for NHS rehabilitation pathways, working collaboratively with exercise professionals. Engagement in AFH by leisure providers and clinicians has been excellent. AFH can be conceptualised to help inform future clinical practice and research in community based rehabilitation. Full results are expected December 2018.

Can high intensity interval training be fun enough to motivate desk-top workers for continued participation? A practice-based study of HIIT@WORK

Ine De Clerck, Frank Vandaele, Julie Bourdeaud'huy, Lynn Custers, Annelies Maenhout, Joke Vandewoestyn, Dries Van Hulle, Artevelde University College Ghent

Introduction: Although High Intensity Interval Training (HIIT) is a very popular and effective fitness trend, still policy makers doubt whether it can be used to tackle the often cited time barrier for physical activity. It is thought that training at a high to maximal intensity will scare people off, have negative affective responses and will result in a large drop-out. By use of design methodology, we've created a HIIT@WORK exercise program for desk-top workers in an office setting, including a motivational framework based on the self-determination theory and the social cognitive theory.

Methods: A 4 week HIIT@WORK intervention ($n=27$) was organized within 2 companies. Post-intervention, participants were asked to fill in a questionnaire and participated in a semi-structured interview, both questioning their motivation.

Results: The participation rate remained stable at a mean level of 2.6 per week per person. Participants reported to be positively influenced by following motivators: heart rate measurements (self-regulation), choices of exercise (autonomy), differentiation (competence), individual and group challenges (goal setting), colleagues (belonging) and external rewarding

(incentives). Participants scored the movement program at 104.5 ± 17.7 (on a total of 126) on the Physical Activity Enjoyment Scale. 77% preferred to continue doing HIIT@WORK even after the intervention was finished.

Conclusions: Although HIIT@WORK includes a potentially less enjoyable high intensity work-out, still participants were highly motivated by the motivational framework included in HIIT@WORK. This preliminary study shows that HIIT training can be made fun and motivational both for active and non-active desk-top workers in an office setting.

Culture eats strategy for breakfast

Matti Leijon, Region Östergötland

There is no national physical activity strategy in Sweden. In the autumn of 2015 the regional politicians in Region Östergötland supported the idea of developing a regional strategy - based on the Physical Activity Strategy for the WHO European Region 2016-2025 and the 2030 agenda for sustainable development. During 2016, a strategy document was prepared and developed with the support of society's many different stakeholders. A political decision, at regional level, to support the strategy was made in January 2017.

The overall goal of the strategy is:

- more individuals become physically active
- inequality in activity levels between groups decreases
- to increase intersectoral cooperation among stakeholders who actively participate and cooperate in promoting physical activity

The strategy is focused on five settings:

- built environment
- leisure time and sports
- school and education
- work and economic support
- social welfare and health care services

The strategy is web-based including facts and knowledge and "good examples" of ongoing actions for others to learn and share. The website is (only) in Swedish: www.sattostergotlandirorelse.nu and www.facebook.com/sattostergotlandirorelse.nu.

During the first year we presented more than 30 different "Good examples" from different stakeholders and settings. By demonstrating good examples, we increase interest in and acceptance for actions aimed at promoting physical activity in society. The WHO strategy was useful to create a regional strategy. Combined with a bottom-up social media strategy it seems to be a useful implementation strategy, reaching both the population, organizations as well as the political system.

Effects of replacing sedentary behavior with different intensities of physical activity on physical function among community-dwelling elderly: A cross-sectional study

Takayuki Tajima, Yoshinobu Saito, Yayoi Kibayashi, Yuko Oguma, Keio University

Introduction: The Japanese official physical activity (PA) guidelines ("Active Guide") recommend adding 10 minutes of PA per day through its main message "+10." This study used an isotemporal substitution (IS) model to investigate the effects of replacing sedentary behavior (SB) with 10 minutes of PA categories per day on elderly people's physical function (PF).

Methods: Participants were 131 people aged 60-88 years (61.8% female) from the community-dwelling elderly group in Fujisawa, Japan. We used a triaxial accelerometer to assess the duration of SB (≤ 1.5 METs); light-intensity PA (LPA: >1.5 to <3.0 METs); and moderate-to-vigorous intensity

PA (MVPA: ≥ 3.0 METs). The 30-second chair stand (CS-30) test and the maximal double step length (MDSL) test were used to examine PF. We used multiple linear regression models to assess the correlations between SB, LPA, and MVPA with every two measures of PF. The IS model assessed the effects of replacing 10 minutes per day of SB time with LPA and MVPA.

Results: SB, LPA, and MVPA was 496.1 (111.8), 341.7 (91.8), and 47.4 (29.9) min/day, mean (SD), on average, respectively. In the IS model, replacing SB with LPA or MVPA showed significant positive correlations with the scores of the CS-30 test (LPA, $\beta = 0.228$, 95% confidence interval (CI): 0.092, 0.364; MVPA, $\beta = 0.634$, 95% CI: 0.267, 1.001) and the MDSL test (LPA, $\beta = 0.747$, 95% CI: 0.063, 1.430; MVPA, $\beta = 2.312$, 95% CI: 0.464, 4.160).

Conclusion: These findings suggested that replacing 10 minutes of SB time with LPA or MVPA would significantly affect elderly people's PF.

External funding details: This study was partly supported by JSPS KAKENHI Grant Numbers JP17H06151, and Keio Gijuku Academic Development Funds

Evaluation of a workplace walking programme using pedometer on hospital workers

Abdulla Al-Mohannadi¹, Mohammed Farooq², Izzeldin Ibrahim²

¹ASPETAR, ²Aspetar

Background: Evidence shows that more than 50% of Qatari adults do not engage in regular physical activity. The workplace has been considered one of the best settings to implement PA interventions, yet there is still a need for cost effective and efficient behavioural interventions to promote PA in the workplace.

Objectives: This study assess and describes the PA behaviour and Quality of life among staff in a hospital setting.

Methods: Utilising a repeated measures design, the study implemented a workplace

walking intervention to Aspetar Hospital workers. A total of 800 hospital workers were initially recruited with 212 signing up for a three-months pedometer-based programme. Participants completed the SF-36v2, IPAQ, and WSQ pre- and post-intervention, daily step count was extracted to quantify the changes in the levels of PA.

Results: There was a low participation rate amongst participants in this study (only 54 out of 212 participants) with a high number of incomplete datasets. Based on IPAQ and WSQ, women were similar activity to men but spent more time sitting ($P < 0.001$). There was a significant improvement in step count post intervention compared to baseline ($P = 0.048$). Men showed more steps compared to women throughout the study period. Reasons for low participation included lack of time (33.0%), and family obligations (14.9%).

Conclusion: The workplace walking challenge was successful at improving the step counts of the Hospital staff suggesting effectiveness of the intervention; however, this improvement could not sustained over the long period after 3 months. Post-intervention feedback may provide further programme design improvement in future studies.

Exploring the influence of childcare enrolment of physical activity and sedentary time of a nationally representative sample of Canadian preschoolers

Julie Statler¹, Piotr Wilk¹, Brian W. Timmons², Rachel Colley³, Patricia Tucker¹

¹Western University, ²McMaster University, ³Statistics Canada

Introduction: Research exploring the relationship between preschoolers' physical activity (PA) and sedentary time (ST) in various childcare environments has been conducted on a small-scale. Given the large number of Canadian children enrolled in various types of childcare, coupled with the substantial time they spend in these settings, capturing a national picture of the relationship between childcare enrollment (and type) and PA levels (i.e., light, moderate- to-vigorous, and total) and ST in young children is needed.

Methods: Using a national representative sample of preschoolers (aged 3-5 years), this cross-sectional study used cycles 3 and 4 of the Canadian Health Measures Survey. Childcare enrollment (e.g., centre-, home-based childcare, home with parent, kindergarten) was reported by parents. Preschoolers wore an Actical accelerometer for 7 consecutive days to measure PA and ST. Device and population-specific cut-points were applied to delineate PA intensities and ST. A MANCOVA was conducted to examine the influence of childcare enrollment on MVPA, LPA and ST while an ANCOVA was used for total physical activity, with both analyses accounting for participant age, sex, household income, and highest level of parental education as co-variables.

Results: Analyses are currently underway. Based on previous small scale studies, it is anticipated that children attending centre- and home-based childcare will be less active and more sedentary than those attending kindergarten or at home with a parent.

Conclusions: Childcare regulations vary substantially across Canada. As such, this research will provide direction to researchers and early year's stakeholders about which childcare settings may warrant future interventions.

Exploring the relationship between early childhood education students' physical activity training and self-efficacy to facilitate active opportunities in childcare

Brianne Bruijns¹, Kristi Adamo², Shauna Burke¹, Valerie Carson³, Jennifer Irwin¹, Patti-Jean Naylor⁴, Brian Timmons⁵, Leigh Vanderloo⁶, Patricia Tucker¹

¹Western University, ²University of Ottawa, ³University of Alberta, ⁴University of Victoria, ⁵McMaster University, ⁶Hospital for Sick Children

Introduction: Early Childhood Educators influence young children's activity behaviours in childcare, and higher self-efficacy in physical activity (PA)-related domains among educators is associated with increased PA levels of children in childcare. However, it has been postulated that PA-related training during their formative education is lacking. This study sought to examine the PA training afforded to Early Childhood Education (ECE) students and how such training relates to self-efficacy to lead PA opportunities in childcare.

Methods: An expert-developed online survey is currently being administered to Canadian ECE students at interested colleges/universities ($n = 115$) to assess their PA-related knowledge, training, and self-efficacy (17-items assessing self-efficacy). A t-test will explore differences in self-efficacy among students with no formal PA training (0 courses) to those with some PA-related education (1+ course). An ANOVA will explore inter-provincial differences in students' PA-related self-efficacy.

Results: Preliminary data suggest the majority (65.96%) of students ($n = 47$) have not taken any PA-specific courses. Further, students' average self-efficacy ratings (0-10 rating scale) for the items 'Ensure children engage in adequate levels of moderate-to vigorous-intensity PA', 'Model appropriate PA/movement behaviours', and 'Use a variety of methods that encourage PA' are 6.74(SD=2.12), 8.06(SD=1.71), and 7.23(SD=2.51), respectively.

Conclusion: This study will highlight how PA content in Canadian ECE programs relates to students' self-efficacy to facilitate PA in childcare. The findings may suggest the need for additional PA training at the college/university level, in support of improved PA-specific learning prior to entering a childcare-based vocation.

Flemish office workplace campaign to reduce sedentary behaviour

Femke De Meester, Ragnar Van Acker, Flemish Institute Healthy Living

Introduction: High levels of sedentary behaviour have been positively associated with deleterious health consequences. With desk-based office workers engaging in long periods of prolonged sitting, office workplaces are an appropriate setting to influence sedentary behaviour. The Flemish Institute Healthy Living therefore develops an office workplace campaign to influence executives' and employees' knowledge and awareness about sedentary behaviour, their subjective norms and eventually their behaviour.

Methods: The development of this campaign consists of three phases: 1) defining the target group and their characteristics and narrowing the objectives of the campaign, 2) making an inventory of the national and international campaigns, their messages, strategies, results and success factors and 3) development of the campaign with elaboration of the messages and strategies. Key stakeholders (including health safety and environment advisors, occupational health physician, executives and employees) were involved in the development process of the campaign. The stakeholders complemented a panel of experts in physical activity, sedentary behavior, behavioural change and communication.

Results: Between April 2018 and June 2018 the campaign will be pilot tested in a group of office workplaces in Flanders. First results of the process- and product evaluation are expected to be available in the summer of 2018. Based on these results the campaign will be adjusted and launched in September 2018.

External funding details: Funded by the Flemish Government.

FYSS 2017: A tool for healthcare professionals when prescribing physical activity

Ing-Mari Dohrn, Maria Hagströmer, Agneta Ståhle, Karolinska Institutet

It is evident that regular physical activity (PA) can be used in prevention or treatment of several non-communicable diseases, but it is a challenge to implement this knowledge into practical use within the healthcare system.

The third revised edition of the evidence based handbook Physical Activity in the Prevention and Treatment of Disease, "FYSS 2017", is written by over 100 medical experts from Sweden and Norway. Strengths in the new edition include usage of GRADE (Grading of Recommendations, Assessment, Development and Evaluations), a systematic method in judging the quality of evidence and the strengths of recommendations. Also, the new edition has a more standardised and user friendly design. The book includes 53 chapters; 20 background chapters covering general effects of PA, general recommendations regarding PA, terminology etc. and 33 diagnose specific chapters covering the most effective recommendations for each diagnose, regarding dosage (type of physical activity, intensity, frequency and duration) of PA, contra-indications etc.

The main objective of FYSS is to form a knowledge base for healthcare professionals in recommending and prescribing PA and the handbook is an important part of Physical Activity on Prescription (FaR) in Sweden. Through a simplified and thus increased use of the knowledge base, the aim is to contribute to a more equal healthcare, by providing more patients with physical activity in the prevention and treatment of disease. An English translation of FYSS 2017 is at the planning stage.

External funding details: FYSS 2017 was funded by The National Board of Health and Welfare, Sweden, and Helsedirektoratet, Norway.

Impact of 3-month changes in total and workplace standing and light-intensity physical activity on postprandial glycaemic control

Sarah Mullane¹, Meynard JL Toledo¹, Paddy Dempsey², Sarah Rydell³, David Dunstan², Neville Owen², Glenn Gaesser¹, Mark Pereira³, Matthew Buman¹

¹Arizona State University, ²Baker Heart and Diabetes Institute, ³University of Minnesota

Introduction: Reducing sedentary time may improve glycaemic control, however, little is known regarding the dynamic, glycaemic effects of changes in sedentary behaviors within free-living, working environments.

Methods: Prediabetic (fasting glucose >100 mg/dL) desk-based office workers were recruited from an ongoing cluster randomized controlled trial, to reduce sitting and increase light-physical activity (LPA) in the workplace. Participants wore an activPAL (PAL Technologies LTD, UK) for seven consecutive days at baseline and 3 months, to assess sedentary time, standing time and LPA. An iPro2 continuous glucose monitor (Medtronic Inc., MN) was simultaneously worn and standardized lunches were provided on three workdays to capture postprandial area-under-the-curve (AUC) response. Changes in activity variables were calculated for work and total time (work and non-work time combined). Multi-level models (days clustered by participant) were adjusted for age, race, gender, body mass index, total moderate-vigorous activity, baseline fasting and preprandial glucose.

Results: Participants (N = 21, 74.8% female, 74.8% white, 49.5 ± 11.5 yrs) reduced their work sitting time by -41.5 ± 92.9 min/8h workday and total sitting time by -31.9 ± 90.0 min/16h over 3 months. Increases in total standing were associated with improved postprandial total AUC (b[se] = -10.8[4.4] P = .02). Increases in work and total LPA, respectively, were associated with improved postprandial total AUC (b[se] = -48.8 [19.2] and b[se] = -27.3 [8.6]), net AUC (b[se] = -49.5[18.9] and b[se] = -30.7[8.6]) and mean glucose (b[se] = -0.4[0.2] and b[se] = -0.3[0.1]), P's < .01.

Conclusions: Increasing light-intensity walking, and potentially standing, may improve postprandial glycaemic control in free-living, working environments.

External funding details: Funded by NIH [R01CA198971].

Inclinometer-assessed sitting, standing physical activity and energy expenditure before and during Back App ergonomic product usage in office workers

Olli Tikkanen¹, Petra Ihalainen¹, Sini Lindqvist¹, Tanja Grönholm¹, Marko Havu¹, Ari Peltoniemi¹, Tommo Reti¹, Arto Pesola²

¹Fibion Inc, ²South-Eastern Finland University of Applied Sciences

Background: Low energy expenditure during sitting is a risk factor for metabolic disorders. This study assessed whether active furniture, a Back App chair and balance board, increase activity.

Methods: The volunteers were 12 office workers (women n = 10, 42.5 ± 7.6 years, 170 ± 6.7 cm, 76.1 ± 14.9 kg) who wore an inclinometer (Fibion Inc, Finland) on thigh in a leg strap for seven days at baseline and a testing period. For the testing period the volunteers received a Back App chair (no back rest, an unstable seat) and a Back App balance board (designed for dynamic standing). Whole day sitting, standing, physical activity, and energy expenditure with and without Back App product usage, were compared with paired samples t-test.

Results: During the testing period volunteers were self-reportedly sitting on their regular chair 545 ± 389 min, sitting on Back App chair 868 ± 484 min, standing 312 ± 237 min and standing on Back App balance board 247 ± 226 min on a total of 4.6 ± 0.7 days. As compared to sitting on a regular chair (1.50 ± 0.29 kcal/min), sitting on Back App chair ($+6.1\%$; 1.59 ± 0.31 kcal/min, $P = 0.016$), standing (10.9% ; 1.67 ± 0.11 kcal/min, $P < 0.001$) and standing on Back App balance board (16.2% ; 1.75 ± 0.38 kcal/min, $P = 0.007$) increased energy expenditure, with no difference between standing conditions or the whole day results.

Conclusion: As compared to sitting on a regular chair, sitting on Back App chair and standing on Back App balance board increase energy expenditure. Changes in the whole day sitting and physical activity require other interventions.

External funding details: A corporate wellness company paid the measurements for Fibion Inc.

Moderator effect of parents' physical activity level on physical activity intensity of Brazilian adolescents during school physical education class

Ismael Forte Freitas Junior¹, Sueyla Santos², Gabriel Pellis¹, Drenya Bordin¹, Leonardo Carmo¹, Elaine Souza³

¹São Paulo State University, ²Federal University of Amazonas, ³University of Western São Paulo

Children and adolescents are less active during leisure time and Physical Education classes than in the past. Previous studies have indicated association between behavioral and socioeconomic factors with adolescent's Moderate and Vigorous physical activity (MVPA). The aim of this study was to analyze the moderating effect of the parents' leisure time physical activity level (PAL) with demographic and behavioral factors during adolescent's School Physical Education classes (PE). The evaluation of PAL of adolescents were made by accelerometers and parent's PAL were assessed by questionnaire. A total of 92 PE participated in this research. The Wald test showed difference between most active during the class with the parent's PAL (p -value < 0.001). SPSS program, version 25.0 was used in all analyzes. Our results showed an average MVPA during a PE of $4.8 (\pm 0.69)$ minutes (8% of the PE). The lower active girls showed two time more chance to present low levels of physical activity during PE (OR 2.04, 95% CI 1.16-3.58), even when adjusted age and sleep time. In the more active parents, older adolescents with passive school transport and adolescents with lower sleeping time presented high odds of low MVPA during PE (respectively, 11 times (95% CI 1.06-112.06), 22 times (95% CI 1.96-2.50.20) and 58 times (95% CI 2.98-1139.73)). We concluded that the parents' PAL modulated as extrinsic factors the adolescent's PAL during PE.

External funding details: Funding: Foundation for Research Support of the State of São Paulo-FAPESP (proc.2016/09260-3)

Acknowledge: National Council for Scientific and Technological Development (CNPq); Coordination for the Improvement of Higher Education Personnel (CAPES)

Participation in a HIIT@WORK intervention reduces stress and increases mental or emotional wellbeing in a desk top worker population

Dries Van Hulle¹, Frank Vandaele¹, Julie Bourdeaud'huy¹, Lynn Custers¹, Annelies Maenhout², Joke Vande Woestyne¹, Ine De Clerck¹

¹Artevelde University College Ghent, ²Artevelde University College ghent

Introduction: Although physical activity is known to improve health and wellbeing, still only about one third of the European citizens exercises

enough. High Intensity Interval Training (HIIT) is a very time-efficient training method which is at least as effective to enhance ones physical health as the standard recommended moderate intensity training. Less in known about the effect of HIIT-training on mental health and wellbeing.

Methods: Within 2 company's, 27 participants in total took part in a 4 week HIIT@WORK intervention. The Perceived Stress Scale and the Multidimensional Outcome Expectations Scale were used to determine pre and post effects on perceived stress and physical, social and self-evaluative expectations.

Results: Post-intervention, the participants reported a decrease in stress (-9%). Furthermore, they reported 20% higher social expectations, equal physical expectations and a 5% increase in self-evaluative expectations. Also, an increase in happiness ($+28\%$) and a decrease in fatigue was reported.

Conclusions: These preliminary results suggests that participation in a 4-week HIIT@WORK intervention induces a mild positive effect on mental health and wellbeing within desk-top workers. In future research we plan to investigate mental and physical effects during a longer intervention, including a randomized control group.

Physical activity on prescription (FaR) in Sweden: Effectiveness and lessons learned

Ing-Mari Dohrn, Karolinska Institutet

The aim is to give an overview of Physical Activity on Prescription (FaR) in Sweden. The method will be described and results from research studies and experiences from clinical practice will be discussed to give an overview of the effectiveness of FaR.

Studies performed within primary health care indicate that FaR is a feasible and effective way to increase patients' physical activity level and reduce sedentary time. It has been shown that the use of FaR significantly improved body composition, reduced metabolic risk factors, and improved health-related quality of life. All registered health care professionals can deliver FaR and efforts have been made to provide education on the effects of physical activity and how to support behavioral change. Today FaR is implemented in all Swedish county councils. It is widely spread in primary health care settings and in recent years also increasingly used in hospital care. Studies on the feasibility of using FaR for children and youth is ongoing. However, physical activity as a treatment modality in health care is still underutilized. To make it easier for health care professionals to use FaR and to improve follow-up routines, integration of knowledge and decision support tools with the electronic health record systems is essential. The next step is the ongoing development of the handbook FYSS to "eFYSS" to enable this integration.

Physical activity practice and quality of life domains among north eastern Brazil women: A cross-sectional survey

Valter Cordeiro Barbosa Filho, Kleber Ribeiro, Magna Dasilva, Emmanuel Carneiro, Agnes Pinto, Ana Cristino

Federal Institute of Education, Science and Technology of Ceara

This study aimed to describe the indicators of physical activity and quality of life (QoL) among public servants from a federal institute in Northeastern Brazil. This cross-sectional study included 238 public servants (50.2% women, > 18 years-old) from all 28 campuses from the Federal Institute of Ceara in 2016. QoL was assessed using the WHOQOL-brief (domains: physical, psychological, social relationship, environment and global QoL) and Workplace QoL Assessment Inventory (domains: workplace conditions, workplace organization, socio-professional relationships, professional recognition, and work-life link), considering a percentage

(0-100%) scale. The regular participation in physical activities (30 minutes daily, 5+ times/week) and in an institutional QoL Program (0 = no; 1 = yes) were reported. Student's t-test was used. Regular participation in physical activity practice and in the QoL Program was reported by 30% and 17.7% of individuals, respectively. Mean values of QoL domains ranged from (workplace organization) to 67.2% (physical domain). Individuals who reported practicing physical activities had higher WHOQOL-brief domain scores (difference range: 6.1-7.8%, all $P < 0.01$), but no for work-related QoL domains ($p > 0.05$). Servants who reported participating in the QoL Program also had higher WHOQOL-brief domain scores (difference range: 5.9-7.0%, all $P < 0.02$), but lower scores in workplace conditions (-5.0%) and workplace organization (-11.2% all $P < 0.05$) domains, when comparing to peers who did not participate in the QoL Program. In conclusion, increasing opportunities for regular physical activity practice in the occupational context should be encouraged, although our results indicated that the direction of their relationship between physical activity and QoL may vary according to the domains.

Promoting physical activity among young blue-collar workers in the manufacturing industry: The effect and process evaluation of a smartphone application

Dorien Simons¹, Katrien De Cocker¹, Ilse De Bourdeaudhuij¹, Peter Clarys², Corneel Vandelanotte³, Benedicte Deforche¹

¹Ghent University, ²Vrije Universiteit Brussel, ³Central Queensland University

Background: There is need for physical activity (PA) promotion among blue-collar workers, especially young adults beginning in the industry. Smartphone applications are popular and have great potential for PA promotion, however mHealth PA interventions in young blue-collar workers are missing. Therefore, we report on the effect and process evaluation of a smartphone application 'Active Coach'.

Method: Young manufacturing laborers ($n = 57$; 58% male; 25.3 ± 3.2 years) participated in a 2-group RCT assessing accelerometer PA at baseline, post-test (baseline+9 weeks), and follow-up (post+3 months). During the app-intervention (9 weeks), a wearable activity tracker (Fitbit) was used and personal goals, and educational notifications were given to encourage PA. The control group ($n = 24$) only received written non-tailored information on PA. Generalized linear mixed models analyses (effectiveness) and descriptive statistics of individual interviews (process) were used.

Results: No significant intervention effects were found for accelerometer-based PA ($p > 0.05$). The majority of the intervention group (73.3%-80.8%) found the app user-friendly, clear, interesting, and motivating. However, some intervention participants did not engage with it and ignored or switched off the notifications. In those who engaged, the graphical display of PA (steps/minutes) was indicated as the best feature and there was a lot of interest in the Fitbit. 80% found the personal goals motivating, but only a minority found the notifications motivating (34.8%) and tailored to their lifestyle (17.4%).

Conclusion: Present young blue-collar workers evaluated the smartphone application positively. However, this tool did not result in PA increases, due to a lack of highly tailored advice, disinterest, and low continuous user engagement.

Real-world challenges in implementing theoretically-informed and evidence-based sports coaching interventions

Darren Nolan¹, Natalie Campbell², Abbe Brady³

¹St. Mary's University, Twickenham, ²University of Gloucestershire,

³St. Marys University, Twickenham

Background: There is a dearth of research which provides researchers with information on the likely challenges that will be encountered when designing and implementing sports coaching interventions, in a field-based research context. This research combines both experiential and literary evidence to address likely challenges of designing and implementing sports coaching interventions in three core areas $\pm$ participant, contextual and third-party challenges. An additional focus of this research is to provide future researchers with practical solutions to ensure these challenges are effectively met and overcome. A core component of the project is the use of reflective practice to inform and refine the research methods throughout the study. This research aims to articulate the research process from the researcher's point-of-view, highlighting how reflective practice continually influences learning and informs future methodological progressions and decisions during a field-based action research project.

Participants: Six male coaches were recruited from the Palace for Life Foundation full-time staff coaching list. Participants held a minimum of an Football Association (FA) Level 1 and Level 2 coaching qualifications and 1st4sport Level 3 Certificate in Supporting the Delivery of Physical Education and School Sport (QCF) qualification.

Impact: This study will provide future researchers with an increased understanding of the likely obstacles which arise during the design and implementation phases of sports coaching interventions. It will serve as a practical resource for researchers embarking on field-based research projects.

External funding details: The research is co-funded by St. Mary's University, Twickenham and Palace for Life Foundation, the official charitable foundation of Crystal Palace Football Club.

Sitting less at work as an input to the 24-hours movement behaviours model

Anna Maria Puig¹, Judit Bort-Roig², Emi Chirveches-Pérez³, Emma Puigdorior-Juveneny⁴, Lydia Navarro-Blasco⁵, Roser Bausà Peris⁵, Maria Giné-Garriga⁶, Pedro Iturrioz-Rosell⁷, Ángel M González-Suárez⁸, Iván Martínez-Lemos⁹, Kieran Dowd¹⁰, Jim McKenna¹¹

¹University of Vic-Central University of Catalonia; ²University of Vic-Central University of Catalonia, ³Hospital Consortium Vic, ⁴Hospital Consortium Vic, ⁵Hospital de la Santa Creu i Sant Pau; Barcelona, ⁶FPCEE Blanquerna, Universitat Ramon Llull; Barcelona, ⁷Osakidetza; Servicio Vasco de Salud., ⁸Universidad del País Vasco, ⁹Universidad de Vigo, ¹⁰Athlone Institute of Technology, ¹¹Leeds Beckett University

Introduction: How occupational sitting time affects the range of active and sedentary behaviours over a 24-hour period remains unclear. In office employees we examined differences on objectively determined sedentary and physical activity (PA) patterns between low and high occupational sitting days.

Method: Spanish administrative staff ($n = 145$; 82% female; 45 ± 9 years) wore an activPALTM for 7 days (24hrs). This determined daily proportions of time spent sitting, standing, on light PA (LPA), moderate-to-vigorous PA (MVPA; %; hrs/day) and total number of sedentary breaks. Valid data covered 407 workdays. Given the recommendation to reduce occupational sitting by 2 hrs/day, progressing to < 4 hrs/day (Buckley et al, 2015); these days were divided by occupational sitting time (< 4 hrs/day, $n = 83$ days; 4-6 hrs/day, $n = 258$ days; > 6 hrs/day, $n = 66$ days). ANOVA identified differences between groups within (i) a 24-hour period, (ii) 8 hours of shift work and (iii) during non-work hours.

Results: Compared to those showing high occupational sitting days, employees with low occupational sitting days sat less (-11.4%; -0.755 hrs/day), spent more time standing (+10.15%; +1.57hrs/day), doing LIPA (+0.82%; +0.27 hrs/day; $P < 0.001$) and, interrupted sitting time more frequently (+6.8 breaks/day; $p = 0.013$). During working hours, they

sat less (−35.2%; −3.19 hrs/day) and spent more time standing (+29.52%; +2.03 hrs/day), doing LPA (+3.86%; +0.25 hrs/day) and MVPA (+2.6%; +0.11 hrs/day; $P < 0.001$). Outside of working hours, employees with high sitting days interrupted sedentary time more often (+7 breaks/day; $p = 0.023$).

Conclusion: Reducing occupational sitting may improve the 24-hours movement behaviour pattern; compensation effects were only found for breaking sitting time.

External funding details: Ministerio de Economía y Competitividad (MINECO) of the Spanish government; as part of the project Walk@-Work-App (DEP2012-37169).

The development of a theory of change for the co-location of NHS clinics within leisure centres to place physical activity at the heart of the NHS

Natalie Grinvalds, Robert Copeland

Sheffield Hallam University/ NCSEM

Introduction/Background: The promotion of physical activity (PA) has become the focus of multiple strategies to reduce the burden of NCD's on the NHS. Health care professionals do not routinely prescribe PA for patients, citing barriers of time, knowledge and poor signposting. The co-location of facilities, such as health with social care, has led to improvements in service delivery, quicker referral, improved knowledge acquisition, shared learning and greater innovation. The NCSEM in Sheffield placed clinics within leisure centres in an attempt to embed PA into treatment pathways. Currently no research has explored the mechanisms, which might drive this change in culture through co-location.

Methods: Using a realist approach, a theoretical framework is being developed in an attempt to explain the mechanisms and determinants of change of the NCSEM co-location model. A scoping review of existing literature on co-location in addition to interviews with key stakeholders of the NCSEM will be conducted to inform the theoretical framework.

Results: The resulting theory of change will be presented with data-driven hypotheses, associated research questions generated from tacit theories, substantive theories and empirical data. The realist theory will then be explored and refined in qualitative studies with patients and health care professionals experiencing this NCSEM model.

Conclusion: Understanding the mechanisms of the NCSEM co-location model could lead to other locations implementing this approach, potentially reducing the burden of NCD's upon the NHS. This model could also improve patient empowerment and self-management, and lead to more efficient and improved patient care.

External funding details: Sheffield Hallam University, UKActive

The lifestyles habitats and cardiovascular disease risk factor profiles of staff within a provincial tertiary institution in South Africa

Varnika Reddy, Rowena Naidoo, University of KwaZulu-Natal

Background: Cardiovascular disease (CVD) is a rising burden in many parts of the world including South Africa. There is a strong relationship between CVD, type II diabetes and obesity. The CVD risk and health status of employees in tertiary institutions remains of high concern, as limited studies have been conducted in this area.

Objectives: The study objectives were to determine the: CVD risk factor profile; possible risks of other NCDs; and lifestyle habits i.e. physical activity, nutritional/dietary habits, tobacco smoking and alcohol consumption of university employees.

Methods: A cross-sectional design was conducted on academic and non-academic (professional) staff members from the University of KwaZulu-Natal, South Africa. Purposive sampling of staff within the School of Health Sciences was selected to participate in this study. The data collection included health/fitness screening questionnaires, selected anthropometric measurements and non-fasting blood tests.

Results: Seventy-five staff members with a mean age of 39.71 years old voluntarily participated in this study. A significant number of staff members presented with a moderate CVD risk profile. Body fat percentages were significantly higher for females than for males. In addition waist circumference measures indicated possible risks for Type II diabetes and metabolic syndrome. The overall lifestyle habits were adequate to poor.

Conclusion: There is an imperative need for workplace health interventions to improve CVD risk profiles and the susceptibility to other NCD's among staff in tertiary institutions.

External funding details: National Research Foundation (NRF) ± for the financial support which assisted me during this dissertation.

The WELL Building Standard™ (WELL): Leveraging the built environment for healthier buildings and communities.

Vienna McLeod, International WELL Building Institute

Background: The buildings in which we live, work and play have a tremendous impact on our health, wellbeing, and productivity. This presents a unique opportunity to utilize the design, construction and operation of buildings and communities to promote and improve human health.

Description: The WELL Building Standard™ (WELL) is a rating system for measuring, certifying, and monitoring features of buildings and communities around the globe that impact health and wellness. WELL is administered by the International WELL Building Institute and third-party certified by Green Business Certification Inc. (GBCI).

Components: Our innovative program synthesizes health, scientific and design research, translating that research into more than 100 features that leverage performance, design and policies at both the building and community scale. The program addresses ten topic areas (WELL concepts) that impact human health including Air, Water, Nourishment, Light, Fitness, Thermal comfort, Sound, Materials, Mind and Community.

Conclusion: Since the program launched in 2014, over 700 projects spanning 32 countries across a variety of building sectors have committed to the healthy building movement and are in pursuit of WELL Certification. Of those, 72 have achieved certification. To date, 26 projects are located in the United Kingdom, four of which have already achieved WELL Certification.

Drawing on research from multiple disciplines and presenting integrative, actionable interventions targeted at creating healthier built environments, WELL promotes the creation of healthier buildings and communities and the right to health for all.

TV programme on national television as media-based physical activity promotion campaign: Preliminary results

Danijel Jurakic, University of Zagreb

Introduction: We created 24-minute educational and fun TV programme oriented toward promotion of physical activity and healthy eating. The programme was broadcasted on Croatian national television once a week from October 2016 to January 2017. Each episode introduced one form of recreational exercise or sport from perspective of exercise beginner, physical activity expert, nutritional expert and personal view of

experienced exerciser. The goal of this research was to determine basic audience measurement parameters of above mentioned TV programme.

Methods: The following parameters were used in analyses: Reach (RCH) which represents the number of viewers who watched at least one minute of TV programme expressed in number and in percentage of whole population; Share percentage (SHR%) defined as percentage of viewers watching the specific programme through all viewers watching television at the time; Adhesion (ADH) which shows audience composition i.e. proportion of viewers in the target group to the number of total viewers in particular variable.

Results: The average RCH for all 16 episodes was 196.762 viewers which represents 4.81% of whole population and the average SHR% was 4.71%. The RCH varied between 116.479 (2.85%) to 279.869 (6.84%) and SHR% between 2.93% and 7.48%. Most of the TV programme viewers belong to the rural middle class (family type households) (AHD = 35.93%).

Conclusion: 24-minute TV programme dedicated to physical activity promotion showed promising potential for media-based campaign especially among rural middle-class Croatian inhabitants living in family type households.

Workplace setting: New evidence, new model, new directions for physical activity

Bill Bellew, Adrian Bauman, Josephine Chau, Lina Engelen, Lindsey Reece, The University of Sydney

Background: We reviewed evidence for wellness and disease prevention interventions in the workplace setting since 2007. Reputable scientific studies located in the workplace setting have quadrupled in the past decade; physical activity is very prominent in this evolution of evidence. Our conceptual models for the setting need to take account of the growth in knowledge. We introduce a third generation conceptual model to guide future intervention and research.

Methods: We conducted a rapid systematic review under the Evidence Check™ methodology developed by the Sax Institute, Australia. Electronic databases were searched for peer-review and grey literature from 2007. PRISMA reporting protocols were observed.

Four main research questions addressed

1. Evidence for effectiveness of interventions;
2. Essential design elements of effective interventions;
3. Implementation success factors (navigating barriers and facilitators); and
4. The contribution of organisational and systems approaches

Results: We will provide (a) main findings for the four main research questions; (b) analysis of the evolution of knowledge in this setting; (c) a new model - Workplace Wellness 3.0 which brings together the latest evidence, principles and systems approaches; and (d) discussion of the implications and directions for physical activity interventions and research in this setting.

Conclusion: In its updated 'best buys' advice, The World Health Organisation recommends multi-component physical activity programmes in the workplace setting. We offer an evidence review and new conceptual model which can guide implementation and research as this recommendation is put into practice.

External funding details: Initial research was funded by the NSW Government and commissioned through the Sax Institute.

Theme: Social Environment

An intersectional analysis of active transportation Experiences among Washington DC Area Youth

Jennifer Roberts¹, Sandra Mandic², Craig Fryer¹, Rashawn Ray³

¹University of Maryland, School of Public Health, ²University of Otago, School of Physical Education Sport and Exercise Sciences, ³University of Maryland, Department of Sociology

Introduction: In an area lacking heavy-rail-transportation, the Washington, DC area Silver-Line Metro opened on July 26, 2014. While the Silver-Line provides an opportunity for youth to engage in active transportation (AT), negative environmental (e.g. street trash) and social (e.g. microaggressions) variables converge on the AT experiences of low-income youth and youth of color, particularly Latinos and African Americans. Race-class-gender has been the traditional trinity of intersectional studies, however, for this research, these modalities of identity were explored within the context of transportation inequity.

Methods: An intersectionality framework was used to examine demographic, environmental and social constructs on youth AT. Recruitment for focus group participants (ages 12-15 years) who lived within a two-mile buffer of the Silver-Line Metro stations occurred from May-August 2016. Gender-specific, semi-structured focus groups were conducted until saturation was achieved. Data were digitally recorded, transcribed verbatim, manually coded, and analyzed using a content analysis technique with NVivo 11.

Results: Majority of the focus group participants (15-male; 9-female) represented communities of color. Participants perceived AT as "exercise", however, many reported parents and safety as barriers to AT. Safety was defined by many through a race-class-gender lens. For example, a female participant stated, "... people [are] not safe ... they're really mean in the neighborhood I live in, they're really racist ...". Another male participant indicated that for his safety his parents told him not to walk in "areas certain people live".

Conclusion: Our findings revealed that interactions and decision-making processes relating to youth AT and everyday life were complex and socially interconnected.

Assessing the social climate of physical activity in Canada

Lira Yun¹, Leigh Vanderloo², Tanya Berry³, Amy Latimer-Cheung⁴, Hai Van Nguyen⁵, Norm O'Reilly⁶, Ryan Rhodes⁷, John Spence³, Mark Tremblay⁸, Guy Faulkner¹

¹University of British Columbia, ²ParticipACTION, ³University of Alberta, ⁴Queens University, ⁵Memorial University of Newfoundland, ⁶Ohio University, ⁷University of Victoria, ⁸Children's Hospital of Eastern Ontario Research Institute

Background: Ecological models suggest an influential role of social climate on population-level physical activity (PA) yet research and surveillance efforts have paid limited attention to empirical assessment of this construct. The purpose of this study was two-fold: 1) to develop a measure of social climate for PA; and 2), to assess social climate in Canada.

Methods: A representative sample of Canadian adults (n = 2519, male = 50.3%, Mage = 49.06 ± 16.28 years) completed an online survey assessing demographics, PA, and social climate. Social climate was conceptualized as 1. the social acceptability of physical (in)activity; 2. support for PA related policies, regulations and programs; 3. perceptions of the causes of inactivity; and, 4. perceptions of responsibility for preventing inactivity. Descriptive analyses were conducted.

Results: Physical inactivity was considered a serious public health concern in Canada. The majority of Canadians (61%) reported not often seeing other people exercising nor kids playing outdoors (75%). Twenty-eight percent of the sample believed that society disapproves of physical inactivity. The majority (63%) of respondents believed that physical inactivity is caused by both individual and societal factors. Strong support existed for environmental-, individual- and economic-level policies and less for legislative approaches.

Conclusion: Physical inactivity is recognized by Canadians as a serious public health problem, yet there may be room for improvement in some social climate dimensions. The outcome of the current assessment provides a baseline for tracking the impact of future system-level interventions on social climate as it pertains to PA.

Barriers and facilitators to being physically active in a rural area of Hawaii: A Photovoice project

Siosaia Hafoka, University of Hawaii

Introduction: Several studies have examined the relationship between the built environment and physical activity behavior. However, very few studies have examined that relationship in rural areas. Even fewer studies have examined ethnic minority population. The purpose of this study is to identify barriers and facilitators to being physically active among Native Hawaiian and other Pacific Islanders (NHPI) in a rural area of Hawaii.

Methods: In order to identify barriers and facilitators to physical activity behavior, the Photovoice method was used to capture perceptions of the community. Three sessions were held with community participants (n = 13). A total of 81 photographs were taken by the thirteen participants, and 26 photographs were selected for discussion. Participants were asked to answer questions from the SHOWed method to describe their photographs and how it was related to their physical activity behavior.

Results: Participants selected themes they considered barriers and facilitators. Any changes to the themes were discussed as a group and required agreement among most of the participants before they were made.

Conclusion: This study attempts to fill gaps in the existing literature regarding physical activity, the environment, rural areas, and minority groups. Findings from this study are similar to previous studies examining the rural environment, however, there are also findings that are specific to this community. For example, although recreational facilities were limited, the community formed groups to encourage physical activity (e.g. yoga on the beach and "Walk with a Doc" programs).

External funding details: SH report no external funding source for this study.

Community Sports Trust

Andrea Kemp, Community Sports Trust

Community Sports Trust is a Community Interest Company based in Derbyshire and established in 2009 to develop sport and physical activity opportunities for people where they live and work.

The work of CST is grounded in the belief that being active should be fun, local, affordable and integrated into everyday lifestyles. In our experience, this is best achieved when people are encouraged to take personal and collective responsibility for making a difference to their own health and wellbeing, their communities and their environment. As such, we work to enable and inspire people to 'grow their own' wellbeing through social networks of activity from recreational walking to competitive netball. Most of our work is led by local residents in their neighbourhoods and towns, bringing others together for fitness and friendship in parks, village halls and open spaces.

Rather than delivering projects and programmes to 'get people active', our approach builds relationships, discovers ideas and connects people together around exercise and feeling good. We believe that building active, vibrant communities involves every part of the system; schools, parks, GP Surgeries, shops, highways, leisure centres, housing providers, planners and more and that no single organisation can achieve this on their own.

Describing the diurnal relationships between objectively measured mother and infant physical activity

Alessandra Prioreschi¹, Soren Brage², Kate Westgate², Lisa Micklesfield¹

¹University of the Witwatersrand, ²University of Cambridge

Background: This study aimed to determine the relationship between maternal and infant objectively measured physical activity, and to examine the diurnal interactions between these behaviours while accounting for potential covariates.

Methods: Mothers and infants (n = 152 pairs; infants aged 3-24 months) were recruited from Soweto, South Africa, and physical activity was measured using a wrist worn accelerometer (Axivity AX3, Axivity Ltd, Newcastle-upon-Tyne, UK) for 3-7 days. Significant correlates of infant physical activity, as well as the interactions between mother's physical activity, day of the week, sleep status, and caregiver status, were included in panel regression analyses with infant physical activity as the outcome.

Results: The majority of mothers (73%) did not spend any time apart from their infant. During weekdays, the combined effect of mother's physical activity (b = 0.11) as well as the interactions between mother's physical activity with caregiver status (b = 0.17), and sleep status (b = -0.04) on infant physical activity was b = 0.24; while during weekend days this association was b = 0.21; and was largely moderated by the interaction between the mother being with the infant and her activity levels (b = 0.23), but partly attenuated by mother's physical activity independent of other variables (b = -0.04). For each hour of the day for both mother and infant, peaks of physical activity were higher when the mother was not the primary caregiver.

Conclusions: Infant physical activity levels were strongly associated with their mother's activity levels particularly during the week, yet this relationship was made stronger when mothers were being active while looking after their infant.

Development of an observation tool for measuring physical activity and wellbeing in urban spaces: MOHAWk

Jack Benton¹, Jamie Anderson¹, Margaret Pulis¹, Sarah Cotterill¹, Ruth Hunter², David French¹

¹University of Manchester, ²Queen's University Belfast

Introduction: Systematic observation of behaviour offers an objective method of measuring physical activity and other indicators of wellbeing. However, existing observation tools (e.g. SOPARC) are: (a) only suitable for assessing physical activity (and not other aspects of wellbeing); (b) only suitable in large outdoor environments that attract high numbers of users (e.g. regional parks); and (c) have not been validated outside the US.

Method: We developed MOHAWk (Method for Observing pPhysical Activity and Wellbeing): an observation tool for assessing three levels of physical activity intensity (sedentary, walking and vigorous) and two other evidence-based behavioural indicators of wellbeing (connecting with others and taking notice of the environment). Six observers have used MOHAWk to conduct observations in four sites in Manchester (a park, an urban square and two tree-lined streets) and one site in Belfast (an urban square) across four studies (200 hours of data).

Results: High inter-rater reliability has been established between pairs of observers (ICCs > 0.8). There is preliminary evidence of criterion-related validity, with observed behaviours being patterned in line with hypotheses (e.g. more people taking notice in environments rated as having higher-quality green space). Observing four hours a day, two days a week was found to provide reliable estimates of counts of people and their activity.

Conclusion: MOHAWk is a reliable and feasible observation tool for measuring physical activity and wellbeing in urban spaces, which overcomes issues of response rates and subjectivity associated with self-reported measures. We are now using MOHAWk in two natural experimental studies in Manchester.

Does running in a group change individual cadence (steps/min)?

Colleen Sands¹, Scott Ducharme², Elroy Aguiar², Christopher Moore², Zachary Gould², Catrine Tudor-Locke²

¹University of Massachusetts, ²University of Massachusetts, Amherst

Research has shown that when people walk together they synchronize their steps; however, it is unknown whether individuals synchronize cadence (steps/min) when running in a group.

Purpose: To evaluate the effects of individual versus group running on cadence at moderate and hard paces.

Methods: Fourteen female collegiate runners (age = 19.6 ± 1.4 years, height = 170.1 ± 10.4 cm, mass = 59.6 ± 8.1 kg) completed four 1-mile over-ground running trials on a flat, dirt road. Each participant completed a mile alone at a self-selected moderate (IM) and vigorous (IV) pace, and with a group at a group-selected moderate (GM) and vigorous (GV) pace. Participants were outfitted with an accelerometer (ActiGraph GT9X) located at the lower back. Paired samples t-tests were used to determine changes in cadence between individual and group running.

Results: Cadence significantly increased from individual to group moderate pace running (170.9 ± 5.1 and 174.1 ± 7.0 steps/minute for IM and GM, respectively, $p = .016$). There was no difference ($p = .122$) in cadence from IV (177.4 ± 6.4) to GV (175.8 ± 6.6). Speed decreased between individual and group runs for both the moderate and hard paces (IM = 6:59 ± 22 sec, GM = 7:42; IV = 5:55 ± 14 sec, GV = 6:28).

Conclusion: Cadence increased from the individual to group run, even though speed decreased. Group running appears to be an effective method for increasing running cadence at relatively similar or even slower speeds. Considering higher cadences have been linked to a reduction of factors correlated with increased injury, these findings suggest running in a group may be a strategy to reduce injury risk.

External funding details: NIH/NIA Grant 5R01AG049024-CADENCE-Adults study

Effects of different gender, age and parents' support on physical activity and sedentary behaviour of Chinese children and adolescent

Qiang Guo¹, Xiaozan Wang², Guoyuan Huang³, Yingying Zhang⁴

¹Ningbo University, ²East China Normal University, ³University of Southern Indiana, ⁴Zhejiang Textile and Fashion College

Introduction: This epidemiological study was to investigate and examine how different gender, age and parents' support would affect physical activity level (PAL) and sedentary behavior (SB) in Chinese students and association of their PAL and social support environment.

Methods: The study included 18,424 students (51.9% boys, 49.1% girls) aged 8-18 years old and 10,599 parents in China. The validated

questionnaires PAQ-CN and ASAQ-CN were used to assess subjects' PAL and SB (sitting time). PAQ-CN had three categories as low, medium, and high and the sitting time included education, screen, transport, culture, and social contact-related. Parents' PAL was collected with IPAQ.

Results: The study demonstrated that PAL of girls was significantly lower than boys in each age group ($P < 0.001$, respectively) and decreased greatly with their age increase. But boys' PAL tended to fluctuate gently and was at a low level for all age groups. The total sitting time ranged from 4.29 to 5.21 hours/day that excluded regular study time in class. The sitting time dropped sharply for the age groups of 11-15 but rose greatly after age of 15, which was closely related to education and screen watching. Children's PAL was significantly affected by parents' PAL across three age groups ($P < 0.05$, respectively), showing PAL increases in accordance with increase of their parents' PAL.

Conclusions: SB has become an epidemic phenomenon for young Chinese students, which is closely related to educational sitting time. PAL is evidently lower in young girls. The parents' PAL could greatly affect PAL of children and adolescents.

Effects of parental environments on screen-time behaviour among Thai children

Kornkanok Pongpradit, Piyawat Katewongsa

Institute for Population and Social Research, Mahidol University

Introduction: Screen-time usage among Thai children tend to be higher presently. It directly affects the developmental process in all aspects, namely, physical, mental, emotional, and social aspect. The purpose of this study is to explain effects of parental environments on screen time daily usage of children.

Methods: This study employed data from 2 surveys as follows 1) Thailand Physical Activity Surveillance System in 2017 with national representative samples of 710 children aged 6 to 12 years, and 2) Active School Project in 2017 with 526 participants aged 9 to 10 years.

Results: The descriptive analysis showed that Thai children had an average screen-time of 162.57 minutes daily, with the highest of screen time used between 6.00-10.00 PM. This reflect that Thai children have a usage of screening time more than AAP guideline for 42.57 minutes daily.

One of the major causes of this situation is unfolding from multiple regression analysis. It is found that the perceived on parent's screen time use of children had significantly positive influenced on children's screen time use ($B = .604^{***}$). That is children who perceived of high level of parent's screen time use would also have high level of their use as well. Fortunately, results from logistic regression analysis pointed that the participation or supportive in physical activity of parent could probably reduce of over usage of screen time about 21% (odds ratios = .799).

Conclusion: It can be summarized that parental environments has a strong effects on children behaviors.

External funding details: This project has been supported by Thai Health Promotion Foundation, Thailand

Fostering interactive knowledge-to-action between research, policy and practice to promote physical activity: Experience from the cross-cutting CAPCOM subproject

Peter Gelius, Alfred Rütten, Martin Schultze, Valentin Schätzlein, Sven Messing

FAU Erlangen-Nürnberg

Introduction: The CAPCOM subproject provides the Capital4Health consortium with theoretical frameworks for interactive knowledge-to-

action (IK2A) and capabilities, and fosters knowledge exchange between the involved researchers, policy-makers and practitioners. It aims at increasing awareness for transdisciplinary collaboration, fostering the conceptual convergence and promoting joint action across disciplines.

Methods: CAPCOM interventions included a consortium-wide transdisciplinary steering committee, an international advisory board, regular reflection interviews with subproject teams, and an online glossary of relevant concepts. Evaluation data were collected using participant observation, meeting minutes and field notes, and semi-structured interviews. Data were analyzed using thematic content analysis and MaxQDA.

Results: Preliminary results suggest that partners grew increasingly aware of the importance of transdisciplinary cooperation and began using a common language over the course of the project. Advisory board meetings and reflection interviews acted as “catalytic” events for these developments. The process was slower than expected, and harmonizing discipline-specific theoretical concepts was particularly challenging. Researchers, policy-makers and professionals increasingly acted jointly in various areas, but the intensity of cooperation varied significantly between subprojects.

Conclusions: Methods to foster IK2A to integrate different research disciplines, policy and practice can be an effective means to improve the development and implementation of physical activity promotion programs. However, this process is very time-consuming, especially when attempting to align concepts and methods. Cooperation tends to be easier in some environments than in others, suggesting a need for tailored, setting-specific approaches.

External funding details: CAPCOM is part of the Capital4Health consortium funded by the German Federal Ministry of Education and Research.

Health impact assessment of public park for physical activity: A case study of Betong Municipality, Yala Province, Thailand

Phen Sukmag

Prince of Songkla University, Hatyai Campus, Songkhla

Empirical study has reported that public park as an essential setting for promoting physical activity, especially leisure-time physical activity. Public Park has the potential to increase physical activity, leading to improved health or well-being. The objective of this participatory research to study the impact of Betong Public Park for physical activity on health impact, physical, mental, social and spiritual. The quantitative and quality method integrated into health impact assessment (HIA) process: screening, scoping, appraisal, and public review were being to estimate the health impact of Betong public park. Data were collected using survey, participatory observation, in-depth interview, and focus group discussion, all of which were finally analyzed using content analysis method. The results revealed that Betong public park characteristic consists of children playground, sports complex, green space, Bicycle trail, outdoor swimming pool, and health park. There are more than 300 park users per day, about 1.2% of resident people visit the park, for running, walking, playing football and recreation. Low satisfaction of the interviewee for park use was safety, lighting, car park, toilet adequate and a beautiful landscape. Betong Municipality should improve the security system, infrastructure and built environment for people easy to access the park. The results of this study will benefit Betong Municipality regarding applying HIA for the benefit of increasing physical activity projects or public health policy and the public's well-being.

Neighbourhood characteristics associated with the provision of holistic movement practices in Melbourne

Ineke Vergeer¹, Bojana Klepac Pogrmilovic²

¹University of Southern Queensland, ²Victoria University, Melbourne

Introduction: Holistic movement practices (HMPs) are physical practices embedded in philosophies aimed at enhancing holistic well-being, thereby offering potential for improving mental and physical, and possibly spiritual, health. While some HMPs, like yoga and tai chi, have become more mainstream in western countries, we have limited knowledge about the provision of other HMPs. The purpose of this study was to explore the provision of HMPs and any association with neighbourhood characteristics in an Australian city.

Method: Data were collected via internet searches. We focused on events offered and recorded information about event features, including venue addresses. Number of events was determined per postcode. A range of neighbourhood characteristics were extracted from the 2016 Australian Census data, and were correlated with the number of events per postcode.

Results: We found 541 events offered by 20 HMPs across 127 (46.2%) postcode areas. The number of events in a postcode area was positively correlated with percentages of women, singles, defacto relationships, female labour force participation, university degrees, and no, secular, or other spiritual beliefs. Number of events was negatively correlated with median age, and with percentages of men, married persons, registered marriages, educational certificates, and Christianity.

Conclusion: HMP offerings across Melbourne reflect various differences in neighbourhood characteristics, suggesting that the appearance of these practices may be more likely in some neighbourhoods than others. Non-traditional values appear more common in neighbourhoods where HMPs are offered. This fits with the notion that the underlying philosophies of HMPs often include non-mainstream conceptions of health and/or spirituality.

Older adults mobility and the governance of age-friendly cities: A UK-Brazil comparative study

Ruth Hunter¹, Geraint Ellis¹, Brendan Murtagh¹, Claire Cleland¹, Sara Ferguson¹, Ruth Hunter¹, Rodrigo Reis², Ciro Romelio Rodriguez-Añez³

¹Queen's University Belfast, ²Washington University in St Louis, ³Federal University of Technology, Parana

There is now significant research, policy development and programmes supporting age-friendly cities and the need to support ‘ageing in place’. Central to this is the need to facilitate older adults mobility, which is influenced by a complex range of factors related to inter-personal, social and physical environments. This presentation critically examines the way in which support for mobility is reflected in the concept and governance of ‘age friendly cities’, using a comparative analysis of the approaches in two cities; Belfast (UK) and Curitiba (Brazil). The presentation will draw on interviews with key stakeholders, an evaluation of best local practice and a critical analysis of policy frameworks and governance structures to provide insights on how the mobilities of older adults are supported in each city. The presentation will highlight the implications for ensuring mobility and physical activity of older adults can be more effectively facilitated by the governance of age-friendly cities.

External funding details: ESRC and Newton Fund

The effect of weather conditions and psycho-social measures on daily physical activity in adolescents

Thabo van Woudenberg, Kirsten Bevelander, William Burk, Crystal Smit, Laura Buijs, Moniek Buijzen, Behavioral Science Institute, Radboud University

Introduction: The current study examined the effect of the weather on daily physical activity in adolescents, and extends the literature by adding psycho-social determinants of the theory of planned behavior (TPB) to the analysis.

Method: Dutch adolescents (N=846, 9-15 y/o) participated for four separate weeks between January 2015 and March 2016 in the MyMovez project. Daily minutes of MVPA were measured by means of accelerometer (Fitbit Flex) and questionnaires were sent via a research smartphone. Daily weather measurements were collected from the website of the Royal Dutch Meteorological Institute. In total 120 unique dates were included in the study.

Results: Because participants were nested within schools and classes, and participants provided multiple months and days of physical activity data, mixed models were used to control for clustering of the data within schools, classes, participants, month and days. A linear mixed-effects model, using the lme4 package in R, was used to test the effect of the weather conditions on daily physical activity. After controlling for gender, age, and BMI, the model showed that daily minutes of MVPA was predicted by mean temperature, hours of sunshine, hours of precipitation. After adding the psycho-social determinants (i.e. attitude, perceived norms, self-efficacy and intentions), only the hours of sunshine per day remains a significant predictor of daily minutes of MVPA.

Conclusion: In the literature, several weather conditions are designated as predictors of physical activity. However, when controlled for psychosocial measures, only hours of sunshine appear to be a predictor of daily minutes of MVPA.

The topic of “health” in PE teacher education in Bavaria: Results of the health.edu project

Hans Peter Brandl-Bredenbeck¹, Susanne Tittlbach², Julia Hapke³, Mandy Lutz⁴, Katharina Ptack², Clemens Töpfer⁵, Helmut Strobl², Ralf Sygusch⁵

¹University of Augsburg, ²University of Bayreuth, ³University of Tübingen,

⁴University of, ⁵FAU Erlangen-Nürnberg

Introduction: Health.edu aims at the sustainable development of sport-related health competence (SRHC) in schoolchildren. Research indicates a wide gap between the scientific state of the art on the subject, requirements of German school curricula, and teaching reality in schools. Health.edu used cooperative planning groups in two settings (PE teacher education and secondary schools) to enhance capabilities for the development of SRHC.

Methods: In the teacher education setting, cooperative planning groups with university lecturers and seminar-school teachers were used to develop a common understanding of health competencies and approaches to improve teaching skills. Video-based observations and stimulated recall interviews were used for evaluation. In the school setting, four schools developed new PE lessons while four other schools carried out their conventional PE lessons (control group). SRHC was measured using a standardized pre-post test.

Results: Lecturers and seminar-school teachers have a holistic understanding of health, but PE teaching in schools is still based on a narrow concept of health; more holistic concepts are developed at universities. Students' results indicate a significant improvement of SRHC. Girls' and boys' development is similar but girls show a significantly higher SRHC.

Discussion: Results indicate that cooperative planning seems to be a promising approach for both settings but that changes were smaller in the PE teacher education setting. Some environments may require more time and resources to bring about sustainable change.

External funding details: health.edu is part of the Capital4Health consortium funded by the German Federal Ministry of Education and Research.

Weekday to weekend patterns of objectively measured physical activity (PA) in deprived pre-schoolers

Michael Duncan¹, Charlotte Hall¹, Clare Roscoe²

¹School of Life Sciences, Coventry University, ²College of Life and Natural Sciences, University of Derby

Introduction: Pre-schoolers are recommended to participate in a minimum of three hours PA daily for health benefit. PA volume and intensity may differ between weekdays and weekends. Few studies have examined whether PA differs between weekdays and weekends in pre-schoolers. This study examined this issue.

Method: Following institutional ethics approval and parental informed consent, 364, pre-schoolers (168 girls, 196 boys, mean age = 3.7 ± 0.5 years) wore a GENEActiv accelerometer for 2 weekdays and 2 weekend days on their wrist. Participants were drawn from areas of Coventry and Warwickshire that were all in the top 10% of the most deprived super output areas in England. The Roscoe et al pre-schooler cut-points were used to determine the percentage of time spent sedentary and in light, moderate to vigorous (MVPA) PA.

Results: There were no significant differences in the percentage of time spent in sedentary, light or MVPA between boys and girls (P > 0.05). A greater percentage of time was spent in sedentary behaviour and a lesser percentage of time in light and MVPA (all P < 0.01) during weekends compared to weekdays. 71.6% and 65.2% of pre-schoolers did not meet the recommended three hours of PA per day for health during weekends and weekdays respectively. 76.4% and 72.5% of pre-schoolers did not meet the recommended guidelines of 60mins MVPA during weekends and weekdays respectively.

Conclusion: The majority of deprived pre-schoolers do not achieve the recommended levels of PA for health but greater time is spent in health enhancing PA during weekdays compared to weekends.

Yes, we can (No, you can't): Weight stigma, exercise self-efficacy, and active identity development in higher-weight individuals

Angela Meadows¹, Andrea Bombak²

¹University of Birmingham, ²Central Michigan University

Although many higher-weight individuals engage in regular leisure-time physical activity, an inverse relationship has been observed between body mass index and physical activity levels. Experienced and internalised weight stigma have been linked with reduced exercise enjoyment, motivation, self-efficacy, and participation; however, little is known about how these effects are transmitted. In this conceptual paper, we propose a dual pathway model to account for the impact of weight stigma on exercise behaviour. In the direct pathway, experiences or threat of explicit and implicit stigma and discrimination create traumatic learning experiences in both youngsters and adults, impairing the development of exercise self-efficacy. In the indirect pathway, an absence of positive representations of fat exercisers, and a glut of negative representations, mean that higher-weight people lack role models from whom they may develop vicarious self-efficacy. Across both pathways, low self-efficacy, in turn, hinders the development of active fat identities. Perceived ability has been linked with exercise identity in both cross-sectional and prospective studies, and a strong exercise identity is, in turn, linked to more frequent exercise, greater future exercise intentions, and perseverance in the face of barriers to exercise. We outline a research agenda, particularly in terms of active fat role models, and discuss how inclusive exercise environments may promote the development of exercise self-efficacy and active identities.

Theme: Technology

Acceptability of smartphone-based assessments of physical activity and diet among a cohort of adolescents in Kunming, China

Jenna Hua¹, Sue Eom², Yan Li³, May Wang⁴, Edmund Seto⁵

¹Stanford University, ²Seoul National University, ³Kunming Medical University, ⁴University of California, Los Angeles, ⁵University of Washington

Introduction: The advent of mobile technology to monitor physical activity and diet has created unprecedented opportunities to quantify physical activity and diet in real-world settings. The purpose of this study was to investigate the acceptability of smartphone-based assessments of physical activity and diet among a cohort of adolescents in Kunming, China.

Methods: 308 adolescents (44% male, 56% female) aged 16-18 were recruited from two local high schools in Kunming, China in 2015. Participants were given smartphones with CalFit app to carry for a week. CalFit app measures physical activity with accelerometry and diet with voice-annotated videos of meals. Participants were then asked to complete a 20-question survey assessing the acceptability of CalFit app. Their body mass index (BMI) was calculated using their weights and heights measured by trained study assistants.

Results: The mean BMI of the cohort was 21.6 kg/m². 90% of the participants had prior experience using smartphones. 92% of the participants reported CalFit app was easy to understand and operate. 73% reported using voice-annotated video to record diet was easy, but 89% reported that they preferred taking photos rather than videos. 41% reported it was hard for them to carry the study phone every day. There were no statistically significant differences in CalFit acceptability in terms of participants' weight statuses; however, significant differences between males and females were observed.

Conclusion: Findings indicated that CalFit app was acceptable for assessing adolescent's physical activity and diet. However, using photos instead of videos to record diet were preferred among Chinese adolescents.

External funding details: This research was supported by the Postdoctoral Fellowship in Cardiovascular Disease Prevention (T32) from the National Heart, Lung and Blood Institute (NHLBI), National Institute of Health (NIH); the Ruth L. Kirschstein National Research Service Award for Individual Predoctoral Fellows (Parent F31), National Cancer Institute (NCI), NIH; the Fulbright Program, United States Department of State; Pamela and Kenneth Fong Graduate Student Fellowship, Center for Chinese Studies, UC Berkeley; Douglas Fowler Scholarship, UC Berkeley Public Health Alumni Association; C. C. Chen Foundation Fellowship, UC Berkeley and Norman P. and Pansy L. Chan Fellowship, UC Berkeley.

Apps and wearables to monitor physical activity and sedentary behaviour: Findings from a qualitative systematic review on barriers and facilitators

Laura J Wilde¹, Gillian Ward², Louise Sewell¹, Andre M Müller³, Riya Patel⁴, Petra A Wark¹

¹Coventry University, ²Royal College of Occupational Therapists, London, ³National University of Singapore, ⁴City University of London

Introduction: Monitoring physical activity (PA) and sedentary behaviour (SB) using mobile phone applications (apps) and wearable technology (wearables) may improve these health behaviours. This systematic review aims to synthesise the qualitative literature on the barriers and facilitators of using apps and wearables to monitor PA and SB in adults.

Method: This review is registered in PROSPERO (CRD42017070194). Scientific databases including CINAHL Complete, MEDLINE, PsycINFO, SPORTDiscus, Cochrane Library and Scopus were searched for relevant studies published from 1st January 2012 to 1st September 2017. Studies were included if they 1) included adults who directly used an app or wearable to monitor PA and/or SB 2) explored the barriers and/or facilitators of using an app and/or wearable and 3) were published in English. Following duplicate screening of 4550 titles and abstracts, full-texts of potentially eligible papers will be screened to identify studies using qualitative approaches to explore barriers and facilitators of using apps and/or wearables to monitor PA and/or SB. Discrepancies were resolved through discussion or by consulting a third screener. Relevant excerpts (quotes and text) from the included papers will be extracted and analysed thematically. The Critical Appraisal Skills Programme (CASP) Qualitative Research Checklist will be used to appraise included studies.

Conclusion: Screening is expected to be complete by April 2018 and data extraction by May 2018. This presentation will therefore discuss the findings of the thematic analysis. The results of this work will be useful for those intending to monitor PA and/or SB using these technologies.

Associations between technology use and academic performance of children in a high educational technology school

Leon Straker¹, Courtenay Harris¹, John Joosten², Erin Howie³

¹Curtin University, ²John XXIII College, ³University of Arkansas

Introduction: Technology use is a common sedentary behaviour for many children and has been linked to poor physical and mental health outcomes. Thus, some public health guidelines recommend minimising screen use in general or for leisure purposes. However, many schools now require tablet or laptop computer use for school activities, to develop digital literacy. The impact of technology on child health and academic performance likely varies with both the device and the purpose of use. To help inform guidelines on appropriate use of technology by children this study examined the association between technology use (by specific device and purpose) and academic performance.

Methods: A school with well-developed technology practices was selected. Children from school grades 5, 7, 8, 10 and 11 (ages 10 to 19; 49.6% female; n = 924) completed the TechU-Q online survey during class. The frequency and duration of the use of various devices (TV, laptop, tablet, mobile phone, electronic games) and purpose of use (homework, social, watching videos, playing games) were collected. School subject scores were combined into an academic index, weighted to reflect class and subject level differences.

Results: Greater total technology use associated with poorer academic performance (β -0.5, 95%CI: -0.8, -0.2, $P < .001$), and this association was evident for all devices and for each purpose, except laptop and tablet use for homework.

Conclusion: Whilst technology is being provided to children by parents and schools to enhance academic performance, most technology use is associated with poorer academic performance.

Comparison of accelerometer cut-points for estimating physical activity in frail older adults

Hilde Baardstu, Vidar Andersen, Einar Ylvisaker, Atle Saterbakken

Western Norway University of Applied Science

Background: Accelerometers are frequently used to estimate physical activity (PA). However, the impact of using different cut-points for estimating time spent in different intensities have not been examined

properly amongst frail community-dwelling older adults. The aim of this study was to describe level of PA in frail community-dwelling older adults using different cut-points, and determine prevalence of meeting current PA recommendations based on these cut-points.

Methods: PA was measured with accelerometer (ActiGraph GT3X) in 93 older adults (mean age 84.2 ± 7.5 yr.) for 14 consecutive days. Cut-points from Troiano, Matthews and Swartz were used to define time spent in low PA (LPA) and moderate-to-vigorous PA (MVPA) (LPA: 100-2019, 100-760 and 100-573 counts/min, MVPA: ≥ 2020 , ≥ 760 and ≥ 574 counts/min, respectively). Achieving national PA recommendations was defined as accumulating either ≥ 150 min MVPA/week in total or in bouts of ≥ 10 min.

Results: Overall, mean counts per day was 73.5 ± 51.1 . Time spent in LPA was 86.34 ± 49.02 , 69.71 ± 37.6 and 61.62 ± 32.22 min/day using Troiano, Matthew and Swartz cut-points. For MVPA the same cut-points showed 3.95 ± 6.76 , 20.58 ± 18.71 and 28.67 ± 23.18 min/day respectively. Prevalence of meeting PA recommendations was 2.2, 34.4 and 49.5% respectively.

Conclusion: Time spent in LPA, MVPA and prevalence of meeting PA recommendations were greatly influenced by using different cut-points. This highlights the methodological issues related to choosing the appropriate analytic method for measurement of PA in frail older adults. Thus, more attention should be directed towards finding the most appropriate way of estimating PA in community-dwelling, frail older adults.

External funding details: The study is funded by Regional Research Funds Norway

Exploring the acceptability and feasibility of using activity monitors to support increased physical activity within an exercise referral scheme for adults with, or at risk of, a chronic health condition

Jemma Hawkins¹, Michelle Edwards², Linda McConnon³, Britt Hallingberg³, Mark Kelson⁴, Emily Oliver⁵, Joanna Charles⁶, Rhiannon Tudor Edwards⁶, Simon Murphy³, Sharon Simpson⁷, Russell Jago⁸, Kelly Morgan³, Graham Moore³

¹School of Social Sciences, Cardiff University, ²School of Medicine, Cardiff University, ³DECIPHer, School of Social Sciences, Cardiff University, ⁴College of Engineering, Mathematics and Physical Sciences, University of Exeter, ⁵Department of Sport and Exercise Sciences, Durham University, ⁶Centre for Health Economics and Medicines Evaluation, Bangor University, ⁷MRC/CSO Social and Public Health Sciences Unit, University of Glasgow, ⁸Centre for Exercise, Nutrition and Health Sciences, University of Bristol

Introduction: Whilst there is evidence for initial effectiveness of exercise referral schemes for increasing physical activity, evidence of long-term effects is limited. In Wales, a trial of the National Exercise Referral Scheme [NERS] showed small but significant impacts on physical activity at 12-month follow-up. Technologies such as activity monitors may enhance long-term maintenance of activity by facilitating goal setting and progress monitoring and supporting intrinsic motivation. This pilot trial explored the acceptability and feasibility of implementing accelerometry-based activity monitors within NERS.

Methods: New NERS participants (mean age = 57, 65% female) were randomised to receive either an activity monitor alongside NERS (n = 88) or usual practice (n = 68). Participants completed questionnaires at baseline, 16-weeks and 52-weeks. Twenty intervention participants and 12 NERS staff completed interviews at 4-weeks and 52-weeks.

Results: Findings suggest that participant experiences of utilising the activity monitors were mixed. Approximately half of participants reported

that the devices were easy to use (49%) and met their expectations (57%). In interviews, some participants reported that the monitors helped them to become more aware of their physical activity levels and increased their motivation. Barriers to acceptability included general and device-specific wearability and technological problems, such as device malfunctioning and computer compatibility issues. Staff also reported device- and context-specific technological barriers to implementing the monitors alongside usual practice.

Conclusion: Whilst some findings were device-specific, there are broader lessons for future research and practice incorporating activity monitoring devices into physical activity interventions such as implications for delivery staff time and training.

External funding details: Health and Care Research Wales.

Feasibility of consumer-level activity monitors: Attitudes, user experiences, and accuracy of activity data

Tapio Paljarvi, Lisa Hurt, Daniel Farewell, Bethan Carter, Una Jones, Nichola Gale, Jemma Hawkins, Shantini Paranjothy

Cardiff University

Introduction: Relatively little is still known about the feasibility of using consumer-level activity monitors as an intervention modality at population-level. Thus, it is important to increase our understanding of user attitudes towards activity monitoring, experiences related to activity monitors and the reliability and validity of activity data collected by these devices.

Methods: We selected four consumer-level tri-axial activity trackers with wrist-based optical heart rate sensors for this study (Fitbit®, Garmin®, Jawbone®, and Polar®). Using the HealthWise Wales cohort platform, we recruited a convenience sample of 30 men and women aged 29-59 years, who lived in Cardiff or its surrounding areas in South East Wales to participate in a focus group interview and in subsequent 7-day usability testing in free-living conditions. Cardiff University staff and students (n = 60), aged 18-64 will be recruited to participate in a laboratory-based validation study consisting of repeated walking tests on a treadmill and sedentary tasks while sitting. Data collection for this study will be completed in April 2018.

Results: The results will be presented in relation to participant expressed ideas, feelings, and attitudes towards activity trackers and activity tracking; attitudes towards participating in a study using activity trackers; user-related, device-related, and technology adoption-related challenges of activity trackers; test-retest reliability over three repeated measurements (step count and heart rate); and validity of activity type and intensity against validated criterion standards, or direct observation.

Conclusion: These results will inform interventions aimed to promote physical activity at population-level.

External funding details: Funding: Wellcome Trust ISSF Population Pilot Award

Parental attitudes about screen time in early childhood: A potential policy dilemma

Erin Howie¹, Shelley McNally¹, Leon Straker²

¹University of Arkansas, ²Curtin University

Introduction: While recent 24-hour movement guidelines aim to restrict screen use in young children, early learning initiatives putting screens into the hands of young children and promoting educational apps. An understanding of parent perspectives about their child's technology use and

general attitudes towards use is needed to bridge the gap between these conflicting messages with parenting practice.

Methods: Between January 2016 and January 2018, parents of young children (0-5 years) were recruited from three samples in Australia and the U.S. to complete an online questionnaire about their child's technology use. Additional questions included perceived risk and benefits (Likert scale 1: strongly disagree, 5: strongly agree), and open-ended responses.

Results: Child mean total technology use was 69.3 (SD 81.2) minutes per day. The majority of parents agreed or strongly agreed that technology increased sitting (89%) and reduced physical activity (72%). Only 9% agreed or strongly agreed that using technology in childcare was good for their child's education while 52% disagreed or strongly disagreed. Parental attitudes were associated with reported child total technology use with positive items associated with more use (rho ranging from .23 to .43) and negative items associated with less technology use (rho ranging from -.28 to -.21). Parents described mixed feelings about technology use.

Conclusions: The majority of parents were not opposed to young children using technology in moderation, however, they believed it may negatively impact their child's physical health. Messaging to parents may need to focus on the quality of screen use and balance with other behaviours.

Primary health care digital tools for physical activity surveillance and brief advice in the Portuguese National Health Service

Romeu Mendes¹, Marlene N. Silva², Catarina S. Silva³, Adilson Marques⁴, Rita Tomás³, António Alexandre⁵, Cristina Carvalho⁵, Nilton Nascimento⁵, Celina C. Leite⁵, Henrique Martins⁵, Pedro J. Teixeira⁶

¹Directorate-General of Health, ²Directorate-General of Health; University of Lisbon, FMH, CIPER; Lusófona University, ³Directorate-General of Health; University of Lisbon, FMH, ⁴Directorate-General of Health; University of Lisbon, FMH, CIPER; CISP, ENSP, ⁵SPMS - Shared Services of the Ministry of Health, ⁶Directorate-General of Health; University of Lisbon, FMH, CIPER

Introduction: The study aimed to present initial data on the use of two digital tools recently introduced in the Portuguese National Health Service to assess levels of physical activity (PA) in patients and support brief advice by primary care physicians.

Methods: The PA surveillance tool was incorporated within the digital software/database "SClínico" in September 2017 and can be used by both primary care doctors and nurses. It includes three questions: 1) how many days per week the patient performs any kind of PA (work, commuting or leisure-time); 2) how much time per day; and 3) how many hours per day the patient spends in sedentary behaviours. A PA brief advice tool was also developed and implemented in the "PEM" (Electronic Medical Prescription) software since December 2017. It consists of five inter-related documents that can be delivered to patients (printed or by email), according to their current motivation and PA levels. Both tools were co-developed by Directorate-General of Health and Shared Services of the Ministry of Health.

Results: By December 31st 2017, 5602 patients' records on PA were filled. By January 31st 2018, 2834 brief advice documents were delivered to 1706 patients. Clinical outcomes of these patients are being tracked.

Conclusion: Assessing PA level and providing brief counselling by health professionals are key actions recommended by both the European Union and World Health Organization to promote health-enhancing PA at country level. Future analysis will assess the impact of these tools on increasing PA at a population level.

Theme: Translation of Sport and Exercise Medicine Into Population Health

A review of global surveillance on the muscle strengthening and balance and coordination elements of physical activity recommendations

Karen Milton¹, Andrea Ramirez Varela², Tessa Strain³, Nick Cavill⁴, Charlie Foster⁵, Nanette Mutrie⁶

¹University of East Anglia, ²Universidade Federal de Pelotas, Pelotas, Brazil, ³University of Cambridge, ⁴Cavill Associates, ⁵University of Bristol, ⁶University of Edinburgh

Introduction: The muscle strengthening and balance and coordination recommendations are often omitted from public communication campaigns and national surveillance systems, which appear to prioritise the aerobic '150 minutes' component. The aim of the current research was to review national physical activity surveillance systems to determine: whether they include muscle strengthening and balance and coordination activities; whether these activities are factored into national prevalence estimates; and to appraise the utility of different tools for measuring these components of the physical activity recommendations.

Methods: We obtained a copy of each survey that was used to inform the GoPA country card prevalence estimates, and reviewed both the content and calculating/reporting protocols.

Results: Of the 139 countries with GoPA country cards, 21 countries reported having no physical activity prevalence data. The remaining 118 countries had prevalence data on physical activity and cited the survey that was used to generate the estimates. The physical activity prevalence estimates for 74 countries were taken from the World Health Organization 2014 Global Status Report on Non-communicable Diseases. For the remaining 44 countries, a range of national and international surveys were used. A very limited number of tools sought to assess muscle strengthening activities, and even fewer assessed balance and coordination activities.

Discussion: This review identifies limitations, challenges, and future directions to improve the quality of the physical activity and health recommendations and the surveillance systems used to calculate population prevalence of physical activity.

External funding details: This research was funded by a grant from The Centre for Ageing Better.

Acute eating behaviour responses to apparatus-free high-intensity intermittent exercise in inactive, overweight females

Alice Burgin¹, Andrew Blannin², Derek Peters³, Adrian Holliday⁴

¹University of Worcester, ²University of Birmingham, ³University of Worcester and University of Agder, Kristiansand, Norway, ⁴Leeds Beckett University

Introduction: Appetite and energy intake may be reduced following high-intensity intermittent exercise (HIIE). Yet, exploring such eating behaviour responses at pre-determined time points post-exercise restricts the ecological validity. In addition, the requirement of specialised apparatus questions the effectiveness of many HIIE protocols for public health interventions. Therefore, the purpose of this study was to investigate participant-determined eating behaviour in response to a previously studied protocol, of 2x30 seconds or 4x30 seconds, of apparatus-free HIIE (star jumps) in inactive, overweight females.

Methods: Twelve inactive, overweight females will complete three conditions in a randomised, counterbalanced manner. Recruitment and data

collection is ongoing; five participants have completed so far. Following a standardised breakfast, participants rested for 2.5 hours, before undertaking rest (REST); 2x30 seconds (2x30) or 4x30 seconds (4x30) of high-intensity intermittent star jumping. Time of request (feeding latency) of, and energy intake at, an ad libitum buffet available following each condition were measured. The complete dataset will be available at the time of the conference.

Results: Preliminary data ($n = 5$), before statistical analysis, is presented as mean $\pm$ SD. Following REST, 2x30 and 4x30, feeding latency was 31 ± 16 mins, 32 ± 21 mins and 30 ± 30 mins, respectively, and energy intake was 970 ± 229 kcal, 936 ± 222 kcal and 782 ± 225 kcal, respectively.

Conclusion: Preliminary results suggest a possible reduction in energy intake following 4x30, despite little change in feeding latency. Final findings will enhance understanding of short-term eating behaviour responses to apparatus-free HIE in inactive, overweight females. This may inform effective physical activity strategies for regulating acute energy balance.

Change in patterns of physical activity, sedentary behaviour and health-related lifestyles on the transition to adulthood: Do sport participation matters?

Ignasi Arumi¹, Anna Maria Puig¹, Eva Cirera¹, Joan Carles Martori¹, David Wasley²

¹Universitat de Vic, ²Cardiff Metropolitan

Introduction: The influence that sport participation in adolescents has on the adherence to health-related behaviours as adults is unclear. We studied the associations between changes in sports participation during the transition to young adulthood with changes in patterns of physical activity, sedentary behaviour and health-related lifestyles in a sample of Spanish adolescents.

Method: A 3-year longitudinal study followed up high school students ($n = 113$) to their first year of university (16-17-18 years old). Generalized linear models, adjusted by gender, assessed the influence of changes in sport participation (yes, no, individual, team sport) over time, total and domain-specific physical activity (IPAQ-A), tobacco and alcohol consumption (FRESC-questionnaire), fruit and vegetable consumption (24 h dietary recall) and sedentary behaviour (Active Where?).

Results: Participants that consistently played sports significantly spent more time in vigorous and moderate physical activity, in physical activity at leisure time, less sitting time in specific sedentary domains and consumed more fruit and vegetables.

Discussion: Physical activity levels significantly reduce during the transition from high school to university. Sport participation-based interventions might be a preventive strategy for the adoption of multiple risk behaviours on the transition from adolescence to adulthood, particularly on physical activity maintenance and prevention of sedentary behaviour.

Co-designing a physical activity pathway in the NHS: Placing the users at the centre

Helen Speake¹, Robert Copeland¹, Simon Till², Jeff Breckon¹

¹Sheffield Hallam University, NCSEM Sheffield, ²Sheffield Teaching Hospitals, NCSEM Sheffield

Introduction: A key part of NCSEM Sheffield's whole systems approach to promoting physical activity is the establishment of co-located NHS clinical services in community sports and recreation venues. The strategy recognises that patients and healthcare professionals are fundamental to the success of physical activity interventions and must be actively involved in their design and evaluation. At NCSEM venues, a user-centred design

approach has involved patients, healthcare professionals and community physical activity providers in the development of a physical activity pathway for the prevention and management of long-term conditions.

Methods: The co-design process included interviews with users, development of patient personas, storyboarding and prototyping a physical activity pathway. A case study approach explored how the co-designed physical activity pathway might be implemented in the NHS MSK physiotherapy service in Sheffield.

Results: Components of the pathway included priming patients prior to their appointment to normalise physical activity within the consultation, and feedback from providers to positively reinforce healthcare professionals' referral behaviours. Staff from MSK physiotherapy suggested that the co-designed pathway reflected a model of best practice, supported by the benefits of co-location such as access to exercise facilities and collaboration between healthcare and exercise professionals.

Conclusion: Improvements are being made at NCSEM Sheffield venues including the introduction of environmental prompts and streamlined appointment booking with providers. Further collaboration is ongoing with the MSK physiotherapy service to integrate the pathway into existing caseloads. In addition, a PhD programme is underway to evaluate the health, social and economic impact of the co-located model.

Consultant led physical activity service in secondary care

Hamish Reid, Natasha Jones, Wilby Williamson, James Baldock, Ralph Smith, Julia Newton

Oxford University Hospitals NHS Trust

Introduction: Healthcare is a key component of population approaches to improving physical activity, particularly when targeting the inactive and multimorbid. The majority of healthcare interventions on physical activity have focussed on primary care with a paucity of work on the role of secondary care services. Since chronic disease pathways are determined by specialist services, it is essential that secondary care is engaged in driving a change in the culture of healthcare toward empowering patients to live physically active lives. We describe a unique national feasibility pilot commissioned by Public Health England and the Faculty for Sport and Exercise Medicine to address this vital component of addressing population inactivity through healthcare.

Method: The Sport and Exercise Medicine Consultant led team have instituted a series of system based, patient pathway focussed physical activity interventions in five discrete patient pathways across a large NHS hospital trust. Services include Cardiology, Transplant, Maternity, Critical Care and the Centre for enablement. We describe the development of these pathways using the COM-B model for behavioural change and a process based evaluation.

Conclusion: This pilot been recently commissioned it is too early to draw conclusions or recommendations from this work. However, the pilot phase is due to finish at the end of August when we will have results available from the formal evaluation together with recommendations for further work and the framework for developing an Active Hospital Toolkit.

External funding details: This project is funded by Sport England with the National Lottery

Exploring the feasibility of a combined rehabilitation programme for COPD and heart failure patients

Amy Jones¹, Sally Singh², Rachel Evans², Dale Eslinger¹, Lauren Sherar¹

¹Loughborough University; NCSEM East Midlands, ²NIHR Leicester Biomedical Research Centre $\pm$ Respiratory, NIHR Institute for Lung Health, Centre for Exercise and Rehabilitation Science; NCSEM East Midlands

Introduction: The NCSEM focuses on understanding exercise as an intervention in the management of chronic disease. Currently, Chronic Obstructive Pulmonary Disease (COPD) patients are referred to pulmonary rehabilitation which aims to improve exercise capacity and chronic heart failure (CHF) patients are referred to cardiac rehabilitation which aims to reduce cardiovascular risk. Experts suggest a symptom (e.g. breathlessness), as opposed to disease-specific, approach is needed.

Methods: A novel combined rehabilitation programme for COPD and CHF recently commenced at University Hospital Leicester NHS trust as service improvement, with one site being the NCSEM-East Midlands.

This study aims to examine the feasibility of the combined exercise rehabilitation programme. A secondary aim is to examine the potential treatment effect of the combined rehabilitation for patients with CHF or COPD primary diagnosis.

Results: 60 patients (30 CHF and 30 COPD) referred to the combined exercise rehabilitation programme (8 week programme; 2 sessions a week) will be recruited. Outcome measures that will be collected at baseline and post-rehabilitation include health related quality of life, exercise capacity (ISWT), symptom evaluation, cardio-metabolic risk, accelerometer-assessed physical activity and frailty. Upon completion of the programme, focus groups will be conducted with participants and healthcare professionals regarding the feasibility and acceptability of the programme.

Conclusion: This study has been part-funded by the NSCEM East Midlands and represents an excellent example of how the opportunities generated by the links between researchers and clinicians afforded by the NCSEM are being used to drive the translation of research into novel clinical pathways.

Get Out Get Active

Kat Southwell¹, Andy Dalby-Welsh²

¹English Federation of Disability Sport (EFDS), ²Activity Alliance

Get Out Get Active (GOGA) is a physical activity programme aimed at the UK's least active, supporting people to move more together. It has evidenced behaviour change for delivery partners and beneficiaries engaging over 5,000 participants, 200 volunteers and 30 Peer Mentors, Employed over 40 staff through 25 organisations and engaged with countless coaches to date.

This case study will bring to life the stories of those engaged in the programme and the lasting effects the coaching workforce has had on them. Some of the qualitative programme successes for the participants and coaching workforce include:

- Friendships and connections: "It was a new activity to me and the area. I enjoyed meeting new people, learning new techniques and more about the activity" Cathy, GOGA, Nordic Walking Club, NI
- Family and support
- Mental strength and well-being: "Being a GOGA mentor has really opened my eyes to possibilities and let me try new things. I see my mentee getting so much from the accessible cycling we do together on the side by side bike. She is always smiling and really positive." Ferisa, Mentor in Lambeth
- Having fun and feeling free
- Progressing in life: "Volunteering for the project has made me feel very positive and enthusiastic- and I have fun! Being involved has increased my confidence, and meeting the people has had a positive impact on my life. It's been a rough past six months, so doing sport and being part of GOGA has really made me happy" Angel, GOGA Volunteer Bradford

Streetgames case study: Activator insight report

Hannah Crane¹, Paul Jarvis-Beesley²

¹Streetgames, ²Street Games

Streetgames works with disadvantaged communities to increase access to sport for young people, either creating new opportunities to be active or increasing the quality and accessibility of existing opportunities. Sport delivered effectively to this audience needs to be at the right time, right place, right price and right style ± we call this Doorstep Sport.

Developed in partnership with National Governing Bodies of Sport (NGBs) in response to feedback regarding the challenges faced when part of the coaching workforce, Streetgames created an Activator workshop that supports an individual's journey into sports leadership and coaching by up-skilling and preparing them for work in community settings.

Doorstep Sport reaches young people in communities that often receive little else in terms of sport and physical activity provision. In each community, Doorstep Sport is used as a catalyst for delivering wider social outcomes which can include: reductions in youth related crime and anti-social behaviour, increases in the skills of local youth to support their transition into employment and measurably positive effects on the physical and mental well-being of those who attend the Doorstep Sport sessions.

To use sport effectively to achieve these outcomes requires the right workforce.

Investment into workforce pays dividends. Those who accessed learning from the Activator workshops increased the breadth of their local sporting offer. Half of respondents told us that they had increased the range of sports they provide at multi-sport sessions, and over a third introduced an entirely new weekly session.

The multivariate physical activity signature associated with metabolic health in children

Eivind Aadland¹, Olav Martin Kvalheim², Sigmund Alfred Anderssen³, Geir Kåre Resaland¹, Lars Bo Andersen¹

¹Western Norway University of Applied Sciences, ²University of Bergen, ³Norwegian School of Sport Sciences

Background: It is heavily debated which intensities of physical activity (including sedentary time) that are most influential for metabolic health in children. A fundamental limitation to current evidence for this relationship is the reliance on analytic approaches that cannot handle collinear variables. We therefore used multivariate pattern analysis to determine the physical activity signature related to metabolic health in children across the whole spectrum of physical activity intensities.

Methods: A sample of 841 Norwegian children (age 10.2 ± 0.3 years) provided valid data on accelerometry (ActiGraph GT3X+) and several indices of metabolic health (aerobic fitness, abdominal fatness, insulin sensitivity, lipid metabolism, blood pressure) that were used to create a composite metabolic health score. We created 16 physical activity variables covering the whole intensity spectrum (from 0 ± 100 to ≥ 8000 counts per minute) and used multivariate pattern analysis to analyze the data.

Results: Physical activity intensities in the vigorous range (5000–7000 counts per minute) were most strongly associated with metabolic health. Moderate intensity physical activity was weakly related to health, and sedentary time and light physical activity were not related to health.

Conclusion: This study is the first to determine the multivariate physical activity signature related to metabolic health in children across the whole intensity spectrum. This novel approach shows that vigorous physical activity is strongest related to metabolic health. We recommend future

studies adapt a multivariate analytic approach to further develop the field of physical activity epidemiology.

External funding details: The Research Council of Norway and the Gjensidige Foundation

UK Coaching YouGov Coaching Research Survey Overview

Beth Thompson, Craig Blain, UK Coaching

Those in receipt of coaching had “stickier” sport & physical activity habits; have increased their activity levels since the previous year; would like to do more sport or physical activity in the future.

UK Coaching commissioned YouGov to survey 20,000 adults and 1,000 children in 2017. The primary aim of the survey was to explore the participant experience of receiving coaching and the experience of being a coach. It incorporated the new broader definition of coaching, to include anyone involved in or receiving coaching across the whole sport and physical activity sector.

The majority of adults believe that coaches have a positive influence on people’s personal and professional lives, as well as that they are effective at increasing physical activity and promoting emotional health and wellbeing.

- The UK public thought that great coaching was constructive, friendly and approachable.
- The words or phrases used to describe a “coach” and “coaching” were positive. Commonly associated words were fit and healthy, knowledgeable, encouraging and enthusiastic, training, fitness and teaching.
- Nine-million+ adults received coaching in past 12 months (18% adult pop.)
- Overall, those who receive coaching report a very positive experience.
- Majority say coaching motivates them, encourages and supports them; and would recommend their coach to others.
- Those coached are more likely to rate their physical or mental health as excellent or good, compared to those not in receipt of coaching.

What are the health benefits of muscle and bone strengthening and balance activities across life stages and specific health outcomes?

Melvyn Hillsdon, University of Exeter

Introduction: Many activities of daily living require muscular strength and power as well as balance. Consequently, preserving musculoskeletal function is a prerequisite for maintaining mobility and independent living during ageing. Estimates suggest that the prevalence of physical activity guidelines for strength and balance is low.

Methods: Review of reviews of a) observation studies of the prospective association between measures of musculoskeletal fitness and health outcomes and b) randomised controlled trials of resistance, balance and skeletal impact training exercises on bone health, risk of falls, physical function, motor and cognitive function, quality of life and activities of daily living.

Results: Preserving muscular strength and power in middle and older age is associated with a reduced risk of all-cause mortality, cardiovascular mortality and impaired muscular strength/power as well as balance is associated with an increased risk of falls and lower bone mineral content. Supervised exercise interventions incorporating high intensity resistance training, vertical impacts and a balance challenge are most likely to be beneficial to overall health and wellbeing, bone health and reduce the risks of falls, when undertaken at least twice per week.

Conclusions: Adults in late middle and older age would benefit from a regular program of exercise that incorporates high intensity resistance training, impact exercises and balance challenges. How best to achieve this is unclear.

External funding details: This research was funded by a grant from The Centre for Ageing Better.

What lurks behind the curtain? A critical review of the process of developing self-determination theory-based interventions to promote physical activity in clinical populations

Eleanor Whittaker¹, Andrew Levy¹, Adrian Midgley¹, Bashir Matata²

¹Edge Hill University, ²Liverpool Heart and Chest Hospital NHS Foundation Trust

A plethora of studies apply Self-Determination Theory to explain Physical Activity (PA) behaviour and to inform interventions that aim to change PA behaviour. There is, however, a lack of clarity regarding how SDT-derived interventions to promote PA are developed. Although the EQUATOR Network has provided a standardised method of reporting intervention protocols, as well as the Medical Research Council’s (2008) Developing and evaluating complex interventions facilitating an increase in feasibility and pilot studies prior to the conduction of a randomised control trial, the initial process of intervention development is relatively under-reported. The purpose of this paper is threefold. First, to critically review the effectiveness of SDT for promoting PA in clinical populations. Second, to discuss issues relating to the development of SDT-derived interventions for PA promotion. Finally, to provide research and practical recommendations for developing SDT-derived PA interventions in a contextually-relevant manner.

External funding details: This is a PhD studentship awarded to Eleanor Whittaker by the Post Graduate Medical Institute, Edge Hill University, UK.

What types of physical activities are effective in developing muscle and bone strength and balance?

Charlie Foster, Miranda Armstrong, University of Bristol

The need to be fit, strong, fast and agile has been an evolutionary requirement since early history. In this paper we identify the effectiveness of different types of physical activity on muscle, bone and balance outcomes, and what types of physical activity contribute to the development and maintenance of these outcomes.

We undertook a purposive search of PubMed, international evidence reviews of physical activity, and asked international experts to identify review level relevant literature on the effectiveness of muscle, bone and balance training and physical activity on health outcomes.

We found consistent review level evidence that strength/resistance training as a single intervention or in combination with other activities, two/three occasions per week, were effective for muscular strength, with higher intensities of training producing greater gains. We found consistent review level evidence that strength training as a single intervention or in combination with high impact loading activities taken at least 3 times per week were effective for bone health. Physical activities with a high challenge to balance done in standing three times per week were beneficial for balance training and falls reduction.

The current UK 2011 CMO physical activity guidelines remain consistent with the most up to date review level evidence for muscle and balance health. What is now needed are examples of everyday physical activities that can support the development of MSB health, e.g. stair climbing, and their presentation to the population in messages that are accessible, understandable and effective.

External funding details: This research was funded by the Centre for ageing better