



Original/Deporte y ejercicio

The prevalence of barriers for Colombian college students engaging in physical activity

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Abstract

Objective: To investigate the prevalence of barriers and their association with Colombia college students engaging in PA.

Methods: A total of 5,663 students (3,348 male) from three cities in Colombia. In fall 2013, students voluntarily completed a demographic questionnaire, Barriers to Being Active Quiz. Logistic regression analysis of each barrier (adjusted for confusion variables: gender, age and BMI) was used for verifying such association.

Results: The most prevalent barriers in overweight individuals were "fear of injury" (87.0%), "lack of skill" (79.8%) and "lack of resources" (64.3%). The group of females revealed a protective association regarding "lack of time" (OR=0.53: 0.47-0.60 95% CI), "social influence" (OR=0.67: 0.60-0.75 95% CI), "lack of energy" (OR=0.54: 0.49-0.61 95% CI), "lack of willpower" (OR=0.57: 0.51-0.64 95% CI), "lack of skill" (OR=0.76: 0.66-0.87 95% CI) and "lack of resources" (OR=0.79: 0.71-0.89 95% CI). Such observation also appeared in the 20- to 23-year-old age group concerning "social influence" (OR=0.83: 0.74-0.94 95% CI) and in those aged over 23-years-old (OR=0.86: 0.74-0.99 95% CI) regarding "lack of energy".

Conclusion: A significant prevalence was found regarding self-perception of barriers leading to students ceasing to engage in PA.

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Keywords: Barriers. College students. Exercise. Motivation. Physical activity.

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PREVALENCIA DE BARRERAS PARA LA PRÁCTICA DE ACTIVIDAD FÍSICA EN ESTUDIANTES UNIVERSITARIOS

Resumen

Objetivo: El objetivo de este trabajo fue analizar la prevalencia de barreras y su asociación con la práctica de AF en universitarios de Colombia.

Métodos: Estudio descriptivo de corte transversal, en 5.663 sujetos (3.348 hombres), de tres ciudades de Colombia. Las razones que podrían impedir realizar AF, se evaluaron con el cuestionario de "Percepción de barreras para la práctica de la actividad física" (en inglés, *Barriers to Being Active Quiz-21 ítems*). Un análisis de regresión logística para cada barrera ajustado por las variables de confusión (sexo, edad e IMC) fue usado para verificar la asociación.

Resultados: En la población general, el "miedo a lastimarse" (89,5%) y la "falta de habilidades" (82,1%) eran, en este orden, las razones más frecuentes como barreras auto-percibidas de la práctica de AF. El grupo de mujeres mostró una asociación protectora en relación con las barreras "falta de tiempo" (OR = 0,53 IC95% 0,47-0,60), "influencia social" (OR = 0,67 IC95% 0,60-0,75), "falta de energía" (OR = 0,54 IC95% 0,49-0,61), "falta de voluntad" (OR = 0,57 IC95% 0,51-0,64), "falta de habilidades" (OR = 0,76 IC95% 0,66-0,87) y "falta de recursos" (OR = 0,79 IC95% 0,71-0,89). Esta observación también aparece en el grupo de edades comprendidas entre los 20 y 23 años en la barrera "influencia social" (OR = 0,83 IC95% 0,74-0,94), y en los mayores a 23 años (OR = 0,86 IC95% 0,74-0,99) en la barrera "falta de energía".

Conclusión: Se encontró una importante prevalencia en la percepción de las barreras para cesar la práctica de AF. Estos resultados pueden servir de referencia para las acciones específicas para promover la AF y la salud en universitarios de Colombia.

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Palabras claves: Barreras. Universitarios. Ejercicio. Motivación. Actividad física.

Introduction

Several epidemiological and experimental studies have shown the effect of physical activity (PA) and sedentary behaviour on the adolescent and adult populations' health^{1,2}. For example, it has been shown that fulfilling known recommendations regarding PA (150 minutes of PA weekly) is associated with a reduced risk of premature death and reduced risk concerning the following diseases: coronary disease, cerebral-vascular disease, hypertension, dyslipidaemia, diabetes mellitus type 2, metabolic syndrome, breast cancer, cancer of the colon and depression³⁻⁹.

Rodríguez-Romo *et al.*¹⁰, have shown that the barriers most frequently mentioned by young people concern negative experiences related to PA when they were at school, a lack of reference roles and little support from a their partners. Booth *et al.*¹¹, and Satariano *et al.*¹², have stated that the commonest barriers in the adult population are usually to do with not having enough time, a lack of sports' installations, a lack of interest and, to a lesser extent, not having companions or money, poor health, pain, having to look after children or having had negative experiences in the past.

Such broad gamut of reasons, motives and disincentives presented by people for beginning, maintaining or abandoning active life-styles has led to suggesting the need for individual strategies or strategies targeting specific groups as the most effective way of influencing reduced inactivity in determined sectors of the population¹³. The US Department of Health and Human Services provided a PA-related tool called the Barriers to Being Active Quiz (BBAQ). This questionnaire was aimed at ascertaining perception of barriers against engaging in PA by using the following domains: lack of time, social influence, lack of energy, lack of willpower, fear of injury, lack of skill and lack of resources¹⁴. This questionnaire has been used by different US entities, such as Centers for Disease Control and Prevention (CDC) and the US Department of Health and Human Services (USDHHS). It has also been used routinely in population studies in Latin America^{15,16}.

However, a lack of studies concerning the Latin population which would have led to ascertaining the perception of barriers preventing engaging in PA represents a difficulty for establishing the current situation in the Colombian population. This study was thus aimed at analysing the prevalence of barriers and its association with PA in college students in Colombia.

Methods

Sample

A cross-sectional study was carried out during 2013, involving 5,921 healthy subjects aged 18 to 30 years old from the cities of Bogotá, Cali and Medellín. Stu-

dents were informed that their participation was voluntary with no penalty for not participating. First, the exercise habits of the samples were assessed based on the international PA guidelines (USDHHS)¹⁴. Participants, who perform PA 3 or more sessions per week at moderate to vigorous intensity for 20 min or above, were classified as active. Remained participants were classified as inactive and perceived barriers to PA of them were evaluated by written questionnaire. If students decided to participate in the study, they gave consent and completed clinical test and 2 surveys. Questionnaires were completed anonymously, and students were advised that they could terminate their involvement in the study at any time. A convenience sample of at least 6,000 individuals was invited to participate in the study. Nunnally¹⁸ recommended a minimum sample size of 210 (ten subjects per item) for a 21-item questionnaire. Subjects having a medical or clinical diagnosis of systemic disease, $\geq 30 \text{ kg}\cdot\text{m}^{-1}$ BMI were excluded. The students who agreed to participate and who had signed the informed consent form were given appointments for the following procedures:

Demographic and clinical test

Each individual took part in a health survey; the resulting data concerning sociodemographic, personal and family pathological background was recorded. Each participant's height and weight according to the protocol described by López-Albán *et al.*¹⁷. The BMI was calculated in $\text{kg}\cdot\text{m}^{-1}$ from these variables and healthy subjects were defined as those having 18.5 and $25.0 \text{ kg}\cdot\text{m}^{-1}$ BMI whilst 25.1 to $30.0 \text{ kg}\cdot\text{m}^{-1}$ was classified as being overweight. Blood pressure was determined by using a digital sphygmomanometer in sitting position, following a 10-minute rest. Average blood pressure (ABP) was calculated by using the following formula: $(2 \times \text{systolic blood pressure [SBP]} + \text{diastolic blood pressure [DBP]}) / 3$ ¹⁸.

Barriers to Being Active Quiz

The BBAQ is a 21-item scale that provides a measure of 7 self-reported barriers to being physically active^{15,16}. This instrument uses a 4-point Likert scale for individuals to identify if they would say or think any of the statements would be true for them, with 0 being very unlikely to 3 being very likely. Per instrument instructions, each barrier has 3 items that are summed for scoring, with a range of 0 to 9 for each. In this instrument, the 7 perceived barrier categories are lack of time, social influences, lack of energy, lack of willpower, fear of injury, lack of skill, and lack of resources. A score of 5 or above in any category indicates that this specific category may be an important barrier for an individual to overcome. The BBAQ questionnaire's 21 items had a 0.83 Cronbach alpha, 0.46-0.87

intra-class correlation coefficient and moderate 45% to 80% temporal stability¹⁴⁻¹⁶.

Statistical Analyses

An exploratory analysis was made for determining frequency (measures of central tendency and dispersion for quantitative variables) and relative frequency distribution (qualitative variables); the 95% confidence interval (95%CI) was estimated for each percentage. A logistic regression model was used, calculating the odds ratios (OR) regarding prevalence and 95%CI between each BBAQ domain barrier and confusion variables, i.e. sex, age and BMI. IBM SPSS Statistics 20 software was used for statistical analysis; a $p < 0.05$ value was considered significant. This study was approved by the Ethics Committee for Research involving Human Beings from the centre coordinating the study, based on ontological standards recognised by the Declaration de Helsinki and the legal norms in force in Colombia regulating research involving humans (Colombian Ministry of Health resolution 008430/1993).

Results

The sample consisted of 5,921 subjects; 5,663 (95.5%) of them completed the questionnaire correctly. Table I shows that 59.1% ($n=3,348$) were males, average age was 20.8 ± 2.8 years old; the other characteristics are shown in the same table.

The main reason given for temporally or permanently abandoning PA by 4,247 of the students surveyed (89.5% of the sample) was “fear of injury”, followed by “lack of skill” (82.1%) and then closely by “lack of resources” (66.0%) and “social influence” (65.5%). Other frequently mentioned barriers for justifying such abandonment were “lack of willpower” (50.5%), “lack of energy” (40.2%) and “lack of time” (30.1%). Table II shows that “fear of injury” and “lack of skill” were the most frequently mentioned self-perceived barriers against engaging in PA in both males and females. Table II also shows that the younger students (< 20 and 20-23 years old) gave “lack of time” as the least frequent cause (36.3% and 36.6%, respectively), the respondents stating that their reduced weight was the main barrier for ceasing to engage in PA as their age advanced.

Table III shows the distribution of barriers associated with PA according to nutritional classification by BMI. The “being overweight by 25.1 to 30.0 $\text{kg} \cdot \text{m}^{-2}$ BMI” category obtained the greatest percentage of replies regarding the “fear of injury” (87.0%), “lack of skill” (79.8%), “lack of resources” (64.3%), “social influence” (62.9%) and “lack of willpower” (50.6%) barriers. “Fear of injury” and “lack of skill” were the most frequently mentioned (87.1% and 81.8%, respectively) barriers for ceasing to engage in PA in the group of responders having healthy BMI (18.5 to 25.0 $\text{kg} \cdot \text{m}^{-2}$).

The group of females in the simple regression analysis revealed a protective association regarding the barriers “lack of time” (OR=0.53, 95%CI, 0.47-0.60), “social influence” (OR=0.67, 95%CI, 0.60-0.75),

Table I
The participants' general characteristics regarding the metropolitan areas of Bogotá, Cali and Medellín, Colombia, 2013 ($n=5,663$)

Characteristic	Females ($n=2,315$)	Males ($n=3,348$)	Total ($n=5,663$)
Age (years)	20.3 ± 2.5 (20.3-20.4)	20.8 ± 2.8 (20.7-20.9)	20.5 ± 2.6 (20.5-20.6)
Weight (kg)	57.2 ± 9.3 (56.9-57.5)	67.6 ± 11.1 (67.2-68.1)	61.4 ± 11.3 (61.2-61.7)
Height (m)	1.59 ± 0.06 (1.59-1.59)	1.72 ± 0.07 (1.72-1.72)	1.65 ± 0.09 (1.64-1.65)
BMI ($\text{kg} \cdot \text{m}^{-2}$)	22.5 ± 3.4 (22.4-22.6)	22.8 ± 3.4 (22.6-22.9)	22.6 ± 3.4 (22.5-22.7)
Systolic blood pressure (mmHg)	109.1 ± 12.2 (108.7-109.5)	120.7 ± 13.7 (120.2-121.3)	113.9 ± 14.1 (113.5-114.2)
Diastolic blood pressure (mmHg)	69.0 ± 9.5 (68.7-69.3)	71.4 ± 10.6 (70.9-71.8)	70.0 ± 10.0 (69.7-70.2)
Average blood pressure (mmHg)	82.4 ± 9.3 (82.1-82.7)	87.8 ± 9.7 (87.4-88.2)	84.6 ± 9.8 (84.3-84.8)

Values are presented as the mean $\pm$ standard deviation
95%CI: 95% confidence interval
BMI: body mass index

Table II

The distribution of barriers for college students engaging in physical activity according to gender and age in the metropolitan areas of Bogotá, Cali and Medellín in Colombia, 2013 (n=5,663)

Barrier	Female (n=2,315)		Male (n=3,348)		< 20 years (n=2,477)		20 to 23 years (n=2,109)		> 23 years (n=1,077)	
	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
Lack of time	n	1,035	1,280	1,009	2,339	1,578	772	1,337	373	704
	%	44.7	55.3	30.1	69.9	63.7	36.6	63.4	34.6	65.4
	95%CI	42.7-46.8	53.2-57.3	28.6-31.8	68.2-71.4	61.9-65.6	34.5-38.7	61.3-65.5	31.9-37.3	62.7-68.1
Social influence	n	1,632	683	2,060	1,288	829	1,313	796	731	346
	%	70.5	29.5	61.5	38.5	33.5	62.3	37.7	67.9	32.1
	95%CI	70.5-79.5	61.5-38.5	70.5-29.5	61.5-38.5	31.5-35.4	60.2-64.2	35.8-39.8	65.3-70.7	29.3-34.7
Lack of energy	n	1,125	1,190	1,135	2,213	1,452	829	1,280	406	671
	%	48.6	51.4	33.9	66.1	58.6	39.3	60.7	37.7	62.3
	95%CI	46.6-50.5	49.5-53.4	32.3-35.5	64.5-67.7	56.8-60.8	37.3-41.4	58.6-62.7	34.8-40.5	59.5-65.2
Lack of willpower	n	1,471	844	1,670	1,678	1,343	1,174	935	624	453
	%	63.5	36.5	49.9	50.1	54.2	55.7	44.3	57.9	42.1
	95%CI	61.6-65.4	34.6-38.4	48.2-51.6	48.4-51.8	52.4-56.2	53.6-57.9	42.1-46.4	55.0-60.7	39.3-45.0
Fear of injury	n	2,006	309	2,924	424	2,168	1,812	297	950	127
	%	86.7	13.3	87.3	12.7	87.5	85.9	14.1	88.2	11.8
	95%CI	85.2-88.0	12.0-14.8	86.2-88.5	11.5-13.8	86.3-88.7	84.4-87.6	12.4-15.6	86.1-90.0	10.0-13.9
Lack of skill	n	1,940	375	2,667	681	1,997	1,725	384	885	192
	%	83.8	16.2	79.7	20.3	80.6	81.8	18.2	82.2	17.8
	95%CI	82.4-85.2	14.8-17.6	78.3-81.0	19.0-21.7	79.1-82.1	80.1-83.5	16.5-19.9	79.9-84.5	15.5-20.1
Lack of resources	n	1,607	708	2,152	1,196	1,630	1,397	712	732	345
	%	69.4	30.6	64.3	35.7	65.8	66.2	33.8	68	32
	95%CI	67.5-71.2	28.8-32.5	62.6-65.9	34.1-37.4	63.8-67.7	64.1-68.0	32.0-35.9	65.1-70.5	29.5-34.9

n: individuals evaluated
 %: percentage of those evaluated
 95%CI: 95% confidence interval
 (+): barrier present
 (-): no barrier

Table III
The distribution of barriers preventing college students engaging in physical activity, according to nutritional classification by BMI, in the metropolitan areas of Bogotá, Cali and Medellín, Colombia, 2013 (n=5,663)

Barrier		Healthy BMI (18.5 to 25.0 kg•m ⁻¹)		Being overweight BMI (25.1 to 30.0 kg•m ⁻¹)	
		(+)	(-)	(+)	(-)
Lack of time	n	1,627	2,830	417	789
	%	36.5	63.5	34.6	65.4
	95%CI	35.0-38.0	62.0-65.0	31.8-37.5	62.5-68.2
Social influence	n	2,934	1,523	758	448
	%	65.8	34.2	62.9	37.1
	95%CI	64.4-67.2	32.8-35.6	60.2-65.3	34.7-39.8
Lack of energy	n	1,811	2,646	449	757
	%	40.6	59.4	37.2	62.8
	95%CI	39.2-42.0	58.0-60.8	34.7-39.9	60.1-65.3
Lack of willpower	n	2,531	1,926	610	596
	%	56.8	43.2	50.6	49.4
	95%CI	55.3-58.2	41.8-44.7	47.9-53.3	46.7-52.1
Fear of injury	n	3,881	576	1,049	157
	%	87.1	12.9	87.0	13.0
	95%CI	86.0-87.9	12.1-14.0	84.8-88.9	11.1-15.2
Lack of skill	n	3,645	812	962	244
	%	81.8	18.2	79.8	20.2
	95%CI	80.7-82.9	17.1-19.3	77.5-82.0	18.0-22.5
Lack of resources	n	2,984	1,473	775	431
	%	67.0	33.0	64.3	35.7
	95%CI	65.5-68.3	31.7-34.5	61.6-66.9	33.1-38.4

n: individuals evaluated

%: percentage of those evaluated

95%CI: 95% confidence interval

(+): barrier present

(-): no barrier

BMI: body mass index

“lack of energy” (OR=0.54, 95%CI, 0.49-0.61), “lack of willpower” (OR=0.57, 95%CI, 0.51-0.64), “lack of skill” (OR=0.76, 95%CI, 0.66-0.87) and “lack of resources” (OR=0.79, 95%CI, 0.71-0.89), except for the barrier “fear of injury” (OR=1.06, 95%CI, 0.91-1.24) (Table IV). This observation also appeared in the 20 to 23 year-old age group concerning the “social influence” barrier (OR=0.83, 95%CI, 0.74-0.94) and in those over 23 years old (OR=0.86, 95%CI, 0.74-0.99) concerning “lack of energy”.

Discussion

A large volume of studies provides evidence about the effect of PA and sedentary behaviour as indepen-

dent factors concerning the health of the general population^{4,19,20}. “Fear of injury” (87.1%), “lack of skill” (81.4%) and “lack of resources” (66.4%) were the main barriers against engaging in PA mentioned by the college students being interviewed here. The first of these reasons for abandoning active engagement in PA coincided with that found in a population of older American indians²¹. Nevertheless, such findings did not agree with that presented in the Spanish population by Rodríguez-Romo *et al.*¹⁰, Serra *et al.*²², and Gyurcsik *et al.*²³, in US college students. Though the benefits obtained by being actively involved in PA and sport may outweigh the risk, it should be stated that there is a risk of suffering injury to the locomotor system and cardiovascular problems²⁴. It has been stated that some risk is caused by excessive exercise due to unsuitable

Table IV
Logistic regression by gender, age group and nutritional classification by BMI and barrier regarding college students engaging in physical activity in the metropolitan areas of Bogotá, Cali and Medellín, Colombia, 2013 (n=5,663)

Barrier	Gender	Age		Nutritional classification
	Female ^a OR (95%CI)	20 to 23 years ^b OR (95%CI)	> 23 years ^b OR (95%CI)	BMI >25.1 kg•m ⁻¹ ^c OR (95%CI)
Lack of time	0.53 (0.47-0.60)	1.01 (0.90-1.14)	0.93 (0.80-1.08)	0.92 (0.80-1.05)
Social influence	0.67 (0.60-0.75)	0.83 (0.74-0.94)	1.06 (0.91-1.24)	0.88 (0.77-1.01)
Lack of energy	0.54 (0.49-0.61)	0.92 (0.82-1.03)	0.86 (0.74-0.99)	0.87 (0.76-1.12)
Lack of willpower	0.57 (0.51-0.64)	1.06 (0.94-1.19)	1.16 (1.01-1.34)	0.78 (0.69-1.09)
Fear of injury	1.06 (0.91-1.24)	0.87 (0.73-1.03)	1.07 (0.86-1.33)	0.99 (0.82-1.20)
Lack of skill	0.76 (0.66-0.87)	1.08 (0.93-1.25)	1.10 (0.92-1.33)	0.88 (0.75-1.03)
Lack of resources	0.79 (0.71-0.89)	1.02 (0.90-1.15)	1.10 (0.95-1.28)	0.89 (0.78-1.01)

a: reference group: males

b: reference group: < 20 years old

c: reference group: BMI (18.5-25.0 kg•m⁻¹)

OR: odds ratio

(95%CI): 95% confidence interval

prescription regarding the volume and load of physical training^{25,26}. If someone perceives that they do not have the necessary skills for engaging in PA correctly, the probability of regular participation in PA becomes considerably reduced²⁷.

“Lack of ability” concerns a loss of motor performance and inability to learn new knowledge as one gets older, meaning that less complex PA programmes are needed for those interviewed which would facilitate their adherence to PA²⁸. “Lack of resources” for engaging in PA was the third self-reported barrier and several studies have reported 24.4% to 67.9% prevalence, such variability probably depending on each population’s characteristics and the different data collection devices used, but which mark this as an important obstacle which must be overcome for leading a more active life^{13-16,29}. It was seen in this work that females had higher values regarding different barriers thereby hampering their participation in these types of activity; a similar situation has been reported in Chile³⁰, North América³¹ and Colombia¹⁶ concerning college students and the urban population aged 25 to 50 years old. It was also observed that “lack of time” for the youngest students (< 20 and 20-23 years old) represented the least frequently occurring barrier (36.3% and 36.6%, respectively) for them ceasing to engage in PA.

In spite of such observation, the group of females was seen to have a protective association regarding “lack of time”, “social influence”, “lack of energy”, “lack of willpower”, “lack of skill” and “lack of resources”. Such observation was also seen regarding the 20 to 23 year-old age group concerning “social influence” and “lack of energy” in the students aged over 23 years old. This finding contradicted work by Robbins *et al.*³², who found that males perceived more barriers against PA than females; on the contrary, the

results were consistent with findings reported by Ceschini *et al.*³³, Copetti *et al.*³⁴, and Santos *et al.*³⁵, in a Brazilian population. This could have been associated with greater prevalence of sedentary behaviour in adolescents and college students, as reported in several studies^{3,20}. Researchers must thus bear the socio-cultural context in mind and each gender’s role in society, often meaning that boys receive greater immersion in PA than girls, from their infancy onwards³⁴.

Around 35% of overweight people reported “fear of injury”, “lack of skill” and “lack of resources” as barriers. Compared to a study in the USA concerning 40-64 year-old females, “lack of time” was reported with greater frequency in those reporting normal weight, whilst “lack of willpower” was greater in obese people³³. Obese participants (25 to 70 year-old females) in another study reported greater “lack of motivation” as a barrier against PA than people having normal weight (63.0% vs. 31.0%)²¹. A suitable nutritional classification in a university-type population has been related to lower perception of barriers against PA²⁹.

This study’s limitations would include the fact that the cross-sectional design did not lead to identifying causal relationships between the variables, even though some follow-up studies have confirmed the meaning of this relationship^{29,35}. Another important point concerns the fact that the barriers were self-reported and thus aspects to be considered as true motives could have been confused with possible “excuses” related to PA. Sociocultural and economic profiles of the students participated to this study may be different from the students attended to other universities in the Colombia. Nevertheless, the confusion variables most frequently associated with PA were included in the regression models (e.g. sex, age and BMI). Such findings are useful as dependent variables or for determining how to

orientate the general population, especially the university population, concerning the benefits for health of adopting active life-styles, including regular engagement in PA. They should also notify people concerning the innumerable possibilities for developing practice according to each person's characteristics, including age and physical condition, as reported by Santos *et al.*³⁵ who found that the barriers involved in self-reporting were associated with morbidity in middle-aged adults, suggesting that simply measuring the barriers could provide a useful alternative when PA cannot be evaluated objectively. In addition, participants' PA level was not objectively measured.

In summary, the present study provides relevant data on barriers to PA in Colombian university students. By revealing appreciable differences between sex, BMI and age groups, this study has specific implications for efforts perceived barriers and then recommends changes to enhance pa among young people. Promotion and intervention strategies should consider the barriers and tailor measures to the specific needs in order to reduce university student's constraints to PA.

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References

- Gordon-Larsen P, Adair LS, Popkin BM. Ethnic differences in physical activity and inactivity patterns and overweight status. *Obes Res.* 2002;10(3):141-149.
- Sattelmair J, Pertman J, Ding E, Kohl H, Haskell W, Lee I. Dose response between physical activity and risk of coronary heart disease: a meta-analysis. *Circulation.* 2011;124:789-795.
- Ramírez-Vélez R, Agredo Zúñiga RA, Jerez AM. Relación entre la composición corporal y la capacidad de ejercicio con el riesgo de enfermedades crónicas no transmisibles en mujeres jóvenes. *Apunts Medicina de l'Esport.* 2010;45(166):75-80.
- Ramírez-Vélez R, da Silva-Grigoletto ME, Fernández JM. Evidencia actual de intervenciones con ejercicio físico en factores de riesgo cardiovascular. *Revista Andaluza de Medicina del Deporte.* 2011;4(4):141-151.
- Kohl HW 3rd, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, Kahlmeier S; Lancet Physical Activity Series Working Group. The pandemic of physical inactivity: global action for public health. *Lancet.* 2012;380(9838):294-305.
- Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT; Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet.* 2012;380(9838):219-229.
- Ribeiro IC, Parra DC, Hoehner CM, Soares J, Torres A, Pratt M, et al. School-based physical education programs: evidence-based physical activity interventions for youth in Latin America. *Glob Health Promot.* 2010;17(2):5-15.
- Instituto Colombiano de Bienestar Familiar. Encuesta Nacional de la Situación Nutricional en Colombia, 2010. Bogotá: Imprenta Nacional; 2010.
- Ramírez-Vélez R, González-Ruiz K, García S, Agredo-Zúñiga RA. Sex differences in the relationship between vigorous vs. moderate intensity exercise and risk markers of overweight and obesity in healthy adults. *Endocrinol Nutr.* 2012;59(8):491-495.
- Rodríguez-Romo G, Boned-Pascual C, Garrido-Muñoz M. Motivos y barreras para hacer ejercicio y practicar deportes en Madrid. *Rev Panam Salud Publica.* 2009;26(3):244-254.
- Booth ML, Bauman A, Owen N, Gore CJ. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Prev Med.* 1997;26(1):131-117.
- Satariano WA, Haight TJ, Tager IB. Reasons given by older people for limitation or avoidance of leisure time physical activity. *J Am Geriatr Soc.* 2000;48(5):505-512.
- Rodríguez-Romo G, Mayorga JI, Merino A, Garrido M, Fernández M. La práctica, el abandono y la demanda futura de actividad física y/o deporte entre los habitantes de la comunidad de Madrid. *Kronos.* 2006;5(9):54-66.
- U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. Barriers to Being Active Quiz. In: Promoting Physical Activity: A Guide for Community Action. Champaign, IL: Human Kinetics; 1999:100-101.
- Cardona-Arias JA, EY Arroyave-Martínez. Prevalencia de hipertensión arterial en universitarios, Medellín. *Curare.* 2014;1(1):19-28.
- Arango EF, Patiño FA, Quintero MA, Arenas MM. Levels of physical activity, barriers, and stage of change in an urban population from a municipality in Colombia. *Colomb Med.* 2011;42:352-61.
- López-Albán CA, Ramírez-Vélez R, Gallardo CE, Marmolejo LC. Características morfofuncionales de individuos físicamente activos. *Iatreia.* 2008;21:121-28.
- Weiner JS, Lourie JA. Practical human biology. 1st Ed. London: Academic Press 1981. p 56. Nunnany J. Psychometric theory. 2nd ed. New York: McGraw Hill;1978.
- Hernán Jiménez, Ramírez-Vélez R. Strength training improves insulin sensitivity and plasma lipid levels, without altering body composition in overweight subjects. *Endocrinol Nutr.* 2011;58:169-74.
- Español-Moya MN, Ramírez-Vélez R. Validación del cuestionario International Fitness Scale (IFIS) en sujetos colombianos de entre 18 y 30 años de edad. *Rev Esp Salud Pública* 2014;88:271-278.
- Sawchuk CN, Russo JE, Bogart A, Charles S, Goldberg J, Forquera R, Roy-Byrne P, Buchwald D. Barriers and facilitators to walking and physical activity among American Indian elders. *Prev Chronic Dis.* 2011;8(3):A63.
- Serra JR, Generelo E, Zaragoza J. Barreras para la realización de actividad física en adolescentes en la provincia de Huesca. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte.* 2010;10(39):470-82.
- Gyuresik NC, Spink KS, Bray SR, Chad K, Kwan M- An ecologically based examination of barriers to physical activity in students from grade seven through first-year university. *J Adol Health.* 2006;38:704-11.
- Strickland D, Smith SA, Dolliff G, Goldman L, Roelofs RI. Physical activity, trauma, and ALS: a case-control study. *Acta Neurol Scand.* 1996; 94:45-50.
- Bales J, Bales K. Swimming overuse injuries associated with triathlon training. *Sports Med Arthrosc.* 2012;20:196-9.
- Kolber MJ, Beekhuizen KS, Cheng MS, Hellman MA. Shoulder injuries attributed to resistance training: a brief review. *J Strength Cond Res.* 2010;24:1696-704.
- Kulavic K, Hultquist CN, McLester JR. A comparison of motivational factors and barriers to physical activity among traditional versus non-traditional college students. *J Am Coll Health.* 2013;61(2):60-6.

28. Shea CH, Park JH, Braden HW. Age-related effects in sequential motor learning. *Phys Ther.* 2006;86:478-88.
29. Chinn DJ, White M, Harland J, Drinkwater C, Raybould S. Barriers to physical activity and socioeconomic position: implications for health promotion. *J Epidemiol Community Health.* 1999;53:191-192.
30. Olivares S, Lera L, Bustos N. Etapas de cambio, beneficios y barreras en actividad física, consumo de frutas y verduras en estudiantes universitarios de Santiago de Chile. *Rev Chil Nutr.* 2008;35:25-35.
31. Allison KR, Dwyer JJ, Makin S. Perceived Barriers to physical activity among high school students. *Prev Med.* 1999;28(6):608-15.
32. Robbins LB, Sikorskii A, Hamel LM, Wu TY, Wilbur J. Gender comparisons of perceived benefits of and barriers to physical activity in middle school youth. *Res Nurs Health* 2009;32(2):163-76.
33. Ceschini FL, Figueira Júnior A. Barreiras e determinantes para a prática de atividade física em adolescentes. *Rev Bras Cienc Mov* 2007;15(1):29-36.
34. Copetti J, Neutzling MB, Silva MC. Barreiras à prática de atividades físicas em adolescentes de uma cidade do sul do Brasil. *Rev Bras Ativ Fís Saúde* 2010;15(2):88-94.
35. Santos MS, Hino AA, Reis RS, Rodriguez-Añez CR. Prevalência de barreiras para a prática de atividade física em adolescentes. *Rev Bras Epidemiol* 2010;13(1):94-104.