

Physical Activity in Public Parks of High and Low Socioeconomic Status in Colombia Using Observational Methods

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Background: Public parks are an important resource for the promotion of physical activity (PA). This is the first study in Colombia and the fourth in Latin America to describe the characteristics of park users and their levels of PA using objective measures. **Methods:** A systematic observation assessed sex, age, and the level of PA of users of 10 parks in an intermediate-size city in Colombia, classified in low (5 parks) and high (5 parks) socioeconomic status (SES). A total of 10 daily observations were conducted, in 5 days of the week during 3 periods: morning, afternoon, and evening. **Results:** In total, 16,671 observations were completed, recording 46,047 users. A higher number of users per park, per day, were recorded in high SES (1195) versus low SES (647). More men were observed in low-SES than high-SES parks (70.1% vs 54.2%), as well as more children were observed in low-SES than high-SES parks (30.1% vs 15.9%). Older adults in high-SES parks were more frequent (9.5% vs 5.2%). Moderate to vigorous PA was higher in low-SES parks (71.7% vs 63.2%). **Conclusions:** Low-SES parks need more green spaces, walk/bike trails, and areas for PA. All parks need new programs to increase the number of users and their PA level, considering sex, age group, and period of the week.

Keywords: behavior observation, environment and public health, measurement, activities, leisure, urban planning

Noncommunicable diseases (NCDs) are among the first causes of death worldwide, represented mainly by cardiovascular disease, diabetes, cancer, and chronic pulmonary disease.¹

Among risk factors for NCDs, physical inactivity, and overweight and obesity are at the fourth and fifth places as main risk factors for death in the world, respectively. It is estimated that physical inactivity causes 6%–10% of NCDs; even so, about 44% of the population in the Americas are insufficiently active. Therefore, physical inactivity is consolidated as a risk factor similar to smoking and obesity, and it requires effective interventions.^{2,3}

Among broader models to study health situations, the ecological model assumes multiple levels of influence in human behavior, where social systems, public policy, and the physical environment are important pieces.⁴ In this context, public parks are significant environmental resources for physical activity (PA) promotion among different community groups. Thus, the physical and social aspect of parks may have a potential to become a relevant intervention in the reduction of NCDs and their risk factors in the population.⁵

Recent evidence has shown that the efforts to conserve public open spaces and the creation of new green infrastructure at a larger scale, beyond neighborhoods, may be useful and positively affect public health. Hence, public parks must be a priority when a

decision is made to invest in the conservation of lands and green spaces.⁶

Most publications studying park use have been conducted in the United States (11/17), though studies have been reported from Canada, Australia, Belgium, Taiwan, China, and Turkey, some quite urban, such as Los Angeles, as well as smaller cities, such as Ghent.^{7,8}

Studying the use of the parks in intermediate-size cities (where inhabitants ranged from 50,000 to 1 million) is relevant as these cities had 61% of the urban populations in 2011.⁹ In Latin America, it represents 29% of the population of the area and the highest growth dynamics in almost all countries in the region.¹⁰ In 2014, in Colombia, 31% of the population were found in intermediate cities, including Bucaramanga, where this study takes place.¹¹ The cities of intermediate size offer an adequate environment to boost economic and social growth; moreover, they have the possibility to assume a better planned and sustainable urban development, with an innovative management of public open spaces like parks.^{10,11}

The associations between socioeconomic status (SES) of the neighborhoods and PA of their inhabitants are scarce. In 2012, Cohen et al¹² found that park programming activities, more than safety in the neighborhoods or green areas, contribute to park use among both high- and low-poverty area populations. Nonetheless, no differences were found in observed park use by neighborhood poverty level. Leslie et al¹³ found that residents of high-SES areas live in environments that promote park use, which positively contributes to their weekly amounts of overall and recreational walking, possibly due to higher levels of perceived safety, maintenance, attractiveness, and opportunities for socialization in parks. They also reported higher levels of neighborhood crime safety, aesthetics, and traffic safety.

In the body of literature, only Brazil (in the cities of Curitiba¹⁴ and Recife¹⁵) and Uruguay (Montevideo¹⁶) have published patterns of park use. In Colombia, a recent publication shows the effects of

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urban parks on the well-being of populations in different SES.¹⁷ This is the first study to provide objective data on the profile of park users in Colombia, and it contributes to document the scientific evidence in Latin America and the world on the importance of parks as a public resource to promote PA, health, and well-being of the population, also including cultural patterns of different uses. The aim of this study was to describe the characteristics of park users and their PA levels, comparing parks in high- and low-income regions, in an intermediate-size city in Colombia.

Methods

Location of the Study

Bucaramanga is an intermediate city in Colombia, located in the Cordillera Oriental (Andean mountain range). It has a municipal area of 165 km², mean temperature of 23°C year-round, and 529,785 inhabitants. The land is 15% plane, 30% waved, and 55% inclined; it is divided into 17 regions (urban administrative units) categorized according to geographic location. In addition, buildings and areas of the city are divided into 6 categories, which determine SES, differences in infrastructure, property value, and public service, from lowest (1) to highest (6).

The city has united with the initiative “Emerging and Sustainable Cities” from the Inter-American Development Bank, which determined Bucaramanga presents a deficit in public space with a mean 4.53 m²/inhabitant, whereas the ideal international level is of 10–15 m²/inhabitant.¹⁸ The analysis of the indicators for the city led the “action plan” for the city in areas, such as territorial planning, transportation, mobility and environment, and attention to climate change. For example, Bucaramanga could increase and optimize public space and green areas, as well as generate options for active mobility to improve the quality of the urban environment.¹⁸

In Bucaramanga, there is a total of 147 parks, distributed as follows: 17 metropolitan parks (≥25 ha), from which only 3 are available to public service because they are green areas, around the ravines in areas of scarp, without equipment for the use of visitors; 10 zonal parks (≥1.5; <25 ha), 83 local/neighborhood parks (≥0.1; <1.5 ha), and 37 pocket parks (<0.1 ha).

Study Design and Sample Selection

Between August and December 2015, a cross-sectional study was conducted in 2 zonal and 8 local parks of the city. The selection criteria were “access” (the community has free access to the park because of a nonexistent or partial enclosure); “operation and function” (the park accomplishes the role described by the Land Use Plan (Plan de Ordenamiento Territorial)¹⁹ for local parks (free sports, games for children and adults, active and passive recreation with equipment, and areas for free sports); and “safety” conditions during the inspection visit.

Methods for Observation of Park Users

Instrument. For the observations, the System for Observing Play and Recreation in Communities (SOPARC)²⁰ was used. It is based on systematic observations (scans) of selected areas (target areas), such as courts, trails, and outdoor gyms. Scans are conducted from left to right (~1 s/person), with a mechanical counter (used in the 3 parks with the highest crime rate) or the app for iPads (iSOPARC)²¹ to register the data. SOPARC has been widely used to assess public areas and parks and provides information on the people observed

according to age groups (children: 1–12 y old, adolescents: 13–20 y old, adults: 21–59 y old, and older adults: >60 y old); sex (male/female); and level and type of PA (sedentary, walking/moderate, and vigorous). It also includes the main activity (eg, walking, soccer) in the target area. Its psychometric properties are satisfactory, and recently, its utility and reliability have been tested for its use in public health with interobserver agreement over 80%.²²

This instrument was adapted from the Brazilian version, translated into Spanish. A native Spanish speaker, with fluent knowledge of Portuguese, translated the observation protocol and the forms. In the version for iPad (iSOPARC), the English version was used and applied in 7 of the 10 parks with higher levels of safety.

Assessment of Target Areas. The target areas in parks were identified and coded, according to the type of infrastructure for PA, into 6 categories: (1) courts (basketball, soccer—grass and pavement, tennis, and volleyball); (2) outdoor gyms (mechanical installations consisting of a variety of robust fixed equipment targeting fitness, strength, and balance like spinning bike, recumbent bike, chess press station, or cardio walker station among others); (3) children’s areas (playgrounds); (4) fitness stations (equipments such as parallel bars or push-up bars, sit-up bench, among others); (5) walking/bike trails; and (6) other (such as green areas, plazas, and roundabouts). Maps were created for each park, delineating target areas that were evaluated and coded according to the type of area, as well as the presence of structures for PA and type of surface.

Observation of Park Users. The observations with SOPARC were conducted between September and December 2015. Date and time of observations were registered, and 2 periods were defined: week (Tuesday, Wednesday, and Thursday) and weekends (Saturday and Sunday). The same was done for periods of the day: morning (6:00–11:00 AM), afternoon (3:00–6:59 PM), and evening (7:00–8:00 PM). The observations of target areas were conducted at each hour, with a total of 10 observation hours per day and 50 weekly hours per park.

Training of Observers

Observers were trained by 2 researchers with expertise in the use of SOPARC and were part of the team to validate iSOPARC. The training included lecture and practice (58 h). The observers were trained in coding conventions and categories of PA and age groups by sex. Furthermore, they were instructed to register and complete the SOPARC form and learned to use iSOPARC. The materials were obtained from the Active Living Research website,²⁰ and the tutorial developed for the iPad application. Prior to data collection, 3 pilot tests were conducted for training of the fieldwork team, composed by 2 professionals in physical therapy and 4 senior undergraduate students in physical culture and sport, to standardize the procedures for both SOPARC and iSOPARC. In addition, a webpage was published (<http://geomatiga.uis.edu.co/actividadfisicayparques/>), so the community could consult basic information regarding the project.

In the third test, reliability was assessed with 840 iSOPARC observations, corresponding to 140/observer. Moreover, 156 observations were recorded with mechanical counters, equivalent to 26 observations per each of the 6 observers. The intraclass correlation coefficient for measurement with iSOPARC ranged between .78 and .81 for age group and between .79 and .94 for PA. With the mechanical counter and paper forms, the intraclass correlation

coefficient ranged from .83 to .98 for age group and from .65 to .90 for PA level. All data were entered in duplicates and validated in Stata 14.1 (Stata Press, College Station, TX) prior to analysis.

Geographic Information System Data

The terrain in Bucaramanga conditions participants to live in areas adjoining the escarpment of the plateau; therefore, an analysis by service areas or clusters was conducted. The park's socioeconomic level was calculated by the sum of the SES of each building and divided by the number of buildings in a service area of 500 m surrounding the park by the road network. Based on this, the parks were classified in 2 SES categories: low (1–3) and high (4–6; Figure 1), based on neighborhood income according to the categories available in Colombia, from 1 (lower) to 6 (higher).²³



Figure 1 — Parks distribution by socioeconomic status, in Bucaramanga, Colombia 2015.

Analysis. Park area (in meters squared) and population density (number of inhabitants per age groups of children: 0–9 y, adolescents: 10–19 y, adults: 20–59 y, and older adults: ≥60 y) were calculated using population projections based on the latest national census in 2005.²⁴ Population density was calculated from a 500-m buffer from the centroid of the park, by the sum of the areas of each one of the polygons of the blocks within the buffer. The information was processed in ArcGIS 9.0 (Esri Inc, Redlands, CA).

All analyses were performed according to park SES (low/high), period of the week (week/weekends), period of the day (morning/afternoon/evening), and PA area according to the previous description. For comparison, chi-square test was performed. All analyses were performed in Stata 14.1, and the level of significance was set at $P < .05$.

The study was approved by the internal review board for human subjects of the Facultad de Salud, Universidad Industrial de Santander (Acta 12 of May 3, 2014).

Results

Sample and General Patterns of Park Use

The mean area of the ten parks evaluated was 123,000 m². The total of 139 target areas showed a mean area was 198.4 m². A total of 16,673 observations were completed, and 46,047 users were observed, mostly in high SES (64.9% vs 35.1%). We found 920 users per park, per day and 92 users per park, per day, per observation period (Table 1).

The distribution by sex and age group showed a higher percentage of males (70.1% vs 54.2%) and children (30.1% vs 15.9%) in low-SES parks and more adults (59.1% vs 46.1%) and older adults (9.5% vs 5.2%) in high-SES parks (Table 1).

Differences by Period of Week

A higher percentage of females, children (53% vs 37.2%), and adults (62.2% vs 46.1%) was found in low-SES parks for weekdays; for weekend days, more females, children, and adults were registered in high-SES parks (Table 2). The distribution for male showed higher percentages for children (66.1% vs 48.3%) and adolescents (54.2% vs 45.7%) in high-SES parks for weekdays; for weekend days, higher percentages for children and adolescents were registered in low-SES parks (Table 2).

Differences by Period of Day

In low-SES parks, the period of the day from 6:00 to 11:00 AM showed more female older adults (80.1% vs 69.0%), as well as the period of the day from 7:00 to 8:00 PM showed more female children and adolescents. The high-SES parks recorded more adolescent females during the period from 6:00 to 11:00 AM (21.8% vs 8.2%), as well as more female adults and older adults from 3:00 to 7:00 PM (Table 2). For males, more adolescents were observed (31.3% vs 24.3%), and more adults (35.7% vs 27.8%) were observed in low-SES parks from 7:00 to 8:00 PM when compared with high-SES parks (Table 2).

Differences by Main Activity and Use of Areas

The distribution of the main activity according to park SES showed a higher proportion of empty areas (68.8% vs 58.4%) and soccer (8.1% vs 2.7%) for low-SES parks. On the other hand, the percentage of outdoor gyms (9.0% vs 6.1%), walking trails

Table 1 Park Use Patterns by Neighborhood SES, in Bucaramanga, Colombia, 2015

Variable	Low SES (1–3)		High SES (4–6)		χ^2	P	Total	
	N	%	N	%			N	%
Total users	16,173	35.1	29,874	64.9			46,047	100
Total number of people observed in a park per day ^a	647		1195				920	
Total number of people observed in a park per observation period ^b	65		119				92	
Sex								
Female	4842	29.9	13,675	45.8	1100	<.0001	18,517	39.7
Male	11,331	70.1	16,199	54.2			27,530	60.3
Age group								
Children	4874	30.1	4752	15.9	1600	<.0001	9626	21.0
Adolescents	2990	18.5	4632	15.5			7622	16.5
Adults	7463	46.1	17,656	59.1			25,119	54.5
Older adults	846	5.2	2834	9.5			3680	8.0
Physical activity level								
Sedentary	4349	28.3	10,394	36.8	428.4	<.0001	14,743	33.8
Moderate	6235	40.6	11,213	39.7			17,448	40.0
Vigorous	4771	31.1	6651	23.5			11,422	26.2
Week period								
Weekdays	8723	53.9	13,544	45.3	310.6	<.0001	22,267	48.4
Weekend days	7450	46.1	16,330	54.7			23,780	51.6
Day period								
6:00–11:00 AM	4328	26.8	8674	29.0	174.2	<.0001	13,002	28.2
3:00–7:00 PM	7215	44.6	14,314	47.9			21,529	46.8
7:00–8:00 PM	4630	28.6	6886	23.1			11,516	25.0

Abbreviation: SES, socioeconomic status.

^aTotal number of people observed in a park per day = total number of people observed/(total number of study parks × number of observed days × number of seasons).

^bTotal number of people observed in a park per observation period = total number of people observed in a park per day/number of observation periods.

(9.0% vs 3.8%), standing (6.1% vs 2.7%), sitting (5.4% vs 1.9%), and basketball (3.3% vs 1.2%) was higher for high-SES parks (Figure 2).

Regarding the use of areas in low-SES versus high-SES parks, courts and children's areas were used more often by female children (28% vs 13.6% and 53.2% vs 25.6%) in low-SES parks and by male children (57.7% vs 31.1% and 32.4% vs 18.5%) in high-SES parks (Table 3). Similar results for courts were found for female, adults, and older adults for low-SES parks versus high-SES parks. Males of all age groups used courts more frequently in low-SES parks; also, children's areas for children and older adults, as well as outdoor gyms for older adults (Table 3).

On the other hand, walking/bike trails, as well as other areas (green spaces, plazas, and roundabouts), were used by both males and females in high-SES parks (Table 3).

Differences by PA Level

On PA levels, sedentary activity showed a higher proportion in high-SES parks (36.8% vs 28.3%) and vigorous PA showed a higher proportion in low-SES parks (31.1% vs 23.5%). Significant differences were observed during weekend days, with higher proportion of moderate to vigorous physical activities for low-SES parks (61.6% vs 53.4%) and (76.4% vs 61.5%) for females and males, respectively. No significant differences were found during weekdays (Figure 3). When analyzing the proportion of moderate

to vigorous PA according to period of the day, more women were observed in low-SES parks versus high-SES parks during the periods of 6:00–11:00 AM (79.5% vs 74.3%) and 7:00–8:00 PM (64.8% vs 54.8%). For males, the differences were significant in favor of low-SES parks in the 3 periods (Figure 4).

Regarding PA level by areas, higher moderate to vigorous PA was observed in courts in high-SES parks when compared with low-SES parks for females (73.1% vs 68.4%) and males (79.9% vs 78.2%). Moderate to vigorous PA was registered for high-SES parks in other types of areas. On the other hand, in outdoor gyms and fitness stations, moderate to vigorous PA was higher for males in low-SES parks (72.3% vs 67.4%) and (58.7% vs 49.7%), respectively, when compared with high-SES parks (Figure 5A and 5B).

Discussion

This is the first study in Colombia and the fourth in Latin America that applied objective measures to determine the use of parks and PA levels in public parks, according to their SES (low and high) in an intermediate-size city in Colombia.

Comparing some methodological aspects with other studies, the observations were conducted for 5 days in each park, similar to Evenson et al,⁷ with a mean of 6.5 days (between 1 and 16), although the daily number of observations was lower (mean = 4,

Table 2 Characteristics of Age Group of Parks Users According to Sex, Day of the Week, and Period of the Day by Neighborhood SES, in Bucaramanga, Colombia, 2015

Category	Female						Male					
	Low SES (n = 4842)			High SES (n = 13,675)			Low SES (n = 11,331)			High SES (n = 16,199)		
	Children	Adolescents	Older adults	Children	Adolescents	Older adults	Children	Adolescents	Older adults	Children	Adolescents	Older adults
Day of week												
Weekdays, N (%)	838 (53.0)	242 (48.3)	1425 (62.2)	347 (74.0)	808 (37.2)	716 (41.3)	3741 (46.1)	1211 (72.9)	1592 (48.3)	1137 (45.7)	2591 (50.1)	1571 (54.2)
Weekend days, N (%)	742 (47.0)	259 (51.7)	867 (37.8)	122 (26.0)	1362 (62.8)	101 (58.7)	4370 (53.9)	450 (27.1)	1702 (51.7)	1352 (54.3)	2580 (49.9)	1328 (45.8)
χ^2 (P)		99.91 (<.0001)				554.48 (<.0001)				32.36 (<.0001)		217.4 (<.0001)
Period of day												
6:00–11:00 AM, N (%)	227 (14.4)	41 (8.2)	852 (37.2)	376 (80.1)	280 (12.9)	378 (21.8)	2700 (33.3)	1146 (69.0)	762 (23.1)	329 (13.2)	1542 (29.8)	620 (21.4)
3:00–7:00 PM, N (%)	858 (54.3)	280 (55.9)	883 (38.5)	65 (13.9)	1352 (62.3)	937 (54.1)	3645 (44.9)	409 (24.6)	1823 (55.3)	1381 (55.5)	1781 (34.4)	1576 (54.4)
7:00–8:00 PM, N (%)	495 (31.3)	180 (35.9)	557 (24.3)	28 (6.0)	538 (24.8)	418 (24.1)	1766 (21.8)	106 (6.4)	709 (21.5)	779 (31.3)	1848 (35.7)	703 (24.3)
χ^2 (P)		901.49 (<.0001)				1500 (<.0001)				770.4 (<.0001)		618.6 (<.0001)

Note. Boldface indicates significant associations.
Abbreviation: SES, socioeconomic status.

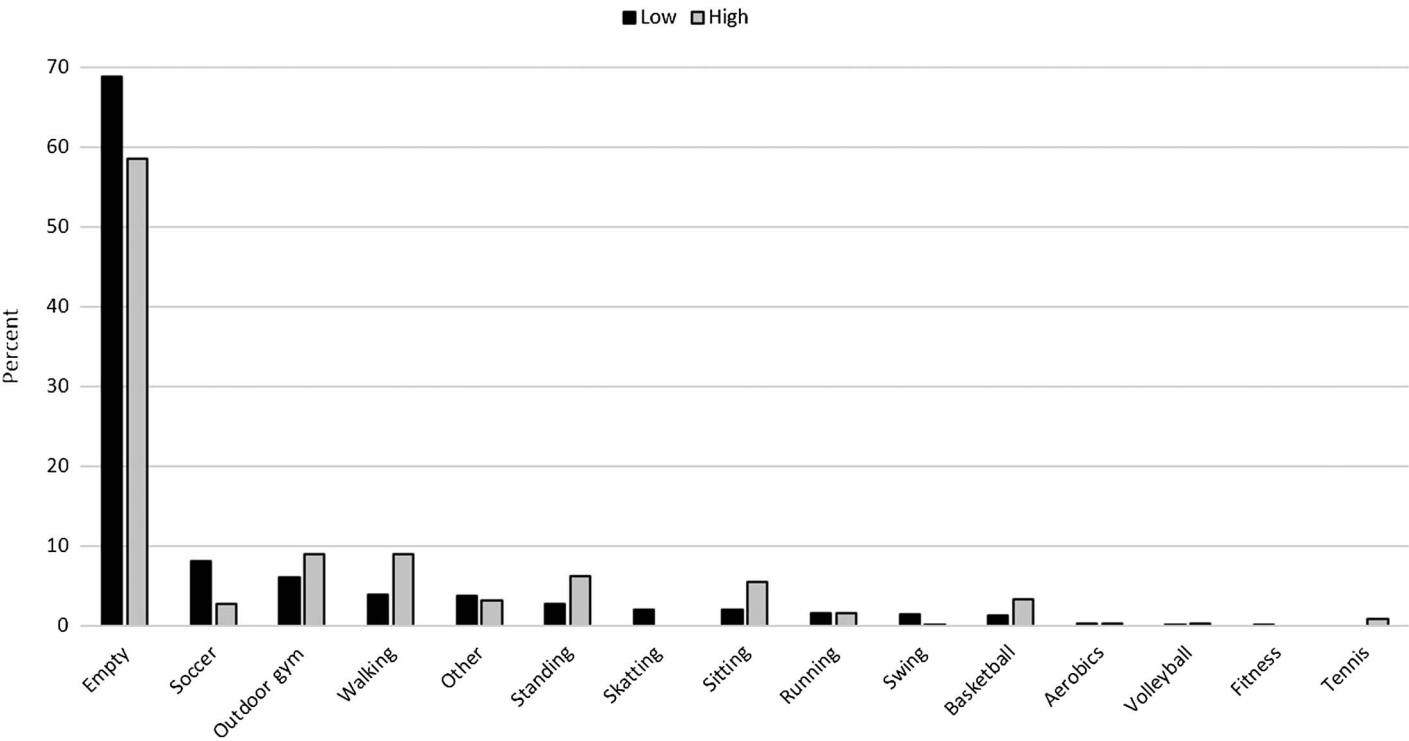


Figure 2 — Principal activity in target areas by socioeconomic status of the parks, in Bucaramanga, Colombia 2015.

between 1 and 14). Joseph and Maddock⁸ reported a mean of 13 parks being studied (between 2 and 30) and mean of 9 days of observation (between 1 and 30). Most studies only analyzed 1 season, similar to our study. The number of users in 2 reviews was lower compared with our data, 17,752 (97–213,708)⁷ and 18,687 (1231–76,632).⁸ In Bucaramanga, a total of 46,047 users were observed. At the same time, Evenson et al⁷ reported a mean of 165.7 users per park, per day and 38.4 users per park, per observation period, which is lower when compared with our data with 920 and 92 users, respectively.

The differences in the number of park users can be explained by some aspects, such as the proximity of the parks to their residences. Besides, all parks studied are public and remain open to the citizens 24 hours a day; but 1 aspect that should be noted is the temperature, as there is moderate variability in the day, early in the morning (4:00 AM and 6:00 AM) ranging from 17°C and 20°C, increasing at noon to 30°C–31°C and decreasing to 22°C–23°C after 5:00 PM. This generates a wider range of time to use parks. Also, it facilitates observation periods from 6:00 AM to 8:00 PM, allowing for 10 daily measurements per park, more than double the median of other studies.⁷

It is important to highlight that users visit parks before 5:00 AM and after 9:00 PM, and it is even possible to find people at 11:00 PM (data not shown) visiting parks, an observation not mentioned in the reviewed studies.^{7,8,14,15} In the culture of the citizens of Bucaramanga, the suspension of work activities at midday, between 12:00 and 2:00 PM, is very deep-rooted, possibly explained by the increase in temperature, in addition to family customs of meeting at lunchtime, rest and take a nap before returning to work. On the other hand, Bucaramanga is an intermediate city, where the distances are short for the population, which makes it possible for them to travel home at noon. It should be

noted that most of the economic activity in both public and private offices close in this time slot.

The proportion of males found in this study (60.3%) has been showed in other studies. Joseph and Maddock⁸ (54.9%), Evenson et al⁷ (57.2%), Parra et al¹⁵ (56%), Hino et al¹⁴ (63.1%), and Del Campo Vega¹⁶ (56%) found a similar trend to different studies from the United States; however, in other countries like China, Taiwan, and Australia, the distribution by sex was higher for females⁸ because the parks represent a meeting place for PA and socialization with an increased perception of safety.

On moderate to vigorous PA levels, a higher percentage was observed in low-SES parks (71.7%), with a distribution slightly higher over weekends in high-SES parks (54.7%) and from periods 3:00–7:00 PM (46.8%), followed by 6:00–11:00 AM (28.2%) for both SES. The prevalence is higher in both reviews^{7,8} (55% and 61.5%), as well as in Recife¹⁵ (18%) and only slightly lower when compared with Curitiba¹⁴ (74%–77%) for males and females, respectively. In Curitiba,¹⁴ children visited parks on weekend days, adults and older adults during weekdays; the period from 7:00 to 8:00 AM, was preferred by adults and older adults, while children and adolescents were more frequent between 11:00 AM and 12:00 PM and from 5:00 to 6:00 PM. In Recife,¹⁵ there was an increase in visits during the afternoon compared with the morning (54% vs 46%), though data are not presented for period of the week.

The behavior of users during these periods may be explained by work and school times in Colombian cities. In general, children are in academic activities during the morning, which conditions free time to be spent in the afternoon for younger children and after 3:00–4:00 PM for adolescents. Moreover, work journeys start after 8:00 AM for adults, whereas older adults, if retired, usually start daily routines early in the morning, facilitating the visit to the park in the first period.

Table 3 Characteristics of Age Group of Parks Users According to Sex and Activity Area by Neighborhood SES, in Bucaramanga, Colombia, 2015

Physical activity area	Female						Male					
	Low SES (1–3), n = 4842			High SES (4–6), n = 13,675			Low SES (1–3), n = 11,331			High SES (4–6), n = 16,199		
	Children	Adolescents	Older adults	Children	Adolescents	Older adults	Children	Adolescents	Older adults	Children	Adolescents	Older adults
Court, N (%)	443 (28.0)	193 (38.5)	881 (38.4)	256 (54.6)	296 (13.6)	1615 (19.9)	1902 (57.7)	2040 (82.0)	3851 (74.5)	156 (41.4)	1728 (59.6)	2800 (29.3)
OG, N (%)	293 (18.5)	121 (24.1)	901 (39.3)	160 (34.1)	363 (16.7)	1285 (15.8)	299 (9.1)	124 (5.0)	782 (15.1)	117 (31.0)	111 (3.8)	1163 (12.2)
Children, N (%)	840 (53.2)	184 (36.7)	488 (21.3)	50 (10.7)	556 (25.6)	593 (7.3)	1069 (32.4)	240 (9.6)	389 (7.5)	98 (26.0)	190 (6.5)	461 (4.8)
Fitness, N (%)	2 (0.1)	2 (0.4)	13 (0.6)	3 (0.6)	101 (4.6)	756 (9.3)	23 (0.7)	84 (3.4)	133 (2.6)	1 (0.3)	234 (8.1)	1250 (13.1)
Walk path/ bike path, N (%)	2 (0.1)	1 (0.2)	9 (0.4)	0 (0)	82 (3.8)	857 (10.6)	1 (0.03)	1 (0.04)	16 (0.3)	5 (1.3)	144 (5.0)	882 (9.2)
Others, N (%)	0 (0)	0 (0)	0 (0)	0 (0)	772 (35.6)	3005 (37.0)	0 (0)	0 (0)	0 (0)	0 (0)	492 (17.0)	2989 (31.3)
χ^2 (P)	596.4 (<.0001)			1400 (<.0001)			1400 (<.0001)			2200 (<.0001)		

Note. Boldface indicates significant associations.
Abbreviation: SES, socioeconomic status.

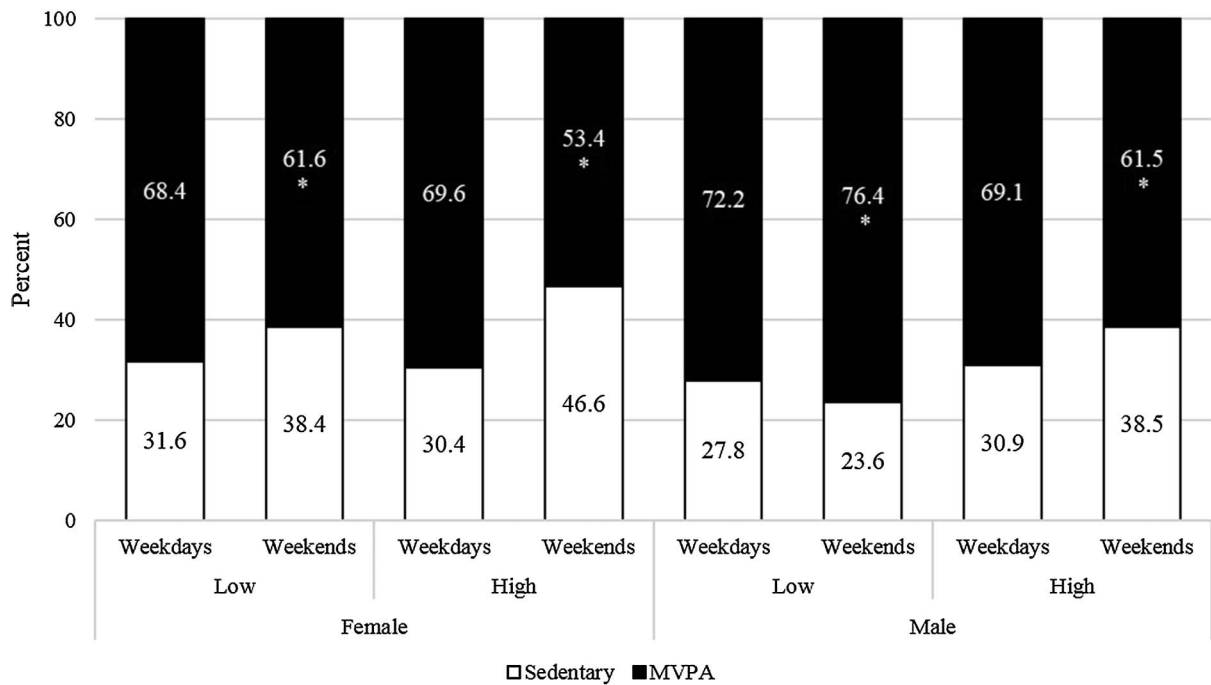


Figure 3 — Physical activity level by sex, socioeconomic status of the parks, and period of the week, in Bucaramanga, Colombia 2015. MVPA indicates moderate to vigorous physical activity. * $P < .0001$.

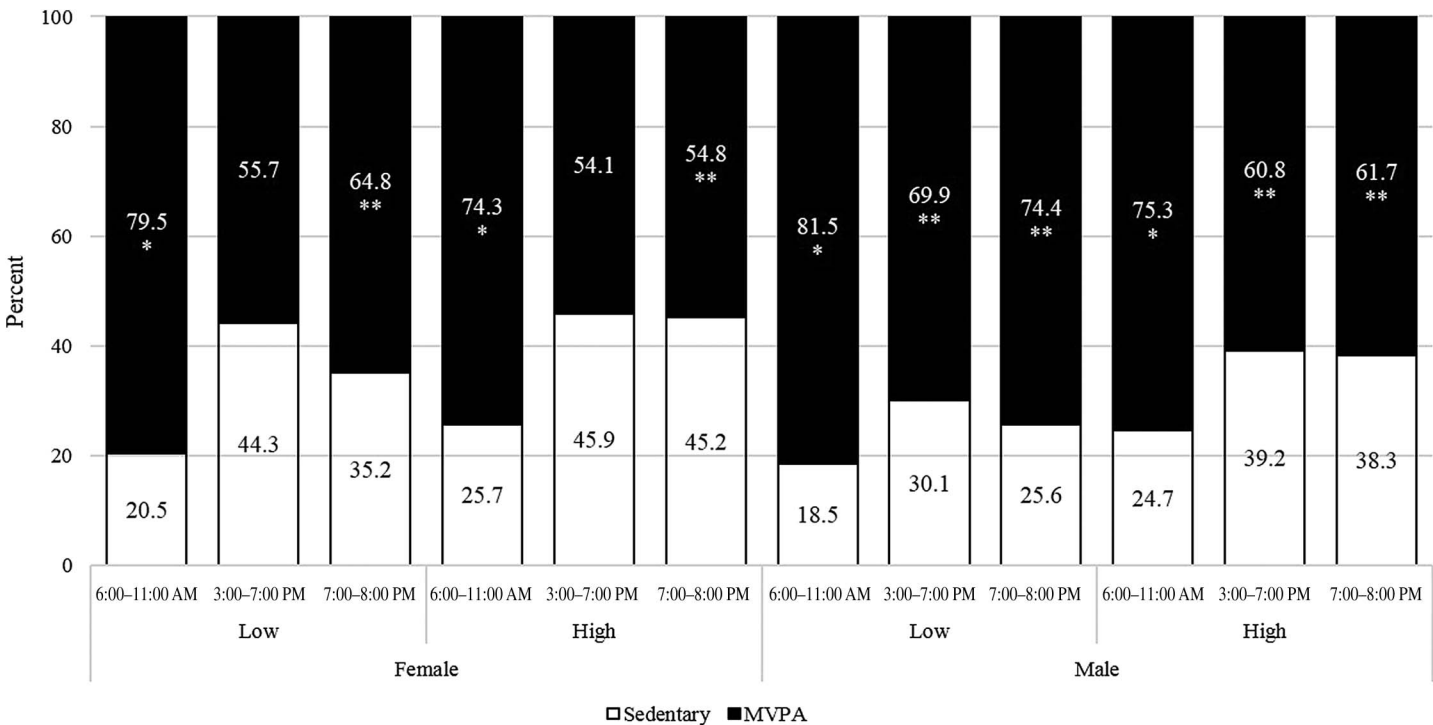


Figure 4 — Physical activity level by sex, socioeconomic status of the parks, and period of the day, in Bucaramanga, Colombia 2015. MVPA indicates moderate to vigorous physical activity. * $P < .01$. ** $P < .0001$.

Associations With SES of the Parks

Regarding the possible effect of the SES of the neighborhood on the visit to the park for PA and recreation, Leslie et al¹³ found a higher mean frequency for high-SES residents which could be

explained by higher levels of crime and traffic safety, maintenance, and more opportunities for socialization, which were positively associated with walking for recreation and total walking by week. Also, Cohen et al²⁵ demonstrated that parks in

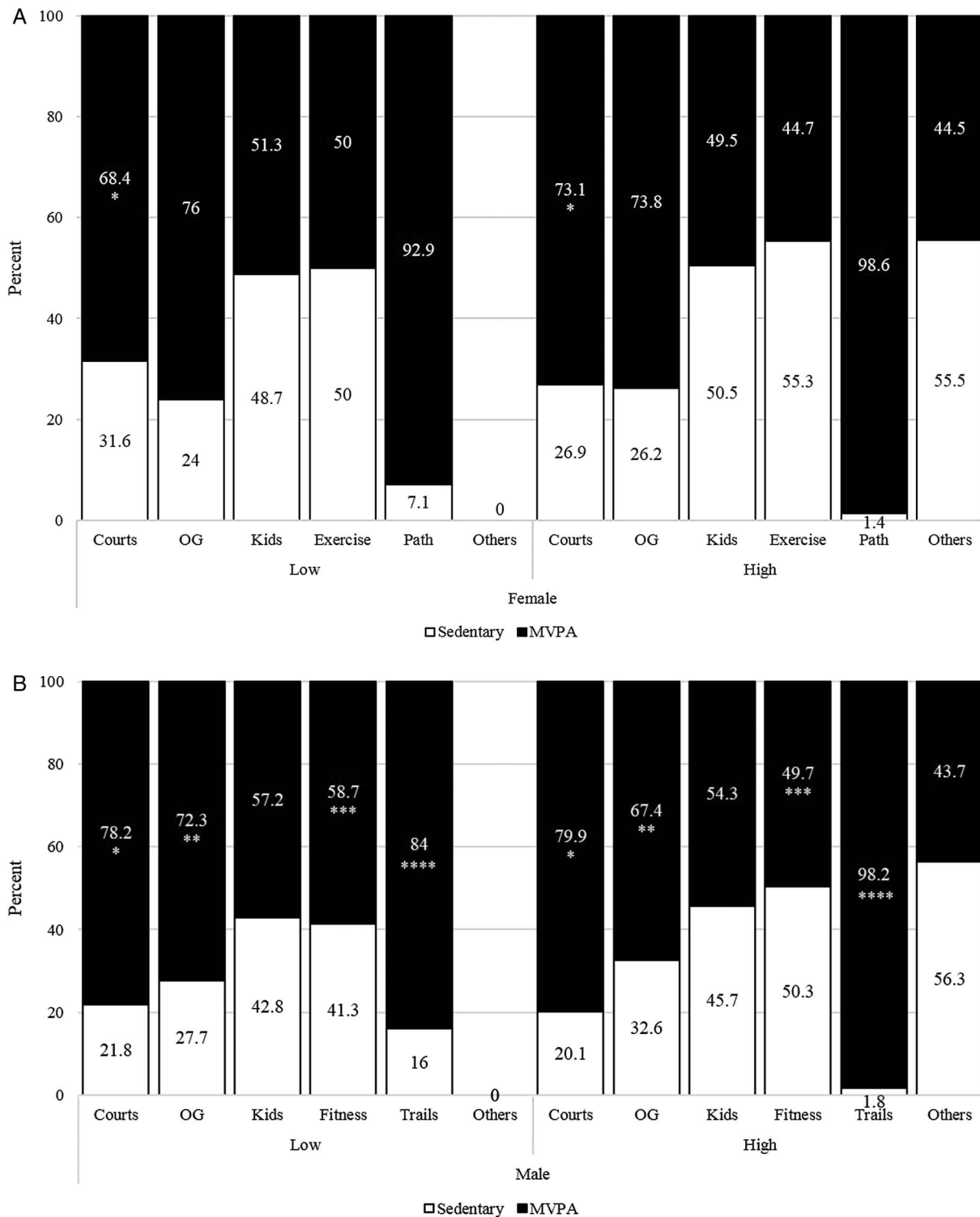


Figure 5 — Physical activity level for (A) female sex, socioeconomic status of the parks, and physical activity areas (* $P < .0001$) and (B) male sex, socioeconomic status of the parks, and physical activity areas (* $P = .03$; ** $P = .003$; *** $P = .01$; **** $P = .0001$), in Bucaramanga, Colombia 2015. MVPA indicates moderate to vigorous physical activity; OG, outdoor gyms.

high-poverty areas were used less than parks in low-poverty neighborhoods.

The higher proportion of females, children, and adults in low-SES parks during the week and high-SES during weekends could

be due to girls going to playgrounds for games and recreation. Furthermore, it is possible that during weekend days, adults in high-SES parks have more free time to spend with the girls. Also, the high-SES parks showed a better quality score²⁶ assessed with

Physical Activity Resources Assessment, which probably contribute to their higher use.

Even though older adults represent a smaller fraction of park users, they are the higher proportion during the 6:00- to 11:00-AM period, higher for females in low- versus high-SES, possibly explained by the time available and routines established for seniors, mostly retired; also, different senior citizens groups, socially organized by neighborhoods, participate in leisure-time activities by their own initiative (data not shown). Moreover, the organized older adults' groups in the city are supported by the municipal government, with different social and cultural programs by administration period.²⁷

In parks classified as low SES, all age groups and specially females were mostly observed in courts, outdoors gyms, and playgrounds, which probably was associated with a higher infrastructure of courts and sport fields in low-SES parks²⁶ showing differential opportunities and preferences of the citizens. Pineda²⁸ established a higher use of trails in high-SES parks (55%) compared with low-SES parks (37.9%) and athletic fields in low-SES parks (50.6%) versus high-SES parks (37.7%). This is relevant because it shows how spaces available for recreation, leisure, and sport could be an opportunity for decision makers to improve the quality and availability of these spaces for the community.

PA levels were higher for males and females in low-SES parks, especially during weekend days, as well as periods from 6:00 to 11:00 AM and from 7:00 to 8:00 PM for females and all periods for males. Only courts located in parks in high SES showed differences in favor of moderate to vigorous PA for females. Parks in low SES registered higher levels of PA for outdoors gyms and exercise stations. Courts, trails, and other areas had higher frequency of moderate to vigorous PA in high-SES parks, like Floyd et al,²⁹ who reported a higher energy expenditure per person in high neighborhood income. Parra et al¹⁵ also reported higher proportion of moderate to vigorous PA in urban parks located in the rural community, of high- versus low-SES parks, with the program *Academia da Cidade* (66% vs 56.9%) and without the program (71.5% vs 55.3%).

A possible explanation for this phenomenon can be the nature of the areas, as courts, outdoors gyms, exercise stations, and trails are inviting for PA, while green spaces, roundabouts, and plazas, located only in high-SES parks are inviting for sedentary activities, such as talking and hanging out.

Among the strengths of this study, it is important to highlight that this is the first study in Colombia that reports objective data on the use of parks. This information is useful for decision making in public policy related with parks as part of the public space and built environment in Colombia and Latin America. In addition the use of objective and standardized evaluation methods allow comparisons valid with other studies.

Nonetheless, it has limitations derived from the cross-sectional design and nonprobabilistic sampling of parks, for which probably do not represent the entire population and parks from Bucaramanga, as many were excluded due to safety, vandalism, and drug trafficking and did not offer the minimum safety conditions for fieldwork.³⁰ However, the sample included 10 of the 30 most recognized parks in the city, according to a report from the municipal government.³¹ It is important to notice that not all parks in Bucaramanga had PA areas, as they were classified as plazas or squares.

The conclusions of this study are important to highlight the broad use of parks, especially during weekends and early in the morning by older adults, and in the afternoon and evening by children, adolescents, and adults. Likewise, the availability of sports facilities, such as courts, outdoors gyms, and bike trails, are a good strategy to promote PA in the population. It is necessary to improve,

maintain, and conserve the public parks, as an equitable strategy for the promotion of health and quality of life of the citizens. The results from Bucaramanga show clearly the need to implement programs and activities with potential to increase the use of these spaces by the population, especially females (less active) and older adults, to decrease differences determined by socioeconomic levels.

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