Journal of Physical Activity and Health, (Ahead of Print)
https://doi.org/10.1123/jpah.2022-0305

Human Kinetics
ORIGINAL RESEARCH

Physical Activity and Sitting Time Patterns and Sociodemographic Correlates Among 155,790 South American Adults

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Background: To estimate the prevalence of different physical activity (PA) domains and sitting time (ST), and to analyze the association with sociodemographic indicators. ***Methods:*** Data from the most recent nationally representative survey from each of the South American countries, comprising 155,790 adults (18–64 y) were used. Data on leisure-time, transport, and occupational PA (all 3 domains as nonzero), total PA (≥150 min/wk), and ST (≥8 h/d) were assessed by specific questionnaires in each survey. Gender, age group (18–34, 35–49, and 50–64 y), and education (quintiles) were used as sociodemographic factors. Random effect meta-analysis of the association between sociodemographic factors and PA and ST were conducted. ***Results:*** The prevalence of PA guidelines compliance and elevated ST in South America was 70.3% and 14.1%, respectively. Women were less likely to achieve the recommended levels of total and domain-based PA. Participants in the highest quintile of education were more likely for elevated ST (2.80, 2.08–3.77), lower occupational PA (0.65, 0.44–0.95), but higher leisure-time PA (3.13, 2.31–4.27), in comparison with lowest quintile. Older adults were less likely to participate in total and leisure-time PA. ***Conclusion:*** Our findings highlight the urge to tackle the inequalities in PA practice in South America, especially gender and education inequalities, for leisure-time PA.

Keywords: exercise, inequalities, sedentary behavior, social determinant of health

Physical activity practice is a well-known protective factor for different chronic diseases and mental disorders, and it is also associated with reduced premature mortality and prolonged life expectancy.[1,2] In Latin America, it is estimated that eliminating physical inactivity would produce a reduction of 11.4% in the all cause-mortality. Among the cause-specific mortality, eliminating physical inactivity would reduce mortality due to coronary heart disease in 7.1%, type 2 diabetes in 8.7%, breast cancer in 12.5%, and colon cancer in 12.6%. It is worth highlighting that the impact of eliminating physical inactivity in Latin America is considerably higher than the worldwide estimate (ie, 9.4% for all-cause mortality, 5.8% for coronary heart disease, 7.2% for type 2 diabetes, 10.1% for breast cancer, and 10.5% for colon cancer). Despite its benefits, Latin America is recognized as the region with the highest prevalence of physical inactivity (ie, approximately 39.1% vs 27.5% worldwide).[3]

In addition to the overall physical activity levels, attention has been paid to how physical activity is performed in its different domains. There is growing evidence that the leisure-time and transport domains are the most protective for health outcomes, while the occupational domain is not associated with health outcomes or may even represent a risk factor.[4,5] The inequalities in physical activity practice are closely related to the United Nations Sustainable Development Goals, highlighting the importance of a surveillance of inequalities in physical activity practice.[6]

In the context of analyzing continuous evidence on physical activity levels in South America, the South American Physical Activity and Sedentary Behavior Network (SAPASEN) was established in 2018[7] to investigate the prevalence and sociodemographic factors of physical activity using nationally representative samples of South American (SA) countries.[8] The previous findings indicated that people with higher education presented higher leisure-time physical activity but lower transport and occupational physical activity, while women presented lower leisure-time and occupational physical activity.[8]

However, the previous analysis was based on only 6 SA countries, with data of Argentina, Brazil, Chile, Ecuador, Peru, and Suriname available.[8] Currently, the data of the remaining 6 SA countries are available, and Argentina, Brazil, Chile, and Ecuador

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released recent data. With the available information, we are able to provide information for all SA countries and advance in the comprehension of the prevalence and sociodemographic correlates of different physical activity domains and sitting time. Therefore, our aim is to describe the prevalence of physical activity and sitting time for all 12 countries, and to investigate the associations with sociodemographic correlates.

Methods

Design and Sample

This is a multicountry study conducted by the SAPASEN, which updated previous analyzes on the prevalence and sociodemographic correlates of physical activity and sedentary behavior among SA adults. After the first analyses,[8] the most recent nationally representative surveys conducted in Argentina, Brazil, Chile, and Ecuador, as well as data we had access to from Bolivia, Colombia, Guyana, Paraguay, Uruguay, and Venezuela. Therefore, representative surveys from all the SA countries are now included.

Data from national surveys of all SA countries were analyzed. Data of each country were pooled, including the age range between 18 and 64 years, except the Bolivia survey which included participants between 18 and 49 years. All samples were calculated through complex sampling, with several levels, and the common primary sample units were census units of each country. After the exclusion of participants older than 64 years and younger than 18 years as well as missing data, the final sample was comprised of 155,790 adults. Sampling weights were used in each study. More information of each survey is presented in the Supplementary Table S1 (available online).

Physical Activity

Surveys from Argentina, Colombia, Peru, and Venezuela included the International Physical Activity Questionnaire,[9] while the surveys from Chile, Ecuador, Guyana, Paraguay, Suriname, and Uruguay included the Global Physical Activity Questionnaire.[10] Brazil used a specific questionnaire, which is derived from another survey (Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey).[11] All the surveys included questions regarding physical activity. Bolivia included a specific question regarding leisure-time physical activity and another for sitting time. Argentina used the short version of the International Physical Activity Questionnaire but included questions about physical activity practice in each domain. The survey from Colombia included questions regarding leisure-time physical activity and transport. Total sitting time (including leisure time, occupational, and transport) was the indicator of sedentary behavior in all the included surveys.[12] The domains and items included in each questionnaires are presented in Supplementary Table S2 (available online).

Different from the previous study,[8] we used the practice of physical activity during leisure time, transport, and occupational domains as binary (nonzero indicators). We changed the leisure-time physical activity indicator from the previous manuscript (ie, from at least 150 min/wk to nonzero) because we consider the nonzero indicator to be more reliable as a proxy of practice/nonpractice and would fit better in the context of access to practice, as our focus is not on association with health outcomes or consistent practice of the activity. The sum of the physical activity domains (leisure time, transport, and occupational) was used as an indicator of total physical activity, and we classified as physically active (ie, physical activity guideline compliance) those who reported at least 150 minutes per week.[13] We also classified sitting time using the cutoff point of 8 hours per day[14] instead of the 4 hours per day, based on the last Canadian recommendations.

Gender, Education, and Age Group

Gender (men and women), chronological age (18–34, 35–49, and 50–64 y), and educational level were considered as sociodemographic indicators. We classified educational level based on the distribution into quintiles of the years of formal education or the highest level of education reached by the individuals in each survey (more information presented in the Supplementary Table S1 [available online]).

Statistics

Ten countries were included in the analyses for total physical activity, 11 for the analyses of leisure-time physical activity, 10 for the analyses of transport physical activity, 9 for the analyses of occupational physical activity, and 10 for the analyses of sitting time. We used values of frequency and 95% confidence interval (CI) to estimate the prevalence of each physical activity domain, total physical activity, and sitting time according to each subgroup. Furthermore, we conducted a harmonized meta-analysis to estimate the prevalence of each outcome according to gender, age, and education. For the harmonized analyses, we conducted logistic regression models in each country/survey, with gender, education, and age group as main exposures, and the models were all mutually adjusted for the exposures. Afterward, we conducted random effect meta-analyses, including each country as an individual observation. We assessed the degree of heterogeneity using the Higgin I^2 statistic. Unlike the previous manuscript,[8] we did not stratify the analyses, as we considered that the best way to analyze the correlates would be to create a mutual-fit model that did not have considerable interactions between the indicators. All the analyses were conducted in 2021, and accounted for country-specific sampling weights, using the Stata software (version 15.1).

Results

The prevalence of different physical activity domains and sitting time among SA countries is presented in Table 1. The prevalence of physical activity guideline compliance (≥150 min/wk) ranged between 56.9% (Venezuela) and 81.7% (Ecuador), leisure-time physical activity practice between 26.9% (Guyana) and 46.5% (Argentina), transport physical activity between 50.1% (Suriname) and 76.6% (Colombia), occupational physical activity between 33.6% (Brazil) and 62.7% (Paraguay), and excessive sitting time between 7.3% (Venezuela) and 23.1% (Uruguay).

The prevalence of total physical activity and sitting time according to education quintiles, gender, and age group is presented in Figure 1. There was great variability for sitting time according to levels of education with the groups with higher education presenting a higher prevalence in most countries, while the inequalities were mixed for total physical activity. Men and younger participants presented higher total physical activity and sitting time.

The prevalence of domain-based physical activity according to education quintiles, gender, and age group is presented in Figure 2. In general, there were minimal and mixed inequalities for transport

Table 1 Prevalence of Physical Activity (Total and by Domains) and Sitting Time Among South American Countries

	Total PA (at least 150 min/wk) % (95% CI)	Leisure-time PA (nonzero) % (95% CI)	Transport PA (nonzero) % (95% CI)	Occupational PA (nonzero) % (95% CI)	Sitting time (8 h/d or more) % (95% CI)
Argentina	68.1 (67.0–69.2)	46.5 (45.3–47.6)	65.9 (64.8–67.0)	35.0 (33.9–36.1)	16.3 (15.5–17.2)
Bolivia	—	37.7 (36.7–38.7)	—	—	9.0 (8.5–9.6)
Brazil	67.0 (66.4–67.6)	42.9 (42.3–43.6)	51.3 (50.6–51.9)	33.6 (32.9–34.2)	—
Chile	70.5 (68.0–72.8)	31.4 (29.0–34.0)	67.9 (65.3–70.3)	42.5 (39.9–45.2)	11.6 (9.9–13.4)
Colombia	—	36.5 (35.2–37.8)	76.6 (75.5–77.6)	—	—
Ecuador	81.7 (80.2–83.0)	37.8 (36.1–39.6)	72.7 (71.0–74.3)	61.1 (59.3–62.8)	10.0 (9.0–11.2)
Guyana	70.9 (68.4–73.4)	26.9 (24.4–29.4)	61.0 (58.1–63.7)	56.9 (54.1–59.6)	8.2 (6.9–9.6)
Paraguay	77.2 (75.5–79.0)	38.2 (36.1–40.4)	57.0 (54.9–59.1)	62.7 (60.7–64.8)	11.8 (10.5–13.3)
Peru	69.6 (68.3–70.9)	40.4 (39.0–41.7)	70.5 (69.2–71.7)	50.6 (49.2–51.9)	21.6 (20.5–22.7)
Suriname	60.9 (59.3–62.5)	28.0 (26.4–29.6)	50.1 (48.4–51.8)	49.4 (47.7–51.1)	21.4 (20.0–22.9)
Uruguay	79.4 (77.5–81.2)	44.8 (42.4–47.2)	60.5 (58.2–62.8)	50.7 (48.3–53.1)	23.1 (21.0–25.3)
Venezuela	56.9 (53.4–60.3)	—	—	—	7.3 (5.7–9.3)
Total	70.3 (66.6–74.1) I^2: 99.9% ($P < .001$)	37.4 (34.5–40.3) I^2: 99.9% ($P < .001$)	63.3 (55.3–71.4) I^2: 99.9% ($P < .001$)	49.2 (41.8–56.6) I^2: 99.9% ($P < .001$)	14.1 (11.6–16.5) I^2: 99.9% ($P < .001$)

Abbreviations: —, not available; CI, confidence interval; PA, physical activity.

physical activity. Participants with lower education presented lower leisure-time physical activity and higher occupational physical activity. Men had a higher prevalence of leisure-time and occupational physical activity than women, with mixed results in transport physical activity. Considering age, only younger participants showed the highest prevalence for leisure-time physical activity.

The associations of education (quintiles), gender, and age group with total physical activity and sitting time among SA countries are presented in Table 2. Although a higher education was associated with higher total physical activity in Argentina, Brazil, and Suriname, it was associated with a lower total physical activity in Ecuador, Paraguay, and Peru, resulting in null association in the pooled analysis. Women were less likely to achieve the recommended levels of total physical activity (odds ratio [OR]: 0.57; 95% CI, 0.49–0.66; I^2: 90.5%) when compared with men. In addition, compared with young adults, adults aged 50–64 years were less likely to achieve the recommended levels of total physical activity (OR: 0.77; 95% CI, 0.70–0.84; I^2: 52.5%). A higher education level was associated with a higher likelihood to present elevated sitting time, being in the highest education quintile was associated with a 180% (OR: 2.80; 95% CI, 2.08–3.77; I^2: 79.9%) higher likelihood of presenting elevated sitting time than those in the lowest quintile. Women (OR: 0.81; 95% CI, 0.69–0.95; I^2: 82.4%) and older participants (35–49 y: OR: 0.82; 95% CI, 0.73–0.92; I^2: 54.8%, 50–64 y: OR: 0.77; 95% CI, 0.68–0.88; I^2: 41.9%) were less likely to present elevated sitting time than men and younger counterparts. All the meta-analyses presented considerable heterogeneity, but the results of each country showed a similar direction, with a variation in the magnitude.

Table 3 presents the association between the sociodemographic correlates and different domains of physical activity. A higher education level (from Q2 to Q5) was associated with higher leisure-time physical activity, while only the highest education was associated with a lower likelihood of practicing occupational physical activity (Q5 vs Q1: OR: 0.65; 95% CI, 0.44–0.95; I^2: 95.2%). Women were less likely to practice leisure time (OR: 0.39; 95% CI, 0.31–0.49; I^2: 97.5%) and occupational physical activity (OR: 0.61; 95% CI, 0.46–0.79; I^2: 97.5%). Older participants were less likely to participate in leisure time (35–49 y: OR: 0.63; 95% CI, 0.56–0.71; I^2: 86.2%, 50–64 y: OR: 0.51; 95% CI, 0.41–0.63; I^2: 93.1%), while the middle-aged adults (35–49 y) were less likely to present transport physical activity (OR: 0.84; 95% CI, 0.76–0.93; I^2: 77.4%) and more likely to present occupational physical activity (OR: 1.27; 95% CI, 1.15–1.41; I^2: 74.0) compared with younger adults (18–34 y).

Discussion

We aimed to revisit the research question of whether sociodemographic factors (ie, education, gender, and age) are associated with total, and domains of, physical activity as well as sitting time, based on the last available nationally representative data. We observed that a higher education level was associated with higher leisure-time physical activity, while it was also associated with higher sitting time and lower occupational physical activity. Women presented lower total, leisure time, and occupational physical activity, while they also presented a lower sitting time. Also, older participants presented lower sitting time, as well as total and leisure-time physical activity. Middle-aged adults presented lower transport physical activity but higher occupational physical activity, compared with younger adults.

Our findings present slight differences compared with the previous paper published by the SAPASEN.[8] In the previous findings, we found no gender differences for total sitting time, while in the present study women were less likely to present elevated sitting time. The differences could occur for different reasons, as the lower number of countries (ie, 4) in the previous paper probably limited the findings compared with the 10 countries included in the present study. Also, we adopted a different cutoff point (ie, 8 h/d vs 4 h/d), and it is plausible that the stricter cutoff point could affect the associations. We highlight that the finding of men with higher sitting time is in line with another cross-national study in Latin America.[15] The lower sitting time among women can

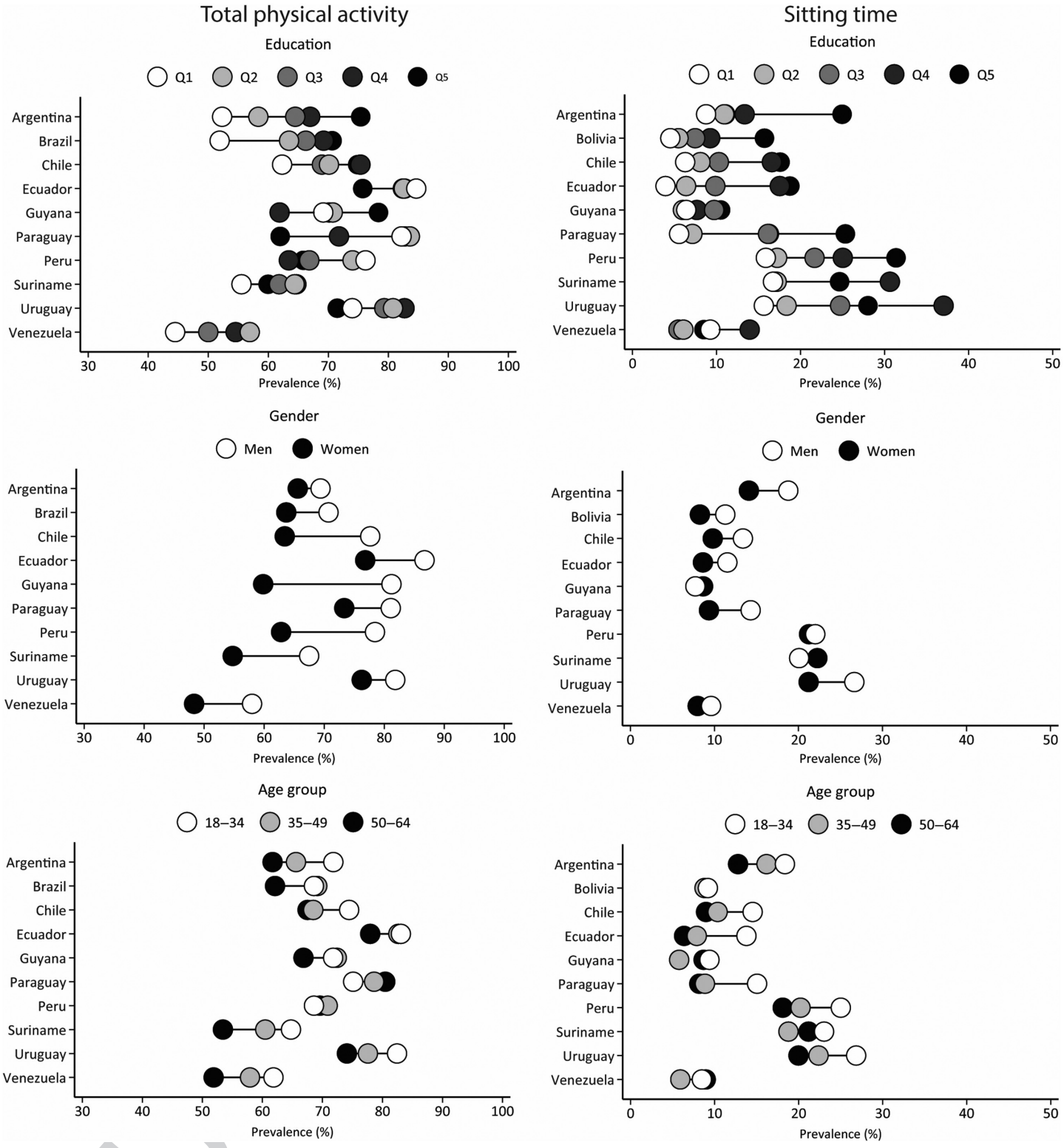

Figure 1 — Prevalence of physical activity guideline compliance (at least 150 min/wk for total physical activity) and increased sitting time (≥8 h/d) according to education quintiles, gender, and age group. Q1 indicates lower education level.

be partly explained by the double burden of women's work, which frequently have other household duties besides the formal paid work.[16]

Another difference compared with the previous study[8] is the lack of association between education and transport physical activity, as people with lower education presented higher transport physical activity in the previous study. The different indicator of education was a potential difference that affected our findings, as we used quintiles of education to increase the comparability between the countries. Also, while most countries showed lower

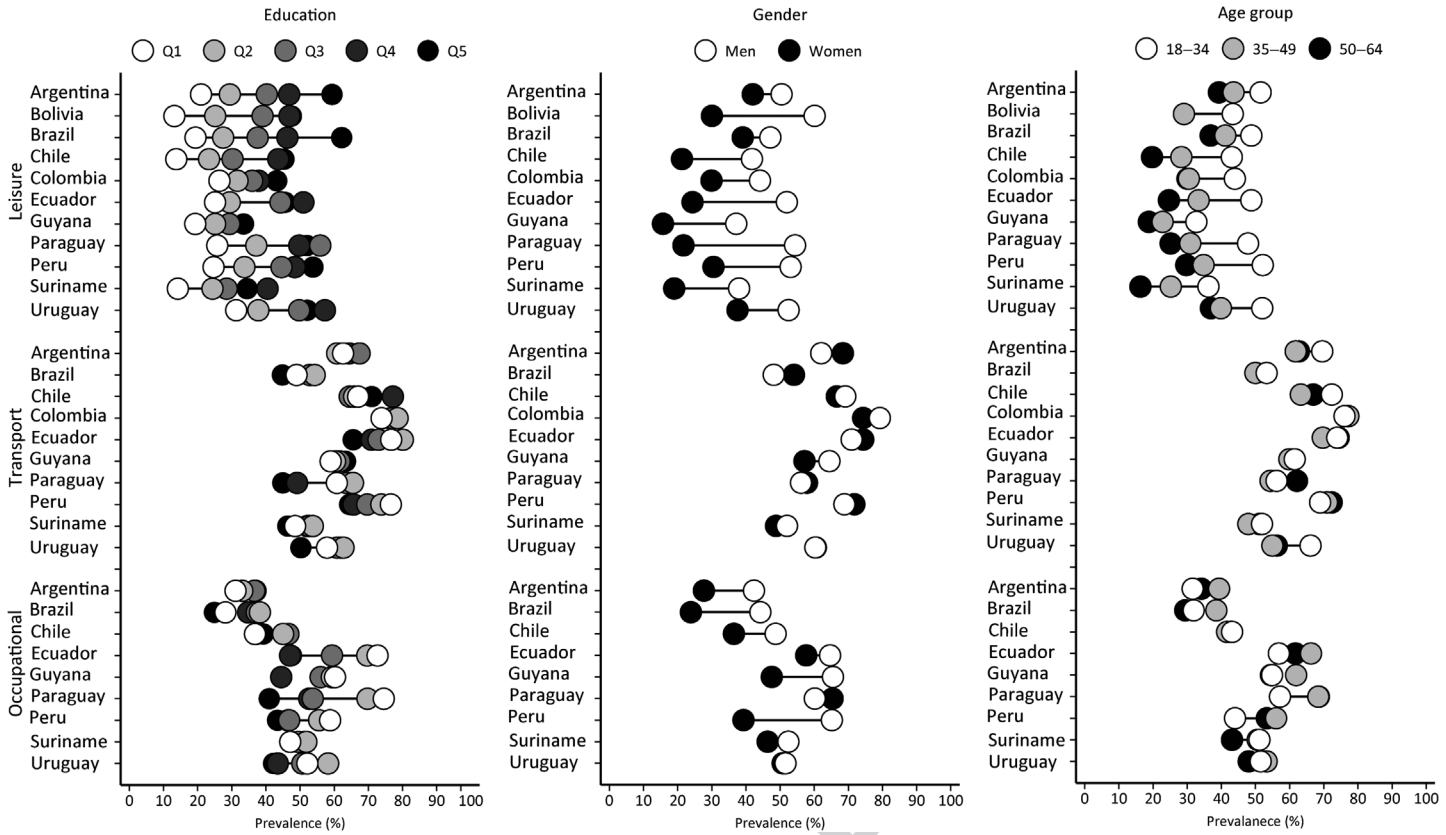

Figure 2 — Prevalence of nonzero leisure time, transport, and occupational physical activity according to education quintiles, gender, and age group. Q1 indicates lower education level.

transport physical activity among people with higher education in the previous study, most of the countries presented no association in the present study, and a higher education level was associated with higher transport physical activity in Colombia. This lack of association reveals the different reasons for adopting active transport, which can be due to economic reasons but also due to enjoyment.

Our findings highlight the huge educational inequalities in the physical activity practice in South America. Only inferring total physical activity can hide the inequalities, especially regarding leisure-time and occupational physical activity. According to previous findings in different SA countries,[8,17,18] the prevalence of leisure-time physical activity is higher among people with higher socioeconomic conditions, while people with lower education present higher levels of occupational physical activity. The finding of higher leisure-time physical activity among participants with higher education can be explained for several reasons, as richer people have greater access to private exercise facilities, frequently live in neighborhoods with better walkability, and live closer to high-quality public facilities for physical activity practice.[19–21] Therefore, public policies are needed to reduce the disparities in leisure-time physical activity practice, especially to tackle the inverse equity hypothesis in which the innovations in leisure-time physical activity such as through the expansion of gyms, private facilities, and high-quality public facilities already reached the population with higher socioeconomic status, but not the poorest groups. Therefore, policies like the revitalization of streets and parks are needed in the most disadvantaged neighborhoods.[22] Public programs in streets and parks should also be expanded.[23,24]

On the contrary, people with higher education were also more likely to present elevated sitting time. The higher sitting time among people with higher education is well known[8,25] and is probably related to different factors, including the predominantly sedentary jobs and better access to screen devices (eg, computer). However, it is plausible that work-related sitting time is the main driver of this association, especially considering that previous findings from Latin America revealed only slight differences in sedentary activities in the leisure-time domain among participants with different education levels (ie, higher computer use, reading, and using the telephone).[25] Despite the inequalities, we found considerable levels of elevated sitting time, especially in Argentina, Peru, Suriname, and Uruguay, so policies should also be directed to reduce this behavior.

The gender inequality was also marked in the present study for physical activity indicators, especially considering the occupational and leisure-time domains. The gender inequalities in leisure-time physical activity are one of the biggest challenges in public health terms.[26] The gender differences in physical activity practice occur since childhood, especially due to cultural norms,[26,27] and tend to persist during adulthood.[28,29] Therefore, studies on the determinants of physical activity among women should be a priority to guide policies focusing on early interventions to reduce gender inequalities starting in childhood.

Also, our findings are consistent with the decline of leisure-time physical activity during adulthood, where older participants are less likely to participate in the behavior.[30] Therefore, environmental changes in parks and streets would also influence the practice of physical activity among older adults. Physical activity

Table 2 Associations of Sociodemographic Correlates With Total Physical Activity and Sitting Time Among South American Countries

	Quintiles of schooling (reference = Q1)				Gender (reference = men)	Age group (reference = 18–34 y)	
	Q2 OR (95% CI)	Q3 OR (95% CI)	Q4 OR (95% CI)	Q5 OR (95% CI)	Women OR (95% CI)	35–49 y OR (95% CI)	50–64 y OR (95% CI)
Total physical activity (at least 150 min/wk)							
Argentina	1.25 (0.97–1.60) %Weight: 11.36	1.44 (1.12–1.84) %Weight: 10.42	1.71 (1.35–2.16) %Weight: 10.64	2.57 (2.04–3.25) %Weight: 10.25	0.79 (0.71–0.87) %Weight: 11.42	0.77 (0.69–0.87) %Weight: 13.65	0.71 (0.63–0.81) %Weight: 16.32
Brazil	1.60 (1.40–1.84) %Weight: 13.02	1.75 (1.52–2.03) %Weight: 10.93	2.03 (1.77–2.32) %Weight: 10.92	2.20 (1.91–2.53) %Weight: 10.40	0.71 (0.67–0.75) %Weight: 11.83	1.08 (1.01–1.16) %Weight: 15.29	0.84 (0.78–0.90) %Weight: 21.46
Chile	1.28 (0.87–1.89) %Weight: 9.01	1.23 (0.83–1.81) %Weight: 9.41	1.53 (0.89–2.64) %Weight: 9.13	1.53 (0.98–2.37) %Weight: 9.67	0.51 (0.40–0.65) %Weight: 9.29	0.81 (0.60–1.08) %Weight: 7.50	0.80 (0.58–1.11) %Weight: 5.71
Ecuador	0.78 (0.48–1.27) %Weight: 7.46	0.77 (0.61–0.97) %Weight: 10.49	0.77 (0.43–1.38) %Weight: 8.88	0.52 (0.40–0.68) %Weight: 10.18	0.49 (0.40–0.60) %Weight: 9.93	0.93 (0.74–1.18) %Weight: 9.43	0.66 (0.51–0.85) %Weight: 8.23
Guyana	1.09 (0.70–1.68) %Weight: 8.27	1.11 (0.73–1.67) %Weight: 9.24	0.71 (0.41–1.25) %Weight: 9.04	1.55 (0.96–2.51) %Weight: 9.53	0.35 (0.26–0.46) %Weight: 8.71	1.07 (0.79–1.45) %Weight: 7.34	0.83 (0.58–1.17) %Weight: 5.05
Paraguay	1.11 (0.77–1.59) %Weight: 9.43	0.96 (0.64–1.46) %Weight: 9.19	0.52 (0.39–0.71) %Weight: 10.38	0.35 (0.27–0.45) %Weight: 10.17	0.62 (0.50–0.76) %Weight: 9.80	1.09 (0.86–1.40) %Weight: 9.05	1.01 (0.76–1.34) %Weight: 6.87
Peru	0.77 (0.63–0.93) %Weight: 12.29	0.51 (0.42–0.62) %Weight: 10.71	0.46 (0.37–0.57) %Weight: 10.69	0.46 (0.37–0.58) %Weight: 10.26	0.43 (0.37–0.49) %Weight: 11.00	1.01 (0.87–1.17) %Weight: 12.57	0.87 (0.73–1.03) %Weight: 12.84
Suriname	1.37 (1.10–1.71) %Weight: 11.81	1.18 (0.94–1.47) %Weight: 10.55	1.30 (1.06–1.59) %Weight: 10.75	1.28 (1.03–1.60) %Weight: 10.27	0.57 (0.49–0.66) %Weight: 10.86	0.85 (0.72–1.01) %Weight: 11.93	0.66 (0.55–0.79) %Weight: 12.16
Uruguay	1.33 (0.95–1.87) %Weight: 9.81	1.22 (0.89–1.67) %Weight: 9.98	1.59 (1.11–2.29) %Weight: 10.10	0.89 (0.55–1.44) %Weight: 9.52	0.72 (0.57–0.90) %Weight: 9.52	0.77 (0.58–1.01) %Weight: 8.10	0.65 (0.50–0.85) %Weight: 7.43
Venezuela	1.36 (0.84–2.20) %Weight: 7.55	0.88 (0.57–1.36) %Weight: 9.08	1.06 (0.65–1.71) %Weight: 9.48	0.91 (0.60–1.39) %Weight: 9.74	0.62 (0.44–0.87) %Weight: 7.64	0.81 (0.54–1.21) %Weight: 5.14	0.64 (0.43–0.97) %Weight: 3.94
Pooled	1.18 (0.97–1.43) I^2: 79.7% ($P < .001$)	1.05 (0.78–1.41) I^2: 92.3% ($P < .001$)	1.05 (0.71–1.55) I^2: 94.9 ($P < .001$)	1.01 (0.62–1.65) I^2: 97.0% ($P < .001$)	0.57 (0.49–0.66) I^2: 90.5% ($P < .001$)	0.92 (0.82–1.03) I^2: 74.0% ($P < .001$)	0.77 (0.70–0.84) I^2: 52.5% ($P = .026$)
Sitting time (at least 8 h/d)							
Argentina	1.24 (0.78–1.97) %Weight: 7.46	1.14 (0.73–1.8) %Weight: 10.19	1.46 (0.93–2.28) %Weight: 11.05	3.24 (2.10–4.98) %Weight: 10.67	0.65 (0.57–0.73) %Weight: 12.44	0.86 (0.75–1.00) %Weight: 16.11	0.71 (0.60–0.84) %Weight: 20.10
Bolivia	1.17 (0.73–1.87) %Weight: 7.32	1.65 (1.05–2.59) %Weight: 10.26	2.08 (1.26–3.41) %Weight: 9.91	3.85 (2.46–6.04) %Weight: 10.46	0.73 (0.63–0.86) %Weight: 12.00	1.12 (0.96–1.30) %Weight: 15.80	—
Chile	1.21 (0.53–2.78) %Weight: 2.35	1.55 (0.67–3.6) %Weight: 4.93	2.48 (0.96–6.36) %Weight: 4.12	2.74 (1.15–6.57) %Weight: 6.28	0.73 (0.52–1.03) %Weight: 8.45	0.79 (0.52–1.21) %Weight: 5.73	0.77 (0.48–1.24) %Weight: 5.93
Ecuador	1.47 (0.66–3.29) %Weight: 2.49	2.23 (1.47–3.37) %Weight: 10.99	3.92 (2.07–7.42) %Weight: 7.34	5.07 (3.37–7.61) %Weight: 10.95	0.72 (0.56–0.94) %Weight: 9.97	0.65 (0.47–0.89) %Weight: 8.40	0.49 (0.33–0.72) %Weight: 8.16
Guyana	0.92 (0.51–1.67) %Weight: 4.58	1.50 (0.90–2.49) %Weight: 9.13	1.14 (0.51–2.58) %Weight: 5.21	1.65 (0.96–2.85) %Weight: 9.41	1.14 (0.79–1.63) %Weight: 8.09	0.64 (0.41–0.99) %Weight: 5.29	1.02 (0.66–1.56) %Weight: 7.04
Paraguay	1.24 (0.71–2.16) %Weight: 5.19	2.72 (1.67–4.42) %Weight: 9.55	2.82 (1.83–4.34) %Weight: 11.43	5.34 (3.70–7.72) %Weight: 11.36	0.64 (0.49–0.84) %Weight: 9.77	0.68 (0.48–0.95) %Weight: 7.52	0.76 (0.50–1.14) %Weight: 7.51
Peru	1.06 (0.87–1.29) %Weight: 39.78	1.36 (1.11–1.67) %Weight: 15.56	1.64 (1.30–2.08) %Weight: 17.11	2.24 (1.79–2.80) %Weight: 12.78	1.02 (0.89–1.17) %Weight: 12.35	0.83 (0.71–0.97) %Weight: 15.75	0.77 (0.64–0.92) %Weight: 19.25
Suriname	1.03 (0.77–1.38) %Weight: 19.12	0.87 (0.65–1.17) %Weight: 13.58	1.90 (1.49–2.41) %Weight: 16.90	1.68 (1.29–2.18) %Weight: 12.43	1.18 (0.98–1.40) %Weight: 11.60	0.80 (0.65–0.98) %Weight: 13.21	0.96 (0.78–1.19) %Weight: 16.41

(continued)

Table 2 *(continued)*

	Quintiles of schooling (reference = Q1)				Gender (reference = men)	Age group (reference = 18–34 y)	
	Q2 OR (95% CI)	Q3 OR (95% CI)	Q4 OR (95% CI)	Q5 OR (95% CI)	Women OR (95% CI)	35–49 y OR (95% CI)	50–64 y OR (95% CI)
Uruguay	1.11 (0.74–1.64) %Weight: 10.17	1.63 (1.13–2.34) %Weight: 11.99	3.06 (2.09–4.47) %Weight: 12.76	2.16 (1.29–3.60) %Weight: 9.76	0.72 (0.57–0.90) %Weight: 10.58	0.77 (0.59–1.01) %Weight: 10.02	0.71 (0.54–0.93) %Weight: 12.78
Venezuela	1.85 (0.67–5.12) %Weight: 1.55	1.40 (0.52–3.79) %Weight: 3.83	3.64 (1.43–9.31) %Weight: 4.17	2.08 (0.83–5.23) %Weight: 5.90	0.74 (0.41–1.34) %Weight: 4.75	0.86 (0.40–1.83) %Weight: 2.16	1.20 (0.58–2.50) %Weight: 2.83
Pooled	1.10 (0.97–1.25) I^2: 0.0% (P = .975)	1.50 (1.21–1.87) I^2: 62.5% (P = .004)	2.15 (1.74–2.67) I^2: 54.7% (P = .019)	2.80 (2.08–3.77) I^2: 79.9% (P < .001)	0.81 (0.69–0.95) I^2: 82.4% (P < .001)	0.82 (0.73–0.92) I^2: 54.8% (P = .020)	0.77 (0.68–0.88) I^2: 41.9% (P = .088)

Abbreviations: —, no available; CI, confidence interval; Q1, lower education level; OR, odds ratio.

Table 3 Associations of Sociodemographic Correlates With Domains of Physical Activity Among South American Countries

	Quintiles of schooling (reference = Q1)				Gender (reference = men)	Age group (reference = 18–34 y)	
	Q2 OR (95% CI)	Q3 OR (95% CI)	Q4 OR (95% CI)	Q5 OR (95% CI)	Women OR (95% CI)	35–49 y OR (95% CI)	50–64 y OR (95% CI)
Leisure-time physical activity (nonzero)							
Argentina	1.52 (1.17–1.98) %Weight: 10.01	2.26 (1.75–2.92) %Weight: 9.68	3.12 (2.43–4.00) %Weight: 9.96	5.31 (4.16–6.78) %Weight: 9.51	0.63 (0.57–0.69) %Weight: 9.38	0.77 (0.69–0.86) %Weight: 10.56	0.75 (0.66–0.84) %Weight: 10.94
Bolivia	1.74 (1.27–2.39) %Weight: 8.05	2.67 (1.97–3.63) %Weight: 8.46	3.92 (2.81–5.46) %Weight: 9.12	4.00 (2.93–5.46) %Weight: 9.17	0.28 (0.26–0.32) %Weight: 9.36	0.59 (0.53–0.65) %Weight: 10.78	—
Brazil	1.59 (1.34–1.88) %Weight: 15.34	2.38 (2.00–2.83) %Weight: 11.89	3.50 (2.96–4.14) %Weight: 10.65	6.91 (5.83–8.19) %Weight: 9.81	0.65 (0.62–0.69) %Weight: 9.47	0.82 (0.77–0.88) %Weight: 11.22	0.81 (0.75–0.87) %Weight: 11.21
Chile	1.51 (0.85–2.67) %Weight: 3.16	2.04 (1.16–3.59) %Weight: 4.14	2.99 (1.55–5.77) %Weight: 5.82	3.51 (1.97–6.25) %Weight: 7.46	0.38 (0.30–0.48) %Weight: 8.65	0.61 (0.45–0.81) %Weight: 6.91	0.42 (0.31–0.59) %Weight: 8.93
Colombia	1.26 (1.06–1.51) %Weight: 14.85	1.41 (1.20–1.66) %Weight: 12.18	1.51 (1.29–1.77) %Weight: 10.72	1.98 (1.66–2.37) %Weight: 9.78	0.53 (0.47–0.59) %Weight: 9.33	0.62 (0.54–0.71) %Weight: 10.04	0.64 (0.55–0.74) %Weight: 10.75
Ecuador	1.00 (0.65–1.55) %Weight: 4.98	1.98 (1.63–2.42) %Weight: 11.23	2.47 (1.61–3.78) %Weight: 8.08	2.31 (1.83–2.93) %Weight: 9.55	0.27 (0.23–0.32) %Weight: 9.10	0.61 (0.51–0.74) %Weight: 9.02	0.36 (0.28–0.45) %Weight: 9.98
Guyana	1.38 (0.87–2.18) %Weight: 4.58	1.70 (1.13–2.56) %Weight: 6.29	1.60 (0.93–2.74) %Weight: 6.90	1.78 (1.13–2.80) %Weight: 8.31	0.31 (0.24–0.40) %Weight: 8.50	0.66 (0.49–0.89) %Weight: 6.66	0.52 (0.36–0.76) %Weight: 8.40
Paraguay	1.58 (1.15–2.18) %Weight: 7.83	2.43 (1.71–3.46) %Weight: 7.36	1.98 (1.48–2.65) %Weight: 9.53	2.79 (2.10–3.71) %Weight: 9.31	0.20 (0.17–0.25) %Weight: 8.89	0.51 (0.40–0.65) %Weight: 7.78	0.36 (0.26–0.48) %Weight: 9.30
Peru	1.19 (1.00–1.43) %Weight: 14.80	1.67 (1.39–2.01) %Weight: 11.62	2.10 (1.71–2.59) %Weight: 10.33	2.31 (1.87–2.87) %Weight: 9.64	0.39 (0.35–0.44) %Weight: 9.31	0.52 (0.45–0.59) %Weight: 10.14	0.44 (0.37–0.51) %Weight: 10.64
Suriname	1.88 (1.39–2.55) %Weight: 8.37	2.17 (1.61–2.94) %Weight: 8.55	3.28 (2.52–4.28) %Weight: 9.82	3.76 (2.83–4.99) %Weight: 9.31	0.35 (0.30–0.42) %Weight: 9.08	0.60 (0.50–0.73) %Weight: 8.96	0.37 (0.29–0.47) %Weight: 9.95
Uruguay	1.14 (0.83–1.56) %Weight: 8.02	1.92 (1.42–2.59) %Weight: 8.60	2.89 (2.06–4.05) %Weight: 9.06	2.66 (1.66–4.28) %Weight: 8.16	0.52 (0.42–0.63) %Weight: 8.92	0.59 (0.47–0.75) %Weight: 7.92	0.57 (0.45–0.72) %Weight: 9.91
Pooled	1.41 (1.27–1.58) I^2: 42.3% ($P = .074$)	2.00 (1.75–2.29) I^2: 67.0 ($P < .001$)	2.56 (2.04–3.21) I^2: 87.3 ($P < .001$)	3.13 (2.31–4.27) I^2: 93.3% ($P < .001$)	0.39 (0.31–0.49) I^2: 97.5% ($P < .001$)	0.63 (0.56–0.71) I^2: 86.2% ($P < .001$)	0.51 (0.41–0.63) I^2: 93.1% ($P < .001$)
Transport physical activity (nonzero)							
Argentina	0.92 (0.71–1.18) %Weight: 10.07	1.11 (0.87–1.42) %Weight: 10.05	0.97 (0.77–1.23) %Weight: 11.14	1.10 (0.87–1.38) %Weight: 10.57	1.33 (1.21–1.47) %Weight: 10.81	0.71 (0.63–0.80) %Weight: 12.23	0.76 (0.67–0.87) %Weight: 12.66
Brazil	1.21 (1.06–1.38) %Weight: 17.57	1.09 (0.95–1.26) %Weight: 13.25	1.08 (0.94–1.23) %Weight: 12.75	0.78 (0.68–0.89) %Weight: 11.50	1.30 (1.23–1.37) %Weight: 11.19	0.85 (0.80–0.91) %Weight: 13.65	0.83 (0.78–0.89) %Weight: 14.59
Chile	0.92 (0.63–1.34) %Weight: 5.70	0.85 (0.59–1.24) %Weight: 6.75	1.47 (0.86–2.52) %Weight: 6.28	1.11 (0.73–1.67) %Weight: 8.29	0.92 (0.73–1.15) %Weight: 8.84	0.70 (0.53–0.92) %Weight: 7.02	0.83 (0.61–1.12) %Weight: 6.70
Colombia	1.30 (1.08–1.55) %Weight: 14.08	1.22 (1.02–1.46) %Weight: 12.19	1.21 (1.02–1.43) %Weight: 12.26	1.27 (1.05–1.53) %Weight: 11.06	0.75 (0.67–0.84) %Weight: 10.58	1.10 (0.96–1.28) %Weight: 11.21	1.11 (0.95–1.29) %Weight: 11.58
Ecuador	1.21 (0.77–1.89) %Weight: 4.28	0.79 (0.64–0.97) %Weight: 11.32	0.68 (0.42–1.09) %Weight: 7.15	0.56 (0.45–0.70) %Weight: 10.63	1.20 (1.01–1.41) %Weight: 9.86	0.75 (0.62–0.91) %Weight: 9.51	0.96 (0.76–1.20) %Weight: 8.85
Guyana	1.06 (0.72–1.58) %Weight: 5.23	1.14 (0.78–1.66) %Weight: 6.68	1.09 (0.64–1.85) %Weight: 6.42	1.19 (0.77–1.84) %Weight: 8.01	0.74 (0.58–0.93) %Weight: 8.74	0.97 (0.73–1.28) %Weight: 6.97	1.03 (0.75–1.42) %Weight: 6.27
Paraguay	1.23 (0.92–1.65) %Weight: 8.23	1.14 (0.82–1.59) %Weight: 7.69	0.64 (0.49–0.83) %Weight: 10.64	0.54 (0.42–0.69) %Weight: 10.40	1.08 (0.90–1.29) %Weight: 9.70	0.87 (0.71–1.08) %Weight: 8.98	1.12 (0.88–1.42) %Weight: 8.49

(continued)

Table 3 *(continued)*

	Quintiles of schooling (reference = Q1)				Gender (reference = men)	Age group (reference = 18–34 y)	
	Q2 OR (95% CI)	Q3 OR (95% CI)	Q4 OR (95% CI)	Q5 OR (95% CI)	Women OR (95% CI)	35–49 y OR (95% CI)	50–64 y OR (95% CI)
Peru	0.88 (0.74–1.05) %Weight: 14.61	0.73 (0.60–0.87) %Weight: 12.03	0.60 (0.49–0.74) %Weight: 11.66	0.58 (0.47–0.71) %Weight: 10.81	1.10 (0.97–1.24) %Weight: 10.52	1.03 (0.89–1.18) %Weight: 11.39	1.05 (0.89–1.23) %Weight: 11.29
Suriname	1.22 (0.98–1.52) %Weight: 11.74	1.16 (0.93–1.45) %Weight: 10.76	1.19 (0.97–1.44) %Weight: 11.83	1.05 (0.84–1.30) %Weight: 10.74	0.85 (0.74–0.98) %Weight: 10.26	0.83 (0.71–0.98) %Weight: 10.65	0.99 (0.83–1.18) %Weight: 10.73
Uruguay	1.10 (0.83–1.47) %Weight: 8.48	1.02 (0.78–1.34) %Weight: 9.29	1.10 (0.81–1.50) %Weight: 9.87	0.74 (0.48–1.15) %Weight: 8.00	1.02 (0.84–1.24) %Weight: 9.49	0.64 (0.51–0.80) %Weight: 8.40	0.67 (0.54–0.85) %Weight: 8.84
Pooled	1.10 (1.00–1.22) I^2: 43.2% ($P = .070$)	1.01 (0.89–1.15) I^2: 67.4 ($P = .001$)	0.95 (0.80–1.15) I^2: 81.3 ($P < .001$)	0.84 (0.68–1.04) I^2: 87.3% ($P < .001$)	1.02 (0.88–1.17) I^2: 92.0% ($P < .001$)	0.84 (0.76–0.93) I^2: 77.4% ($P < .001$)	0.92 (0.83–1.02) I^2: 72.5% ($P < .001$)
Occupational physical activity (nonzero)							
Argentina	1.05 (0.82–1.35) %Weight: 11.66	1.32 (1.03–1.69) %Weight: 11.24	1.34 (1.06–1.70) %Weight: 11.66	1.16 (0.92–1.47) %Weight: 11.40	0.51 (0.46–0.56) %Weight: 11.40	1.46 (1.30–1.64) %Weight: 13.93	1.17 (1.03–1.33) %Weight: 13.31
Brazil	1.64 (1.38–1.95) %Weight: 12.72	1.55 (1.29–1.86) %Weight: 11.57	1.43 (1.20–1.70) %Weight: 11.96	0.89 (0.74–1.06) %Weight: 11.59	0.40 (0.37–0.42) %Weight: 11.51	1.39 (1.30–1.49) %Weight: 15.61	0.87 (0.80–0.94) %Weight: 14.57
Chile	1.33 (0.92–1.93) %Weight: 9.79	1.47 (1.01–2.14) %Weight: 10.37	0.93 (0.56–1.55) %Weight: 9.77	1.03 (0.68–1.56) %Weight: 10.45	0.60 (0.48–0.74) %Weight: 10.75	0.93 (0.70–1.22) %Weight: 7.68	0.98 (0.74–1.29) %Weight: 8.76
Ecuador	0.86 (0.57–1.30) %Weight: 9.20	0.56 (0.47–0.68) %Weight: 11.54	0.36 (0.24–0.55) %Weight: 10.50	0.34 (0.28–0.43) %Weight: 11.46	0.71 (0.61–0.84) %Weight: 11.15	1.30 (1.09–1.56) %Weight: 11.07	1.03 (0.84–1.26) %Weight: 10.99
Guyana	0.98 (0.67–1.42) %Weight: 9.70	0.90 (0.63–1.29) %Weight: 10.50	0.54 (0.33–0.91) %Weight: 9.74	0.83 (0.55–1.24) %Weight: 10.53	0.47 (0.38–0.59) %Weight: 10.70	1.32 (1.01–1.71) %Weight: 7.99	0.95 (0.70–1.29) %Weight: 8.18
Paraguay	0.81 (0.60–1.11) %Weight: 10.77	0.44 (0.32–0.61) %Weight: 10.71	0.41 (0.32–0.54) %Weight: 11.46	0.25 (0.19–0.32) %Weight: 11.30	1.19 (0.99–1.44) %Weight: 10.99	1.36 (1.09–1.69) %Weight: 9.44	1.15 (0.89–1.47) %Weight: 9.62
Peru	0.75 (0.64–0.88) %Weight: 12.89	0.50 (0.42–0.60) %Weight: 11.60	0.53 (0.43–0.65) %Weight: 11.82	0.41 (0.33–0.51) %Weight: 11.50	0.31 (0.27–0.34) %Weight: 11.32	1.52 (1.33–1.74) %Weight: 13.08	1.24 (1.06–1.45) %Weight: 12.53
Suriname	1.18 (0.95–1.47) %Weight: 12.12	1.05 (0.84–1.31) %Weight: 11.37	1.10 (0.90–1.34) %Weight: 11.86	1.05 (0.85–1.31) %Weight: 11.46	0.77 (0.67–0.89) %Weight: 11.22	0.98 (0.84–1.15) %Weight: 11.95	0.73 (0.61–0.88) %Weight: 11.80
Uruguay	1.26 (0.95–1.68) %Weight: 11.14	0.92 (0.70–1.21) %Weight: 11.08	0.69 (0.51–0.94) %Weight: 11.24	0.66 (0.42–1.02) %Weight: 10.30	0.99 (0.82–1.20) %Weight: 10.94	1.12 (0.89–1.40) %Weight: 9.25	0.89 (0.71–1.12) %Weight: 10.24
Pooled	1.07 (0.86–1.33) I^2: 84.2% ($P < .001$)	0.88 (0.63–1.22) I^2: 94.1 ($P < .001$)	0.74 (0.52–1.05) I^2: 93.5 ($P < .001$)	0.65 (0.44–0.95) I^2: 95.2% ($P < .001$)	0.61 (0.46–0.79) I^2: 97.5% ($P < .001$)	1.27 (1.15–1.41) I^2: 74.0% ($P < .001$)	0.99 (0.87–1.12) I^2: 79.1% ($P < .001$)

Abbreviations: —, no available; CI, confidence interval; Q1, lower education level; OR, odds ratio.

should be embedded in all policies, facilitating accessibility for everyone by making more friendly and people-centered environments. The expansion of public physical activity opportunities (ie, better pedestrian paths) throughout cities would be helpful to improve the perceived safety and self-efficacy, especially in the context of having facilities near home.[31] On the other hand, older adults were less likely to present elevated sitting time, which leads to possible interventions for younger adults. Also, the lower transport and higher occupational physical activity observed among middle-aged in comparison with younger adults might be explained by the entry in the labor market as well as the characteristics of the career stages. Similarly, the entry in the labor market can explain that participants aged 50–64 years presented similar occupational physical activity than participants aged 18–34 years. However, longitudinal studies should explore the behavior changes during the life transitions in SA countries.

It is important to note that, considering the COVID-19 pandemic, it is likely that the prevalence of different domains of physical activity changed due to socioeconomic changes and social distancing measures.[32,33] However, as different studies in SA noted,[34] the change in the prevalence of physical activity is different when considering different groups of the population. For example, young adults and people with lower education were probably the most affected. Therefore, the continuous surveillance system for physical activity is primordial to follow up on how physical activity levels will behave as the pandemic evolves, informing the risk groups for possible intervention strategies.[35]

To the best of our knowledge, this is the first study on physical activity including a nationally representative sample of all SA countries, except for the ultramarine territories. We consider that providing a whole picture of SA can contribute to the formulation of regional policies to increase physical activity among the most disadvantaged groups. However, our findings should be inferred in light of possible limitations. First, the surveys were conducted in different years, and it is possible that the context of each country changed between the earliest and the most recent survey. In the future, a harmonized surveillance system among SA countries would provide a more realistic picture about the analyzed indicators.[30] Second, the estimates should be inferred with caution, as the countries included different questionnaires on physical activity and sitting time. However, these limitations may help encourage policymakers to standardize the assessment for the physical activity and sitting time sections of national surveys in SA countries, in order to establish a standardized strategy for its surveillance.

Conclusion

The current analysis highlights the inequalities in physical activity practice among SA countries, especially for leisure-time physical activity, with men, younger adults, and people with higher educational level presenting higher levels. We also highlight the need for continuous surveillance of physical activity and sitting time levels to investigate whether the policies for promoting these behaviors has been effective.

Acknowledgments

The authors gratefully thank all institutions that conducted the surveys, as well as all members of the SAPASEN. The authors used secondary databases that were previously approved by local ethics committee in each country. All the participants provided consent to participate. Data sets from Argentina, Brazil, Chile, and Peru are available in each governmental website. Data sets from Ecuador and Guyana are available upon request to the World Health Organization. Data sets from Bolivia are available upon request to the Demographic Health Survey. Data sets from Colombia, Paraguay, Suriname, Uruguay, and Venezuela are available upon request to each organizing committee. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Werneck is supported by the São Paulo Research Foundation (FAPESP) with a PhD scholarship (FAPESP process: 2019/24124-7). Araujo is supported by the Coordination for the Improvement of Higher Education Personnel (CAPES) with a PhD scholarship (CAPES process: 88887.605034/2021-00). Aguilar-Farias is supported by Grant FRO19101 InES for Research Leaders. This paper presents independent research. The views expressed in this publication are those of the authors and not necessarily those of the acknowledged institution. **Author Contributions:** *Conceptualization, visualization, formal analysis, and writing—original draft:* Werneck. *Writing—original draft and validation:* Araujo, Silva. *Writing—review and editing:* Anza-Ramírez, Brazo-Sayavera, García-Witulski, Aguilar-Farias, Baldew, Sadarangani, Ramírez-Vélez, García-Hermoso, Ferrari, Cañete, Nieto-Martinez. All authors approved the final version.

References

1. Firth J, Siddiqi N, Koyanagi A, et al. The Lancet Psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *Lancet Psychiatry*. 2019;6(8):675–712. doi:10.1016/S2215-0366(19)30132-4
2. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. 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. doi:10.1016/S0140-6736(12)61031-9
3. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Glob Health*. 2018;6(10):e1077–e1086. doi:10.1016/S2214-109X(18)30357-7
4. Holtermann A, Schnohr P, Nordestgaard BG, Marott JL. The physical activity paradox in cardiovascular disease and all-cause mortality: the contemporary Copenhagen general population study with 104 046 adults. *Eur Heart J*. 2021;42(15):1499–1511. doi:10.1093/eurheartj/ehab087
5. White RL, Babic MJ, Parker PD, Lubans DR, Astell-Burt T, Lonsdale C. Domain-specific physical activity and mental health: a meta-analysis. *Am J Prev Med*. 2017;52(5):653–666. doi:10.1016/j.amepre.2016.12.008
6. Salvo D, Garcia L, Reis RS, et al. Physical activity promotion and the United Nations sustainable development goals: building synergies to maximize impact. *J Phys Act Health*. 2021;18(10):1163–1180. doi:10.1123/jpah.2021-0413
7. Werneck AO, Baldew SS, Miranda JJ, Incarbone Ó, Silva DR. The South American Physical Activity and Sedentary Behavior Network (SAPASEN). *Glob Health Promot*. 2020;27(3):171–176. doi:10.1177/1757975919859577
8. Werneck AO, Baldew SS, Miranda JJ, Díaz Arnesto O, Stubbs B, Silva DR. Physical activity and sedentary behavior patterns and sociodemographic correlates in 116,982 adults from six South American countries: the South American physical activity and sedentary behavior network (SAPASEN). *Int J Behav Nutr Phys Act*. 2019;16(1):68. doi:10.1186/s12966-019-0839-9

9. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*. 2003;35(8):1381–1395. doi:10.1249/01.MSS.0000078924.61453.FB
10. Armstrong T, Bull F. Development of the World Health Organization Global Physical Activity Questionnaire (GPAQ). *J Public Health*. 2006;14(2):66–70. doi:10.1007/s10389-006-0024-x
11. Moreira AD, Claro RM, Felisbino-Mendes MS, Velasquez-Melendez G. Validade e reprodutibilidade de inquérito telefônico de atividade física no Brasil. *Rev Bras Epidemiol*. 2017;20(1):136–146. doi:10.1590/1980-5497201700010012
12. Silva DR, Barboza LL, Baldew SS, et al. Measurement of physical activity and sedentary behavior in national health surveys, South America. *Rev Panam Salud Publica*. 2022;46:e7. doi:10.26633/RPSP.2021.XX
13. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med*. 2020;54(24):1451–1462. doi:10.1136/bjsports-2020-102955
14. Ross R, Chaput JP, Giangregorio LM, et al. Canadian 24-Hour Movement Guidelines for Adults aged 18–64 years and Adults aged 65 years or older: an integration of physical activity, sedentary behaviour, and sleep. *Appl Physiol Nutr Metab*. 2020;45(10)(suppl 2):S57–S102. doi:10.1139/apnm-2020-0467
15. Ferrari G, Kovalskys I, Fisberg M, et al. Original research Socio-demographic patterning of self-reported physical activity and sitting time in Latin American countries: findings from ELANS. *BMC Public Health*. 2019;19(1):1723. doi:10.1186/s12889-019-8048-7
16. Ferrant G, Pesando LM, Nowacka K. *Unpaid Care Work: The Missing Link in the Analysis of Gender Gaps in Labour Outcomes*. OECD Develop Centre; 2014.
17. Mielke GI, Malta DC, Nunes BP, Cairney J. All are equal, but some are more equal than others: social determinants of leisure time physical activity through the lens of intersectionality. *BMC Public Health*. 2022;22(1):36. doi:10.1186/s12889-021-12428-7
18. Werneck AO, Barboza LL, Araújo RHO, et al. Time trends and sociodemographic inequalities in physical activity and sedentary behaviors among Brazilian adults: national surveys from 2003 to 2019. *J Phys Act Health*. 2021;18:1332–1341. doi:10.1123/jpah.2021-0156
19. de Sousa-Mast FR, Reis AC, Vieira MC, Sperandei S, Gurgel LA, Pühse U. Does being an Olympic city help improve recreational resources? Examining the quality of physical activity resources in a low-income neighborhood of Rio de Janeiro. *Int J Public Health*. 2017;62(2):263–268. doi:10.1007/s00038-016-0827-7
20. Manta SW, Reis RS, Benedetti TRB, Rech CR. Public open spaces and physical activity: disparities of resources in Florianópolis. *Rev Saúde Pública*. 2019;53:112. doi:10.11606/S1518-8787.2019053001164
21. Ramirez PC, Camargo DM, Quiroga V, Rios AP, Fermino RC, Sarmiento OL. Quality of public urban parks for physical activity practice in Bucaramanga, Colombia. *Rev Bras Cineantropom Desempenho Hum*. 2017;19(4):480. doi:10.5007/1980-0037.2017v19n4p480
22. Crochemore-Silva I, Knuth AG, Mielke GI, Loch MR. Promotion of physical activity and public policies to tackle inequalities: considerations based on the inverse care law and inverse equity hypothesis. *Cad Saúde Pública*. 2020;36(6):155119. doi:10.1590/0102-311x00155119
23. Paez DC, Reis RS, Parra DC, et al. Bridging the gap between research and practice: an assessment of external validity of community-based physical activity programs in Bogotá, Colombia, and Recife, Brazil. *Behav Med Pract Policy Res*. 2015;5(1):1–11. doi:10.1007/s13142-014-0275-y
24. Sarmiento O, Torres A, Jacoby E, Pratt M, Schmid TL, Stierling G. The ciclovía-recreativa: a mass-recreational program with public health potential. *J Phys Act Health*. 2010;7(suppl 2):S163–S180. doi:10.1123/jpah.7.s2.s163
25. Ferrari GLM, Oliveira Werneck A, Rodrigues da Silva D, et al. Socio-demographic correlates of total and domain-specific sedentary behavior in Latin America: a population-based study. *Int J Environ Res Public Health*. 2020;17(15):5587. doi:10.3390/ijerph17155587
26. The Lancet Public Health. Time to tackle the physical activity gender gap. *Lancet Public Health*. 2019;4(8):360. doi:10.1016/S2468-2667(19)30135-5
27. Brown WJ, Mielke GI, Kolbe-Alexander TL. Gender equality in sport for improved public health. *Lancet*. 2016;388(10051):1257–1258. doi:10.1016/S0140-6736(16)30881-9
28. Mielke GI, da Silva ICM, Kolbe-Alexander TL, Brown WJ. Shifting the physical inactivity curve worldwide by closing the gender gap. *Sports Med*. 2018;48(2):481–489. doi:10.1007/s40279-017-0754-7
29. Strain T, Wijndaele K, Garcia L, et al. Levels of domain-specific physical activity at work, in the household, for travel and for leisure among 327 789 adults from 104 countries. *Br J Sports Med*. 2020;54(24):1488–1497. doi:10.1136/bjsports-2020-102601
30. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet*. 2012;380(9838):247–257. doi:10.1016/S0140-6736(12)60646-1
31. Giles-Corti B, Vernez-Moudon A, Reis R, et al. City planning and population health: a global challenge. *Lancet*. 2016;388(10062):2912–2924. doi:10.1016/S0140-6736(16)30066-6
32. Stockwell S, Trott M, Tully M, et al. Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review. *BMJ Open Sport Exerc Med*. 2021;7(1):000960. doi:10.1136/bmjsem-2020-000960
33. Werneck AO, Silva DR, Malta DC, et al. Changes in the clustering of unhealthy movement behaviors during the COVID-19 quarantine and the association with mental health indicators among Brazilian adults. *Transl Behav Med*. 2021;11(2):323–331. doi:10.1093/tbm/ibaa095
34. Malta DC, Szwarcwald CL, Barros MBA, et al. A pandemia da COVID-19 e as mudanças no estilo de vida dos brasileiros adultos: um estudo transversal, 2020. *Epidemiol Serv Saúde*. 2020;29(4):2020407. doi:10.1590/s1679-49742020000400026
35. Sallis JF, Adlakha D, Oyeyemi A, Salvo D. An international physical activity and public health research agenda to inform coronavirus disease-19 policies and practices. *J Sport Health Sci*. 2020;9(4):328–334. doi:10.1016/j.jshs.2020.05.005

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