



# Inequalities related to participation in Physical Education classes among South American adolescents: a pooled analysis with 173,288 participants

Desigualdades relacionadas à participação em aulas de Educação Física entre adolescentes sul-americanos: uma análise com 173.288 participantes

## AUTHORS

Raphael Henrique de Oliveira Araujo<sup>1,2</sup>   
 André Oliveira Werneck<sup>3,4</sup>   
 Thiago Sousa Matias<sup>5</sup>   
 Rafael Miranda Tassitano<sup>6</sup>   
 Clarice Maria de Lucena Martins<sup>7,8</sup>   
 Nicolas Aguilar-Farias<sup>9</sup>   
 Gilmar Mercês de Jesus<sup>10</sup>   
 Robinson Ramirez-Vélez<sup>11,12</sup>   
 Se-Sergio Baldeu<sup>13</sup>   
 Cecília Anza-Ramirez<sup>14</sup>   
 Mario Germán Álvarez-Álvarez<sup>15</sup>   
 Javier Brazo-Sayavera<sup>16,17</sup>   
 Danilo Rodrigues Pereira da Silva<sup>1,18</sup>

1 Londrina State University, Graduation Program in Health Sciences, Londrina, Paraná, Brazil.

2 The University of Queensland, School of Public Health, Brisbane, Australia.

3 Universidade de São Paulo, Department of Nutrition, School of Public Health, Center for Epidemiological Research in Nutrition and Health, São Paulo, São Paulo, Brazil.

4 King's College London, Department of Psychological Medicine, Institute of Psychiatry, Psychology and Neuroscience, United Kingdom.

5 Federal University of Santa Catarina, School of Sports, Florianópolis, Santa Catarina, Brazil.

6 University of Illinois at Urbana-Champaign, Department of Kinesiology and Community Health, Illinois, USA.

7 Federal University of Paraíba, Department of Physical Education, João Pessoa, Paraíba, Brazil.

8 University of Porto, Faculty of Sports, Research Center in Physical Activity, Health and Leisure, Porto, Portugal.

9 Universidad de La Frontera, Department of Physical Education, Sports and Recreation, Temuco, Chile.

10 State University of Feira de Santana, Department of Health, Feira de Santana, Bahia, Brazil.

11 Universidad Pública de Navarra, Navarrabiomed, Complejo Hospitalario de Navarra, Pamplona, Navarra, Spain. CIBER of Frailty and Healthy Aging, Instituto de Salud Carlos III, Madrid, Spain.

12 Facultad de Ciencias de la Educación, Unidad Central del Valle del Cauca, Tuluá, Valle del Cauca, Colombia.

13 Anton de Kom University of Suriname, Faculty of Medical Sciences, Department of Physical Therapy, Paramaribo, Suriname.

14 Universidad Peruana Cayetano Heredia, CRONICAS Centre of Excellence in Chronic Diseases, Lima, Peru.

15 Universidad Politécnica Salesiana, Research Group of Physical Activity and Sports Sciences, Cuenca, Ecuador.

16 Universidad Pablo de Olavide, Department of Sports and Computer Science, Sevilla, Spain.

17 Universidad de la República, Centro Universitario Regional Noreste, Rivera, Uruguay.

18 Federal University of Sergipe, Department of Physical Education, São Cristóvão, Sergipe, Brazil.

## ABSTRACT

We aimed to describe the prevalence of participation in Physical Education (PE) classes among South American adolescents according to sociodemographic correlates. We used nationally representative data from 11 South American countries, comprising 173,288 adolescents (>11 to 19y). Participation in PE classes was self-reported (0, 1, 2, and  $\geq 3$  days/week). Sociodemographic correlates were gender, age group, and food security status. Poisson Regression models were used to estimate the Prevalence Ratios. Around 16% of South American adolescents did not participate in PE classes, while 27% participated  $\geq 3$  days/week in PE classes. There were more boys in the  $\geq 3$  days/week category [1.10 (1.03; 1.19)] and no gender difference in the 0 days/week category [1.03 (0.91; 1.16)]. Older adolescents ( $\geq 16$ y) had a higher prevalence of 0 [1.50 (1.11; 2.02)] and 1 day/week [1.18 (1.05; 1.33)], and a lower prevalence of 2 [0.70 (0.58; 0.85)] and  $\geq 3$  days/week [0.73 (0.60; 0.89)] compared to the younger adolescents (12–13y). Adolescents who reported food insecurity had a higher prevalence of 0 [1.20 (1.06; 1.36)] and  $\geq 3$  days/week [1.07 (1.02; 1.12)]. In conclusion, approximately 16% of South American adolescents do not participate in PE classes, with differences related to gender, age, and food security status.

**Keywords:** Adolescent; Physical education; Physical activity; Global School-Based Student health survey.

## RESUMO

*O objetivo do presente estudo foi descrever a prevalência de participação em aulas de Educação Física (EF) entre adolescentes sul-americanos de acordo com correlatos sociodemográficos. Foram utilizados dados de 11 países sul-americanos, compreendendo 173.288 adolescentes (>11 a 19 anos). A participação em aulas de EF foi autorrelatada (0, 1, 2 e  $\geq 3$  dias/semana). Os correlatos sociodemográficos foram gênero, faixa etária e status de segurança alimentar. Modelos de regressão de Poisson foram usados para estimar as razões de prevalência. Cerca de 16% dos adolescentes sul-americanos não participaram de aulas de EF, enquanto 27% participaram  $\geq 3$  dias/semana em aulas de EF. Meninos tiveram maior probabilidade de participar de aulas de EF  $\geq 3$  dias/semana do que meninas [1,10 (1,03; 1,19)], não havendo diferença de gênero na categoria 0 dia/semana [1,03 (0,91; 1,16)]. Adolescentes mais velhos ( $\geq 16$  anos) apresentaram maior prevalência de 0 [1,50 (1,11; 2,02)] e 1 dia/semana [1,18 (1,05; 1,33)], e menor prevalência de 2 [0,70 (0,58; 0,85)] e  $\geq 3$  dias/semana de aulas de EF [0,73 (0,60; 0,89)] em comparação aos adolescentes mais jovens (12–13 anos). Adolescentes que relataram insegurança alimentar apresentaram maior prevalência de 0 [1,20 (1,06; 1,36)] e  $\geq 3$  dias/semana de aulas de EF [1,07 (1,02; 1,12)]. Assim, aproximadamente 16% dos adolescentes sul-americanos não participam de aulas de educação física, sendo observadas diferenças de gênero, entre faixas etárias e entre status de segurança alimentar.*

**Palavras-chave:** Adolescente; Educação física; Atividade física; Global School-Based Student health survey.

## CORRESPONDING

Raphael H O Araujo  
 raphael.edfis@gmail.com  
 Rodovia Celso Garcia Cid, Km 380. Londrina,  
 Paraná, Brazil.  
 Zip Code: 86057-970.

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## Introduction

Physical Education (PE) class has an essential role in students' education through bodily expression, playful experiences, social relationships<sup>1,2</sup>, and potential health-related outcomes (e.g., decreasing anxiety)<sup>3</sup>. PE is also associated with increases in students' total physical activity<sup>2,4,5</sup>, and benefits such as cardiorespiratory fitness, muscular strength, reductions in body fatness indexes, and improvements in fundamental motor skills, cognition, and academic performance<sup>2,6,7</sup>.

There is a growing concern about the participation of children and adolescents in PE classes. For instance, data from a worldwide survey indicates that PE is not implemented in line with state policy legal requirements in 29.0% of the countries<sup>8</sup>. In Latin America and the Caribbean, 11% of the countries did not implement PE following expectations/obligations<sup>8</sup>. In addition, although being consolidated in the school curricula, evidence has been raised on PE inequalities among South American (SA) countries. For example, in Brazil, despite PE classes being mandatory, girls and adolescents in lower socioeconomic conditions tend to report lower participation in PE classes than boys and adolescents with higher socioeconomic conditions, respectively<sup>9,10</sup>. Considering that, even with SA countries presenting different legislations (e.g., at the state and national level), they do not change according to gender and socioeconomic status.

In addition, some gaps persist in the literature, as there are no multi-country studies including exposures related to economic indicators with harmonized datasets from SA<sup>11,12</sup>. As far as we know, only one previous study<sup>13</sup> with SA countries used food security status (proxy of socioeconomic status) to identify whether participation in PE differs between those more and less socially favored. However, the previous study used a dichotomic indicator of participation in PE ( $\geq 3$  days/week)<sup>13</sup>, and possible differences in other weekly frequencies of PE are unknown.

Although some studies have been carried out data from multiple countries<sup>12</sup> or with a focus on Latin American and Caribbean countries<sup>11</sup>, only data from the Global School-based Student Health Survey (GSHS) were used, which did not cover all SA countries (e.g., Brazil). Furthermore, GSHS data from Colombia and Ecuador are not nationally representative so far<sup>11</sup>. However, once Brazil, Colombia, and Ecuador have their own nationally representative surveys with adolescents, harmonizing and analyzing these surveys

could improve regional representativeness as well as country-level estimates.

The South American Physical Activity and Sedentary Behavior Network – SAPASEN has sought to harmonize and analyze nationally representative datasets to provide continuous evidence on movement behaviors<sup>14</sup>. By summarizing the information through nationally representative datasets, it is possible to understand the gaps in participation in PE, guiding new policies and research on the subject. For example, providing useful information for countries to plan and evaluate legislation on PE across the school years, as well as providing information on the most needed subgroups in relation to PE promotion. Therefore, this study aims to present the prevalence of participation in PE among SA adolescents according to sociodemographic indicators (i.e., gender, age, and status of food security).

## Methods

We used nationally representative cross-sectional data from Argentina (GSHS, 2018)<sup>15</sup>, Bolivia (GSHS, 2018)<sup>15</sup>, Brazil (Brazil National School Health Survey, PeNSE 2015)<sup>16</sup>, Chile (GSHS, 2013)<sup>15</sup>, Colombia (Colombia National School Health Survey, ENSE 2017)<sup>17</sup>, Ecuador (Ecuador National Health and Nutrition Survey, ENSANUT 2018)<sup>18</sup>, Guyana (GSHS, 2010)<sup>15</sup>, Paraguay (GSHS, 2017)<sup>15</sup>, Peru (GSHS, 2010)<sup>15</sup>, Suriname (GSHS, 2016)<sup>15</sup>, and Uruguay (GSHS, 2012)<sup>15</sup>. When the countries presented two or more surveys, only the latest was used. Details on the sampling strategy are available elsewhere<sup>13</sup>. All surveys were previously approved by local ethics committees in each country, and informed consent was obtained from the students and/or parents/legal guardians, as required by the local ethics review board.

The Ecuador surveys comprised data from individuals aged 5 to 18 years old, while the lower age category in other surveys was  $\leq 11$ y. Thus, aiming to harmonize the surveys, we excluded all participants aged  $\leq 11$ y and those with no data for exposures and/or outcomes. Those  $\leq 11$ y represented ~8% (15,976/200,827) of the initial sample. After that, 11,563 participants were excluded by missing data, and the final sample was comprised of 173,288 adolescents from Argentina ( $n = 53,315$ ), Bolivia ( $n = 7,052$ ), Brazil ( $n = 14,368$ ), Chile ( $n = 1,926$ ), Colombia ( $n = 74,319$ ), Ecuador ( $n = 9,000$ ), Guyana ( $n = 2,244$ ), Paraguay ( $n = 2,894$ ), Peru ( $n = 2,827$ ), Suriname ( $n = 2,031$ ), and Uruguay ( $n = 3,312$ ). More details are shown in Supplementary Chart 1.

## Physical Education classes

The GSHS (Argentina, Bolivia, Chile, Guyana, Paraguay, Peru, Suriname, and Uruguay) and *ENSE-2017* (Colombia) assessed the participation in PE classes by the question “*During this school year, on how many days did you go to physical education classes each week?*”. The *PeNSE-2015* (Brazil) used the question, “*During the last seven days, how many days did you go to a physical education class at school?*”. Two questions were used in the *ENSANUT-2018* (Ecuador). First, “*in a normal week, when you go to school, do you go to the physical education classes?*”. Second, “*on how many days did you go to a physical education class per week?*”. The participants who answered did not go to PE class in a normal week were coded as 0 days. The answers were coded as “0 days/week”, “1 day/week”, “2 days/week”, and “≥3 days/week”.

## Sociodemographic correlates

Information about gender, age group (12-13; 14-15; ≥16 y.o), and food security status were collected. The question used to assess food security status was, “*During the past 30 days, how often did you go hungry because there was not enough food in your home?*” For analysis, responses to how often the student reported being hungry due to the absence of food were grouped into the following two categories: “food security” (never/rarely) and “food insecurity” (sometimes/most of the time/always)<sup>19</sup>. In the present paper, we used food security status as a proxy for socioeconomic status. Food insecurity is closely associated with socioeconomic status indicators among adolescents, such as lower parental education and lower-income<sup>20</sup>. Among the analyzed countries, only Ecuador did not report information on

food security status.

## Statistics

All analyses were conducted using Stata 15.0 (StataCorp., College Station, TX, USA). Descriptive statistics were performed using relative frequencies and their respective 95% confidence intervals (95% CI). The command “metaprop” was used to estimate the weighted frequencies of the PE classes. To identify possible differences in each PE class category, we created dummy variables for the outcome. For instance, in the first model, considering gender as exposure, we sought to identify if the probability of reporting zero days of PE classes per week was different between boys and girls. In the second model, we verified possible differences in one day of PE classes, and so on. Crude Poisson regression models were used to identify the association of the sociodemographic correlates with frequencies of PE class. The command “metan” was used to run the random-effects meta-analysis models. The heterogeneity was assessed using the Higgins’  $I^2$  statistic. All analyses accounted for appropriate sample weights for each country.

## Results

The sample characteristics are presented in Table 1. The proportion of girls ranged from 49.0% (Bolivia and Brazil) to 54.3% (Uruguay), while the sample was older in Uruguay and Bolivia. Suriname and Guyana had the highest prevalence of food insecurity.

Table 2 presents the participation in PE classes among SA countries. The pooled analysis revealed that 16.0% (95% CI: 10.0; 21.0) of SA adolescents did not

**Table 1** – Sociodemographic characteristics of adolescents from 11 South American countries (n = 173,288).

	Gender	Age group			Food insecurity
	Girls	12-13 y	14-15y	≥16y	Yes
Argentina (2018)	52.3 (51.5; 53.2)	20.8 (20.1; 21.5)	46.9 (46.1; 47.8)	32.3 (31.6; 33.1)	11.4 (10.8; 11.9)
Bolivia (2018)	49.0 (47.8; 50.2)	11.1 (10.4; 11.9)	39.4 (38.2; 40.5)	49.5 (48.3; 50.7)	20.2 (19.2; 21.1)
Brazil (2015)	49.0 (47.9; 50.2)	27.5 (26.6; 28.4)	31.2 (30.2; 32.3)	41.3 (40.1; 42.4)	12.1 (11.3; 12.9)
Chile (2013)	51.4 (48.8; 53.9)	22.2 (20.4; 24.0)	34.5 (32.1; 37.0)	43.3 (40.7; 46.0)	8.2 (6.9; 9.9)
Colombia (2017)	53.6 (53.0; 54.2)	20.6 (20.1; 21.1)	43.5 (42.9; 44.1)	36.0 (35.4; 36.5)	7.3 (7.0; 7.7)
Ecuador (2018)	48.3 (46.5; 50.0)	35.7 (34.0; 37.4)	34.2 (32.5; 35.9)	30.1 (28.5; 31.8)	-
Guyana (2010)	51.5 (49.3; 53.6)	24.0 (22.1; 25.9)	60.6 (58.5; 62.7)	15.4 (13.9; 17.0)	33.1 (31.1; 35.2)
Paraguay (2017)	51.6 (49.7; 53.5)	21.0 (19.5; 22.6)	40.8 (39.0; 42.6)	38.2 (36.4; 40.1)	11.4 (10.3; 12.7)
Peru (2010)	49.5 (47.6; 51.4)	21.2 (19.7; 22.8)	62.5 (60.7; 65.3)	16.3 (14.9; 17.7)	19.3 (17.9; 20.9)
Suriname (2016)	50.9 (48.6; 53.2)	25.0 (23.1; 27.0)	43.9 (41.6; 46.1)	31.1 (29.0; 33.3)	32.8 (30.6; 35.0)
Uruguay (2012)	54.3 (52.6; 56.1)	7.3 (6.4; 8.2)	22.6 (21.1; 24.1)	60.5 (58.7; 62.2)	16.9 (15.6; 18.3)

Note: The values are presented through percentage and their respective 95% confidence intervals.

participate in any PE class. The highest and lowest prevalence of 0 days/week of PE classes were in Guyana (49.7%, 95% CI: 47.5; 51.8) and Ecuador (3.2%, 95% CI: 2.7; 3.9), respectively. Approximately 27.0% (95% CI: 19.0; 35.0) of SA adolescents participate in PE classes on  $\geq 3$  days/week, with the higher and lower proportions being observed in Bolivia (40.3%, 95% CI: 10.4; 11.9) and Peru (2.2%, 95% CI: 6.8; 8.8), respectively. The most common pattern of PE classes is once a week (38.0%, 95% CI: 26.0; 50.0).

Table 3 presents the prevalence and prevalence ratios (PR) of participation in PE classes according to gender. The pooled analysis revealed that boys had more probability to participate in PE classes on  $\geq 3$  PE days/week than girls [PR = 1.10 (95% CI: 1.02; 1.19),  $I^2 = 88.0\%$ ].

Table 4 presents the proportion of participation in PE classes according to age groups. The older adolescents ( $\geq 16y$ ) were less likely to participate in PE class compared to the younger adolescents (12-13y). Adolescents aged 14-15y and  $\geq 16y$  had more probability to participate in PE class on 1 day/week than younger adolescents [PR<sub>14-15y</sub> = 1.13 (95% CI: 1.05; 1.21)  $I^2 = 87.2\%$ ; PR <sub>$\geq 16y$</sub>  = 1.18 (95% CI: 1.05; 1.33),  $I^2 = 94.4\%$ , respectively], but they had less probability to participate in PE classes on 2 days/week [PR<sub>14-15y</sub> = 0.85 (95% CI: 0.76; 0.94),  $I^2 = 84.1\%$ ; PR <sub>$\geq 16y$</sub>  = 0.70 (95% CI: 0.58; 0.85),  $I^2 = 94.8\%$ , respectively]. Lastly, adolescents aged 14-15y and  $\geq 16y$  had a prevalence of  $\geq 3$  days/week of PE classes 12.0% and 27.0% lower than younger adolescents, respectively.

Table 5 presents the proportion of participation in PE classes according to food security status. The pooled analysis revealed a U-shaped association, where adolescents with food insecurity had a higher prevalence of 0 and  $\geq 3$  days/week of PE classes than adolescents with food security [PR<sub>0 days/week</sub> = 1.20 (95% CI: 1.06; 1.36),  $I^2 = 80.1\%$ ; PR <sub>$\geq 3$  days/week</sub> = 1.07 (95% CI: 1.02; 1.12),  $I^2 = 35.4\%$ ], but a lower prevalence of 1 day/week [PR = 0.97 (95% CI: 0.93; 0.97),  $I^2 = 23.6\%$ ].

0 days/week of PE class than adolescents with food security [PR = 1.20 (95% CI: 1.06; 1.36),  $I^2 = 80.1\%$ ]. However, the proportion of  $\geq 3$  days/week of PE classes was higher among adolescents with food insecurity [PR = 1.07 (95% CI: 1.02; 1.12),  $I^2 = 35.4\%$ ].

## Discussion

The present study described the prevalence of participation in PE among SA adolescents according to socio-demographic correlates. Our results show that almost a fifth proportion does not participate in PE classes. Students mostly report PE once a week. Boys seem to participate in PE more frequently in a week than girls and older adolescents seem to participate less in PE classes than their younger pairs. Food insecurity presented a U-shaped association with the weekly frequency of PE.

Our pooled analysis showed that approximately 16.0% of the SA adolescents reported not participating in PE classes; prevalence similar to that found in a previous study with 54 countries/territories, but lower than in regions such as Central Asia, Middle East, and North Africa (24.0%), Oceania (27.0%), and Sub-Sa-

**Table 2** – Proportion of participation in Physical Education classes in 11 South American countries (n = 173,288).

	0 days/week		1 day/week		2 days/week		$\geq 3$ PE days/week	
	% (95% CI)	$I^2$	% (95% CI)	$I^2$	% (95% CI)	$I^2$	% (95% CI)	$I^2$
Argentina (2018)	12.0 (11.4; 12.6)		16.3 (15.7; 16.9)		34.3 (33.5; 35.1)		37.5 (36.6; 38.3)	
Bolivia (2018)	11.1 (10.4; 11.9)		42.8 (41.6; 44.0)		5.7 (5.2; 6.3)		40.3 (39.2; 41.5)	
Brazil (2015)	23.9 (22.9; 25.0)		40.2 (39.1; 41.3)		26.3 (25.4; 27.3)		9.6 (9.0; 10.2)	
Chile (2013)	8.8 (7.4; 10.3)		43.3 (40.7; 45.9)		15.1 (13.5; 16.9)		32.8 (30.4; 35.3)	
Colombia (2017)	7.7 (7.4; 8.1)		40.4 (39.8; 41.0)		14.4 (14.0; 14.8)		37.4 (36.9; 38.0)	
Ecuador (2018)	3.2 (2.7; 3.9)		23.7 (22.3; 25.2)		45.9 (44.2; 47.7)		27.1 (25.5; 28.8)	
Guyana (2010)	49.7 (47.5; 51.8)		22.3 (20.5; 24.1)		9.1 (7.9; 10.4)		19.0 (17.3; 20.8)	
Paraguay (2017)	15.2 (13.9; 16.6)		58.3 (56.5; 60.2)		6.0 (5.2; 7.0)		20.4 (19.0; 22.0)	
Peru (2010)	7.7 (6.8; 8.8)		86.0 (84.6; 87.3)		4.1 (3.4; 4.9)		2.2 (1.7; 2.9)	
Suriname (2016)	20.6 (18.8; 22.6)		40.6 (38.4; 42.9)		5.7 (4.7; 7.0)		33.0 (30.9; 35.1)	
Uruguay (2012)	12.6 (11.5; 13.8)		8.1 (7.2; 9.1)		44.3 (42.5; 46.0)		35.0 (33.3; 36.7)	
South America	16.0 (10.0; 21.0)	100%	38.0 (26.0; 50.0)	100%	19.0 (11.0; 27.0)	100%	27.0 (19.0; 35.0)	100%

Note: Days per week are not the same as hours or classes per week.

**Table 3** – Association between gender and participation in Physical Education in South America (n = 173,288).

Countries		0 days/week		1 day/week		2 days/week		≥3 days/week	
		% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
Argentina	Girls	11.8 (11.0; 12.7)	Ref	16.6 (15.7; 17.4)	Ref	36.8 (35.7; 37.9)	Ref	34.8 (33.7; 36.0)	Ref
	Boys	12.1 (11.3; 13.0)	1.03 (0.93; 1.13)	15.9 (15.1; 16.8)	0.96 (0.89; 1.03)	31.6 (30.5; 32.8)	0.86 (0.82; 0.90)*	40.3 (39.1; 41.6)	1.16 (1.11; 1.21)*
Bolivia	Girls	10.3 (9.2; 11.4)	Ref	44.6 (42.9; 46.4)	Ref	5.4 (4.6; 6.3)	Ref	39.7 (38.0; 41.5)	Ref
	Boys	11.9 (10.9; 13.1)	1.16 (1.01; 1.34)*	41.1 (39.5; 42.7)	0.92 (0.87; 0.97)*	6.1 (5.3; 6.9)	1.12 (0.92; 1.38)	40.9 (39.3; 42.6)	1.03 (0.97; 1.09)
Brazil	Girls	23.5 (22.2; 24.9)	Ref	40.2 (38.6; 41.8)	Ref	27.3 (25.9; 28.7)	Ref	9.0 (8.2; 9.9)	Ref
	Boys	24.3 (22.9; 25.8)	1.03 (0.95; 1.12)	40.1 (38.6; 41.7)	1.00 (0.94; 1.06)	25.4 (24.1; 26.7)	0.93 (0.86; 1.00)	10.2 (9.3; 11.1)	1.13 (0.99; 1.29)
Chile	Girls	9.5 (7.6; 11.8)	Ref	43.8 (40.2; 47.5)	Ref	13.8 (11.7; 16.1)	Ref	32.9 (29.5; 36.5)	Ref
	Boys	8.0 (6.2; 10.3)	0.85 (0.61; 1.18)	42.7 (39.1; 46.3)	0.97 (0.86; 1.10)	16.6 (14.2; 19.3)	1.21 (0.97; 1.50)	32.7 (29.4; 36.3)	0.99 (0.86; 1.15)
Colombia	Girls	6.8 (6.4; 7.2)	Ref	40.3 (39.6; 41.1)	Ref	14.9 (14.3; 15.5)	Ref	38.0 (37.2; 38.8)	Ref
	Boys	8.8 (8.3; 9.4)	1.30 (1.29; 1.41)*	40.5 (39.6; 41.4)	1.00 (0.98; 1.03)	13.9 (13.3; 14.5)	0.93 (0.88; 0.99)*	36.8 (35.9; 37.6)	0.97 (0.94; 1.00)
Ecuador	Girls	4.1 (3.2; 5.2)	Ref	24.5 (22.4; 26.7)	Ref	45.4 (42.8; 47.9)	Ref	26.0 (23.7; 28.5)	Ref
	Boys	2.4 (1.9; 3.1)	0.59 (0.41; 0.83)*	23.0 (21.1; 25.1)	0.94 (0.83; 1.06)	46.4 (44.0; 48.9)	1.02 (0.95; 1.11)	28.1 (25.9; 30.4)	1.08 (0.96; 1.22)
Guyana	Girls	51.0 (48.1; 53.9)	Ref	22.3 (20.0; 24.9)	Ref	8.5 (7.0; 10.3)	Ref	18.1 (16.0; 20.5)	Ref
	Boys	48.2 (45.0; 51.5)	0.95 (0.87; 1.03)	22.2 (19.6; 25.0)	0.99 (0.84; 1.17)	9.7 (7.9; 11.8)	1.14 (0.87; 1.51)	19.9 (17.4; 22.6)	1.09 (0.91; 1.31)
Paraguay	Girls	16.2 (14.4; 18.1)	Ref	62.8 (60.3; 65.3)	Ref	5.5 (4.4; 6.7)	Ref	15.6 (13.8; 17.6)	Ref
	Boys	14.3 (12.5; 16.3)	0.88 (0.74; 1.05)	53.5 (50.8; 56.2)	0.85 (0.80; 0.91)*	6.6 (5.3; 8.1)	1.21 (0.90; 1.62)	25.6 (23.3; 28.1)	1.65 (1.41; 1.92)*
Peru	Girls	5.6 (4.5; 7.0)	Ref	87.8 (86.0; 89.5)	Ref	4.5 (3.5; 5.7)	Ref	2.0 (1.4; 3.0)	Ref
	Boys	9.8 (8.3; 11.5)	1.73 (1.32; 2.27)*	84.2 (82.1; 86.1)	0.96 (0.93; 0.99)*	3.7 (2.8; 4.8)	0.82 (0.56; 1.18)	2.4 (1.7; 3.4)	1.16 (0.69; 1.96)
Suriname	Girls	21.8 (19.2; 24.6)	Ref	43.0 (39.9; 46.1)	Ref	4.2 (3.0; 5.7)	Ref	31.1 (28.3; 34.0)	Ref
	Boys	19.5 (17.0; 22.2)	0.89 (0.75; 1.07)	38.2 (35.1; 41.4)	0.89 (0.80; 0.99)*	7.4 (5.7; 9.4)	1.77 (1.19; 2.64)*	35.0 (31.9; 38.2)	1.12 (0.99; 1.28)
Uruguay	Girls	12.3 (10.8; 13.9)	Ref	7.8 (6.6; 9.2)	Ref	45.0 (42.6; 47.4)	Ref	35.0 (32.7; 37.3)	Ref
	Boys	13.0 (11.4; 14.9)	1.06 (0.88; 1.28)	8.5 (7.1; 10.0)	1.08 (0.85; 1.37)	43.4 (40.9; 46.1)	0.97 (0.89; 1.05)	35.0 (32.6; 37.6)	1.00 (0.91; 1.11)
South America	Girls	16.0 (10.0; 21.0)	Ref	39.0 (27.0; 52.0)	Ref	19.0 (11.0; 27.0)	Ref	26.0 (18.0; 33.0)	Ref
	Boys	16.0 (9.0; 22.0)	1.03 (0.91; 1.16) I <sup>2</sup> (%) = 90.3	37.0 (26.0; 49.0)	0.95 (0.92; 0.98)* I <sup>2</sup> (%) = 67.2	19.0 (12.0; 27.0)	1.00 (0.93; 1.07) I <sup>2</sup> (%) = 76.0	28.0 (20.0; 36.0)	1.10 (1.02; 1.19)* I <sup>2</sup> (%) = 88.0

Note: PR = prevalence ratio. 95% CI = 95% confidence interval; Ref = reference category. \*There is no overlap of 95% confidence intervals. Days per week are not the same as hours or classes per week

haran Africa (29.0%)<sup>12</sup>. In addition, we observed that prevalence of not participating in PE classes ranges from 3% (i.e., Ecuador) to 50.0% (i.e., Guyana) among

SA countries. PE is mandatory in many SA countries, with different laws and educational regulations across them. For instance, two hours per week of PE are ex-

**Table 4** – Association between age group and participation in Physical Education in South America (n = 173,288).

Countries		0 days/week		1 day/week		2 days/week		≥3 days/week	
		% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
Argentina	12-13y	10.4 (9.2; 11.8)	Ref	15.8 (14.6; 17.0)	Ref	36.5 (34.7; 38.3)	Ref	37.4 (35.6; 39.2)	Ref
	14-15y	11.6 (10.8; 12.5)	1.11 (0.96; 1.29)	16.2 (15.3; 17.1)	1.03 (0.93; 1.13)	34.1 (32.9; 35.2)	0.93 (0.88; 0.99)*	38.2 (37.0; 39.4)	1.02 (0.96; 1.08)
	≥16y	13.8 (12.7; 14.9)	1.32 (1.14; 1.53)*	16.7 (15.8; 17.8)	1.06 (0.96; 1.17)	32.9 (31.6; 34.2)	0.90 (0.85; 0.96)*	36.6 (35.2; 38.0)	0.98 (0.92; 1.04)
Bolivia	12-13y	13.4 (11.1; 16.0)	Ref	37.2 (33.9; 40.7)	Ref	7.6 (5.9; 9.9)	Ref	41.7 (38.3; 45.3)	Ref
	14-15y	10.7 (9.6; 12.0)	0.80 (0.65; 0.99)*	42.1 (40.1; 44.0)	1.13 (1.02; 1.25)*	6.3 (5.3; 7.3)	0.82 (0.60; 1.11)	41.0 (39.1; 42.9)	0.98 (0.89; 1.08)
	≥16y	10.9 (9.9; 12.1)	0.82 (0.66; 1.00)	44.7 (43.0; 46.4)	1.20 (1.09; 1.33)*	4.9 (4.2; 5.7)	0.64 (0.47; 0.86)*	39.5 (37.9; 41.2)	0.95 (0.86; 1.04)
Brazil	12-13y	12.0 (10.9; 13.3)	Ref	37.3 (35.5; 39.0)	Ref	35.3 (33.6; 36.9)	Ref	15.4 (14.2; 16.7)	Ref
	14-15y	22.1 (20.5; 23.8)	1.84 (1.62; 2.08)*	41.0 (39.0; 43.0)	1.10 (1.03; 1.18)*	27.6 (25.8; 29.4)	0.78 (0.72; 0.85)*	9.3 (8.3; 10.5)	0.60 (0.52; 0.70)*
	≥16y	33.2 (31.4; 35.1)	2.76 (2.46; 3.09)*	41.5 (39.6; 43.4)	1.11 (1.04; 1.19)*	19.4 (17.9; 20.9)	0.55 (0.50; 0.60)*	5.9 (5.0; 6.9)	0.38 (0.32; 0.46)*
Chile	12-13y	6.4 (4.7; 8.8)	Ref	35.0 (31.3; 38.9)	Ref	28.0 (24.4; 31.9)	Ref	30.5 (26.9; 34.5)	Ref
	14-15y	6.4 (4.6; 8.7)	0.99 (0.63; 1.55)	43.7 (39.4; 48.0)	1.25 (1.08; 1.45)*	15.9 (13.1; 19.2)	0.57 (0.45; 0.72)*	34.1 (30.0; 38.4)	1.12 (0.94; 1.33)
	≥16y	9.3 (6.1; 14.0)	1.84 (1.25; 2.73)*	47.3 (40.7; 53.9)	1.35 (1.17; 1.56)*	10.3 (6.8; 15.2)	0.28 (0.21; 0.38)*	33.2 (27.2; 39.7)	1.08 (0.91; 1.29)
Colombia	12-13y	8.5 (7.7; 9.3)	Ref	37.8 (36.4; 39.1)	Ref	16.5 (15.5; 17.5)	Ref	37.3 (35.9; 38.6)	Ref
	14-15y	7.6 (7.1; 8.1)	0.90 (0.80; 1.01)	39.6 (38.7; 40.5)	1.05 (1.01; 1.09)*	15.3 (14.6; 16.0)	0.93 (0.86; 1.00)	37.5 (36.6; 38.4)	1.01 (0.96; 1.05)
	≥16y	7.4 (7.0; 8.0)	0.88 (0.78; 0.99)*	42.9 (42.0; 43.8)	1.14 (1.09; 1.18)*	12.2 (11.6; 12.8)	0.74 (0.68; 0.80)*	37.5 (36.6; 38.4)	1.01 (0.95; 1.05)
Ecuador	12-13y	1.6 (1.0; 2.4)	Ref	11.5 (9.7; 13.5)	Ref	43.7 (40.9; 46.7)	Ref	43.2 (40.3; 46.2)	Ref
	14-15y	1.7 (1.2; 2.3)	1.06 (0.61; 1.83)	26.0 (23.5; 28.7)	2.27 (1.87; 2.74)*	45.9 (42.9; 49.0)	1.05 (0.96; 1.15)	26.4 (23.7; 29.3)	0.61 (0.54; 0.69)*
	≥16y	7.0 (5.6; 8.8)	4.47 (2.76; 7.23)*	35.6 (32.6; 38.8)	3.10 (2.58; 3.73)*	48.5 (45.3; 51.8)	1.11 (1.01; 1.22)*	8.9 (7.1; 11.0)	0.20 (0.16; 0.26)*
Guyana	12-13y	37.6 (33.3; 42.1)	Ref	26.4 (22.5; 30.6)	Ref	13.6 (10.9; 16.9)	Ref	22.4 (18.8; 26.5)	Ref
	14-15y	51.6 (48.8; 54.4)	1.37 (1.21; 1.56)*	22.4 (20.2; 24.8)	0.85 (0.71; 1.02)	8.2 (6.8; 10.0)	0.60 (0.45; 0.81)*	17.7 (15.7; 20.0)	0.79 (0.64; 0.97)*
	≥16y	60.8 (55.3; 66.0)	1.62 (1.40; 1.87)*	15.3 (11.7; 19.7)	0.58 (0.43; 0.78)*	5.4 (3.5; 8.3)	0.40 (0.25; 0.65)*	18.5 (14.5; 23.3)	0.82 (0.62; 1.10)
Paraguay	12-13y	13.5 (10.9; 16.6)	Ref	55.3 (51.2; 59.3)	Ref	6.0 (4.3; 8.2)	Ref	25.2 (21.8; 29.0)	Ref
	14-15y	15.8 (13.8; 17.9)	1.17 (0.91; 1.50)	58.1 (55.3; 60.9)	1.05 (0.96; 1.15)	5.9 (4.7; 7.3)	0.98 (0.66; 1.45)	20.3 (18.1; 22.7)	0.80 (0.67; 0.96)*
	≥16y	15.6 (13.5; 18.0)	1.16 (0.90; 1.50)	60.2 (57.1; 63.3)	1.09 (1.00; 1.19)	6.2 (4.8; 7.9)	1.03 (0.69; 1.54)	18.0 (15.7; 20.6)	0.71 (0.59; 0.87)*
Peru	12-13y	9.2 (7.0; 11.9)	Ref	83.1 (79.7; 86.1)	Ref	6.0 (4.2; 8.4)	Ref	1.7 (1.0; 3.3)	Ref
	14-15y	7.1 (6.0; 8.4)	0.77 (0.56; 1.06)	87.0 (85.3; 88.5)	1.05 (1.00; 1.09)	3.4 (2.7; 4.3)	0.57 (0.37; 0.86)*	2.5 (1.9; 3.4)	1.51 (0.72; 3.16)
	≥16y	8.2 (6.1; 11.0)	0.89 (0.60; 1.33)	86.1 (82.6; 88.9)	1.04 (0.98; 1.09)	4.1 (2.6; 6.4)	0.68 (0.39; 1.20)	1.6 (0.8; 3.3)	0.97 (0.37; 2.55)

Continue...

Continuation of **Table 4** – Association between age group and participation in Physical Education in South America (n = 173,288).

Countries		0 days/week		1 day/week		2 days/week		≥3 days/week	
		% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
Suriname	12-13y	19.1 (15.8; 23.0)	Ref	42.5 (38.0; 47.0)	Ref	6.8 (4.8; 9.6)	Ref	31.6 (27.5; 36.0)	Ref
	14-15y	17.6 (15.2; 20.2)	0.92 (0.73; 1.16)	43.7 (40.4; 47.1)	1.03 (0.90; 1.17)	5.2 (3.9; 7.0)	0.76 (0.48; 1.21)	33.6 (30.5; 36.8)	1.06 (0.90; 1.25)
	≥16y	26.2 (22.6; 30.2)	1.37 (1.08; 1.74)*	34.9 (31.1; 38.9)	0.82 (0.70; 0.96)*	5.6 (3.8; 8.2)	0.83 (0.49; 1.39)	33.3 (29.5; 37.3)	1.05 (0.88; 1.26)
Uruguay	12-13y	10.7 (8.5; 13.3)	Ref	5.6 (4.1; 7.6)	Ref	43.0 (39.2; 46.7)	Ref	40.8 (37.1; 44.6)	Ref
	14-15y	11.5 (10.1; 13.0)	1.08 (0.83; 1.39)	8.2 (7.0; 9.5)	1.47 (1.04; 2.08)*	46.0 (43.7; 48.3)	1.07 (0.97; 1.18)	34.3 (32.2; 36.5)	0.84 (0.75; 0.94)*
	≥16y	19.3 (16.1; 22.9)	1.80 (1.36; 2.39)	11.2 (8.7; 14.2)	2.00 (1.35; 2.97)*	39.9 (35.8; 44.2)	0.93 (0.81; 1.07)	29.7 (25.8; 33.8)	0.73 (0.62; 0.86)*
South America	12-13y	13.0 (9.0; 16.0)	Ref	35.0 (23.0; 47.0)	Ref	22.0 (13.0; 31.0)	Ref	30.0 (21.0; 38.0)	Ref
	14-15y	15.0 (9.0; 20.0)	1.04 (0.86; 1.25) <sup>I</sup> (%) = 89.7	39.0 (25.0; 53.0)	1.13 (1.05; 1.21) <sup>I</sup> (%) = 87.2	19.0 (11.0; 28.0)	0.85 (0.76; 0.94)* <sup>I</sup> (%) = 84.1	27.0 (19.0; 35.0)	0.88 (0.78; 0.99)* <sup>I</sup> (%) = 91.5
	≥16y	19.0 (11.0; 28.0)	1.50 (1.11; 2.02)* <sup>I</sup> (%) = 94.4	40.0 (30.0; 49.0)	1.18 (1.05; 1.33)* <sup>I</sup> (%) = 94.4	17.0 (11.0; 24.0)	0.70 (0.58; 0.85)* <sup>I</sup> (%) = 94.8	24.0 (16.0; 32.0)	0.73 (0.60; 0.89)* <sup>I</sup> (%) = 96.4

Note: PR = prevalence ratio; 95% CI = 95% confidence interval; \*There is no overlap of 95% confidence intervals; Ref = reference category. Days per week are not the same as hours or classes per week.

**Table 5** – Association between status of food security and participation in Physical Education classes in South America (n = 173,288).

Countries		0 days/week		1 day/week		2 day/week		≥3 day/week	
		% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
Argentina	Food security	11.7 (11.1; 12.3)	Ref	16.3 (15.7; 16.9)	Ref	34.6 (33.8; 35.5)	Ref	37.4 (36.6; 38.3)	Ref
	Food insecurity	15.0 (13.2; 17.0)	1.28 (1.12; 1.47)*	16.2 (14.4; 18.2)	1.00 (0.88; 1.13)	30.8 (28.4; 33.2)	0.89 (0.82; 0.96)*	38.0 (35.5; 40.6)	1.02 (0.95; 1.09)
Bolivia	Food security	10.8 (10.0; 11.7)	Ref	43.6 (42.2; 44.9)	Ref	5.5 (4.9; 6.1)	Ref	40.1 (38.8; 41.5)	Ref
	Food insecurity	12.2 (10.6; 14.1)	1.13 (0.96; 1.33)	39.8 (37.2; 42.5)	0.91 (0.85; 0.98)*	6.7 (5.5; 8.2)	1.23 (0.97; 1.56)	41.2 (38.6; 43.9)	1.03 (0.96; 1.10)
Brazil	Food security	23.8 (22.8; 24.9)	Ref	40.3 (39.2; 41.5)	Ref	26.6 (25.6; 27.7)	Ref	9.2 (8.6; 9.9)	Ref
	Food insecurity	24.8 (21.7; 28.2)	1.04 (0.91; 1.20)	39.1 (35.7; 42.6)	0.97 (0.88; 1.06)	23.8 (21.2; 26.6)	0.89 (0.79; 1.01)	12.3 (10.3; 14.6)	1.33 (1.11; 1.61)*
Chile	Food security	8.1 (6.7; 9.6)	Ref	44.0 (41.4; 46.7)	Ref	15.2 (13.5; 17.0)	Ref	32.7 (30.2; 35.3)	Ref
	Food insecurity	16.6 (11.1; 24.2)	2.06 (1.34; 3.17)*	34.8 (26.6; 44.0)	0.79 (0.61; 1.02)	14.7 (10.0; 21.0)	0.97 (0.66; 1.42)	33.9 (25.5; 43.5)	1.04 (0.79; 1.37)
Colombia	Food security	7.5 (7.2; 7.9)	Ref	40.7 (40.1; 41.3)	Ref	14.5 (14.1; 14.9)	Ref	37.2 (36.7; 37.8)	Ref
	Food insecurity	10.2 (9.0; 11.7)	1.36 (1.18; 1.56)*	36.5 (34.3; 38.6)	0.90 (0.84; 0.95)*	13.6 (12.1; 15.2)	0.94 (0.83; 1.06)	39.7 (37.5; 42.0)	1.07 (1.01; 1.13)*
Ecuador	Food security	-	-	-	-	-	-	-	-
	Food insecurity	-	-	-	-	-	-	-	-

Continue...

Continuation of **Table 5** – Association between status of food security and participation in Physical Education classes in South America (n = 173,288).

Countries		0 days/week		1 day/week		2 day/week		≥3 day/week	
		% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)	% (95% CI)	PR (95% CI)
Guyana	Food security	51.4 (48.7; 54.1)	Ref	22.0 (19.9; 24.3)	Ref	8.9 (7.5; 10.6)	Ref	17.7 (15.7; 19.8)	Ref
	Food insecurity	46.2 (42.4; 50.0)	0.90 (0.81; 0.99)*	22.8 (19.8; 26.2)	1.04 (0.87; 1.23)	9.4 (7.4; 12.0)	1.06 (0.79; 1.42)	21.6 (18.6; 24.9)	1.22 (1.01; 1.47)*
Paraguay	Food security	14.5 (13.2; 16.0)	Ref	59.3 (57.4; 61.3)	Ref	5.9 (5.0; 6.9)	Ref	20.2 (18.7; 21.9)	Ref
	Food insecurity	20.9 (16.6; 25.9)	1.44 (1.13; 1.83)*	50.3 (44.7; 56.0)	0.85 (0.75; 0.95)*	6.7 (4.3; 10.3)	1.13 (0.71; 1.81)	22.1 (17.8; 27.1)	1.09 (0.87; 1.37)
Peru	Food security	7.1 (6.1; 8.3)	Ref	86.7 (85.3; 88.1)	Ref	3.8 (3.0; 4.7)	Ref	2.3 (1.8; 3.1)	Ref
	Food insecurity	10.1 (7.8; 13.0)	1.41 (1.05; 1.90)*	82.9 (79.4; 85.9)	0.96 (0.92; 1.00)	5.3 (3.7; 7.6)	1.41 (0.93; 2.13)	1.7 (0.9; 3.3)	0.74 (0.36; 1.50)
Suriname	Food security	20.3 (18.2; 22.7)	Ref	41.2 (38.5; 43.9)	Ref	5.3 (4.1; 6.8)	Ref	33.2 (30.7; 35.8)	Ref
	Food insecurity	21.3 (18.1; 24.9)	1.05 (0.86; 1.27)	39.5 (35.6; 43.6)	0.96 (0.85; 1.08)	6.6 (4.9; 9.0)	1.25 (0.84; 1.87)	32.5 (28.8; 36.5)	0.98 (0.85; 1.13)
Uruguay	Food security	12.5 (11.4; 13.8)	Ref	8.3 (7.3; 9.3)	Ref	44.7 (42.9; 46.5)	Ref	34.5 (32.8; 36.3)	Ref
	Food insecurity	13.8 (9.9; 18.9)	1.10 (0.78; 1.54)	6.2 (3.8; 10.0)	0.75 (0.45; 1.23)	38.9 (32.8; 45.3)	0.87 (0.74; 1.03)	41.2 (34.9; 47.8)	1.19 (1.01; 1.41)*
South America	Food security	17.0 (11.0; 22.0)	Ref	40.0 (27.0; 53.0)	Ref	16.0 (9.0; 24.0)	Ref	26.0 (18.0; 35.0)	Ref
	Food insecurity	19.0 (14.0; 24.0)	1.20 (1.06; 1.36)*	37.0 (23.0; 50.0)	0.93 (0.90; 0.97)*	16.0 (9.0; 22.0)	0.97 (0.89; 1.05)	28.0 (20.0; 37.0)	1.07 (1.02; 1.12)*
		I <sup>2</sup> (%) = 80.1		I <sup>2</sup> (%) = 23.6		I <sup>2</sup> (%) = 40.4		I <sup>2</sup> (%) = 35.4	

Note: PR = prevalence ratio; 95% CI = 95% confidence interval; \*There is no overlap of 95% confidence intervals; Ref = reference category. Days per week are not the same as hours or classes per week.

pected in Chile<sup>21</sup>, while in Brazil, there is no minimum requirement per week, although PE is a mandatory subject<sup>22</sup>. Thus, given that our study assessed only the number of days of PE per week, it is not possible to identify whether the countries are in line with their expectations/obligations. However, the frequency of zero PE days/week indicates a large inconsistency between the national recommendations and real life. For instance, approximately one-fourth of Brazilian adolescents reported not participating in PE classes, which can be related to a lack of adequate structure for physical activity practices at schools (e.g., lack of built environment, lack PE teacher, and lack of adequate material for the classes), especially among those who live in less developed regions<sup>10</sup>.

The pooled analysis revealed that although there was no difference between the proportions of boys and girls who did not participate in PE, the proportion of boys with ≥3 days/week of PE classes was 10% higher than that of girls. Gender inequality is a global challenge in physical activity promotion<sup>23,24</sup>, with possible explanations related to higher support for physical ac-

tivity practice from family and school for boys than for girls<sup>25</sup>. In addition, a previous paper by Jesus et al.<sup>26</sup> identified that while boys were more engaged in active play than girls, girls reported were more involved in household chores than boys, showing an important cultural aspect behind the inequalities. Thus, identifying how these inequalities occur in the different physical activity domains can support more specific interventions. Our results from SA suggest that the difference between boys and girls occurs with increases in the PE categories, especially considering ≥3 days per week. Thus, SA countries need to think about ways to overcome gender inequality in PE classes. The recently launched toolkit developed by the World Health Organization<sup>27</sup> called “Promoting physical activity through schools” should be an excellent starting point for many countries. In this toolkit, some recommendations regarding the implementation of quality PE are given, such as consultations with students and parents on the preferred PE options and ensuring the girls’ participation during the classes. In addition, other domains (i.e., active travel, physical activity opportunities



before and after school, recess, and lunch, active classrooms, and physical activity for those with additional needs) are also covered for promoting physical activity in the school context.

Older adolescents participated less in PE classes than younger adolescents, with differences between the proportions of  $\geq 16y$  and 12-13y starting in zero days of PE class per week. A reduced in participation in PE classes throughout adolescence has been observed, which may be related to the replacement of PE classes by other subjects due to university exam preparation, as well as having a job and a family<sup>28,29</sup>. In addition, our results are in line with previous findings from Northern Ireland<sup>30</sup>, which revealed that PE classes for adolescents  $\geq 16$  are a matter of concern, and highlights that beyond the general PE promotion (for all age groups), the countries should seek to make PE accessible to the oldest adolescents, especially in unequal countries. For instance, in Guyana, while 38.0% of the adolescents aged 12-13y reported not participating in PE classes, the prevalence for their older counterparts was 61.0%. Further studies might also investigate other factors that may determine the lack of participation in PE classes among the oldest adolescents, such as the motivation of adolescents to participate in PE classes and whether there is a reduction in the weekly frequency of classes per week after a certain age<sup>28</sup>. This information could be useful to formulate actions to promote PE among older adolescents.

Interestingly, the pooled analyses revealed a U-shaped association of food security status with the frequencies of PE classes, whereby adolescents with food insecurity related a higher proportion of 0 days/week and  $\geq 3$  days/week of PE than their peers with food security. These findings extend those presented by Araujo et al.<sup>13</sup>, which sought to identify the association between food security status and participation in PE classes using only a cut-off of  $\geq 3$  days/week of PE classes. The explanations for the higher proportion of 0 days/week of PE classes among those with food insecurity may be related to school conditions, such as a lower probability of having a PE teacher or adequate structure among schools with lower socioeconomic status<sup>31</sup>, as well as lack of energy and lack of disposition for physical activity practice. In addition, most SA countries present meal programs, which might promote higher school attendance among adolescents with food insecurity enrolled in schools that offer meals and consequently increase participation in PE classes<sup>32</sup>.

The present study has strengths, such as the use of

11 nationally representative surveys to estimate the pooled prevalence of PE classes in adolescents from SA. However, limitations need to be pointed out. Although we have used the most recent nationally representative survey available from each country, the surveys ranged from 2010 to 2018, which may introduce bias in the estimates. Information on validity/reproducibility were not available for countries analysed. The PeNSE, ENSE, and ENSANUT adopted slight differences in the questions used to assess participation in PE classes. Participation in PE classes was assessed by the number of days with PE per week, rather than classes per week, which may induce bias in the case of more than one class on the same day. The study was based on self-report data, and participants may have misreported owing to failure to recall, or they may have misreported intentionally.

Although PE is a proposed subject in most SA countries, almost a fifth of SA adolescents do not participate in PE classes. Girls and older adolescents are at a disadvantage in participating in PE classes. Food insecurity may expose students to school attendance and PE as a consequence. Lastly, continuous surveillance on frequency and inequalities in the participation in PE classes are needed, as well as actions promoting PE classes for the students less favored.

### Conflict of interest

The authors declare no conflict of interest.

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### Author's contributions

Araujo RHO: Conceptualization; Methodology; Formal analysis; Data curation; Visualization; Writing – original draft; Approval of the final version. Werneck AO: Conceptualization; Methodology; Formal analysis; Data curation; Visualization; Writing – review & editing; Approval of the final version. Matias TS: Validation; Vi-

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### Declaration regarding the use of artificial intelligence tools in the article writing process

The manuscript did not use artificial intelligence tools for its preparation.

### Availability of research data and other materials

The contents are already available.


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## Supplementary Chart

**Chart S1** – Surveys characteristics.

Country	Survey year	Sample size	Sample ( $\geq 12$ years old)	Missing*	Final sample
Argentina	2018	56933	56933	3618	53,315
Bolivia	2018	7945	7865	813	7,052
Brazil	2015	16556	14484	116	14,368
Chile	2013	2049	2045	119	1,926
Colombia	2017	79640	79640	5321	74,319
Ecuador	2018	23621	9891	891	9,000
Guyana	2010	2392	2373	129	2,244
Paraguay	2017	3149	3126	232	2,894
Peru	2010	2882	2868	41	2,827
Suriname	2016	2126	2116	85	2,031
Uruguay	2012	3534	3510	198	3,312

Note: \*considering the sample with participants aged  $\geq 12$  years.