

DIFFERENT DOMAINS OF PHYSICAL ACTIVITY AND ASSOCIATED FACTORS IN ADOLESCENTS FROM NORTHEASTERN BRAZIL

DIFERENTES DOMÍNIOS DA ATIVIDADE FÍSICA E FATORES ASSOCIADOS EM ADOLESCENTES DO NORDESTE DO BRASIL

Ana Claudia Santos Silva Guimarães^{1,2}, Lucas Souza Santos^{1,2,3}, Aldemir Smith Menezes^{2,4,5}

1. Municipal Secretariat of Basic Education, Aracaju, SE – Brazil.
2. Research Group on Physical Education and Health of the Federal Institute of Education, Science and Technology of Sergipe (GPEFiS/IFS), Aracaju, SE – Brazil.
3. Paulista University - UNIP, Aracaju, SE – Brazil.
4. Federal Institute of Education, Science and Technology of Sergipe – IFS.
5. Graduate Program in Physical Education - PPGEF of the Federal University of Sergipe, Aracaju, SE – Brazil.

ABSTRACT

Objective: to analyze an association between the domains of Physical Activity in leisure, school and commuting with demographic and socioeconomic factors in Sergipe, Brazil. **Method:** the study deals with two epidemiological surveys with cross-sectional designs, carried out in 2011 and 2016, with a representative sample of students, composed of 8143 adolescents (2011 = 3992; 2016 = 4151), aged between 14 and 19 years. The instrument used was the Global Student Health Survey in Schools (GSHS / WHO). The chi-square test and logistic regression were used for data analysis. **Results:** in the two Insufficient Level of Physical Activity (ILPA) in Leisure surveys, it was associated with female students (2011: OR = 4.07; 95% CI 3.52-4.72 / 2016: OR = 3.67; 95% CI 3.18- 4.25) and 3rd year of high school (2011: OR = 1.34; 95% CI 1.10-1.66 / 2016: OR = 1.32; 95% CI 1.08-1.62); with the School ILPA there was an association with females (2011: OR = 1.40; 95% CI 1.19-1.66 / 2016: OR = 1.75; 95% CI 1.51-2.04), night shift (2011: OR = 1.63; 95% CI 1.39-1.92 / 2016: OR = 1.47; 95% CI 1.25-1.73) and residents of the urban area (2011: OR = 1.41; 95% CI 1.20-1.68 / 2016: OR = 1.51; 95% CI 1.30-1.76); the Displacement ILPA was significant for the night shift (2011: OR = 1.25; 95% CI 1.06-1.48 / 2016: OR = 1.29; 95% CI 1.07-1.57). **Conclusion:** high rates of ILPA prevalence between 2011 and 2016 and association in different domains were evidenced.

Keywords: adolescents; physical activity domains; insufficient level of physical activity.

RESUMO

Objetivo: analisar a associação dos domínios de Atividade Física no lazer, na escola e no deslocamento com fatores demográficos e socioeconômicos de Sergipe, Brasil. **Método:** o estudo trata-se de dois levantamentos epidemiológicos com delineamentos transversais, realizados em 2011 e 2016, com amostra representativa de escolares, composta por 8143 adolescentes (2011=3992; 2016=4151), com idade entre 14 e 19 anos. O instrumento utilizado foi o Global School-based Student Health Survey (GSHS/WHO). Utilizou-se o teste qui-quadrado e regressão logística binária para a análise dos dados. **Resultados:** nos dois inquéritos o Nível Insuficiente de Atividade Física (NIAF) no Lazer foi associado com os estudantes do sexo feminino (2011: OR=4,07; IC 95% 3,52-4,72 / 2016: OR=3,67; IC 95% 3,18-4,25) e do 3º Ano do Ensino Médio (2011: OR=1,34; IC 95% 1,10-1,66 / 2016: OR=1,32; IC 95% 1,08-1,62); com o NIAF Escolar verificou-se associação com o sexo feminino (2011: OR=1,40; IC 95% 1,19-1,66 / 2016: OR=1,75; IC 95% 1,51-2,04), do turno noturno (2011: OR=1,63; IC 95% 1,39-1,92 / 2016: OR=1,47; IC 95% 1,25-1,73) e residentes da zona urbana (2011: OR=1,41; IC 95% 1,20-1,68 / 2016: OR=1,51; IC 95% 1,30-1,76); o NIAF de Deslocamento foi significativo para o turno noturno (2011: OR=1,25; IC 95% 1,06-1,48 / 2016: OR=1,29; IC 95% 1,07-1,57). **Conclusão:** foi evidenciado elevadas prevalências de NIAF entre 2011 e 2016 e associação em diferentes domínios.

Palavras-chave: adolescentes, domínios de atividade física, nível insuficiente de atividade física.

Contact: Ana Claudia Santos Silva Guimarães, **Email:** anazoclau@hotmail.com

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INTRODUCTION

The insufficient level of physical activity (ILPA) is one of the main public health problems today due to the increasing changes in mortality determinants caused by non-communicable diseases⁴. Despite the consensus on the direct benefits that the physically active lifestyle provides to health, the population, in general, does not comply with the internationally

recommended guidelines²⁹. Besides, there are rare monitoring of ILPA that associate socioeconomic factors³⁰, in the context of leisure², from the school¹ and displacement²⁷ at earlier ages over time.

Adolescence is a critical phase in the practice of physical activities (PA) because it is perceived that this practice is part of the daily routine of a few young

people¹². For this reason, based on international recommendations that recommend 60 minutes/day of moderate to vigorous PA for this age group²⁴, recognizing the lifestyle of adolescents can support filling gaps in the formation of public policies for health promotion in the medium and long term^{25,28}.

In this sense, it is necessary to increase the estimates of young people sufficiently active in their different domains, inciting changes in daily behaviors. Thus, modifiable economic and demographic related over the years arouse the interest of investigations of the relationship of these phenomena with PA in the context of leisure², in the school environment or physical education classes^{1,20} and active commuting (walking or cycling) from home to school^{7,15}, at earlier ages. Thus, the study aimed to analyze the prevalence and association of PA domains in leisure, school, and commuting with demographic and socioeconomic factors in adolescents.

MATERIAL AND METHODS

The study is epidemiological of transversal character and independent samples, conducted with students from 14 to 19 years old enrolled in the State School Network of Sergipe, Brazil. Two databases were analyzed, from collections carried out in 2011 and 2016, to verify the prevalence and association of the variables of this research. The study was titled "Secular Trend on Health Risk Behaviors in Adolescents: CRIS_Adolescents Study", developed by the Research Group on Physical Education and Health/Federal Institute of Education, Science and Technology of Sergipe (GPEFIS/IFS).

The first survey, in 2011, was approved by the Ethics Committee on Research with Human Beings/University Hospital of the Federal University of Sergipe (CEP/UFS) under approval protocol No. 177/2010; the 2016 project was approved by the Ethics Committee on Research with Human Beings of the Brazil Platform of the Federal Institute of Sergipe under approval protocol no. 1,522,876/2016.

For the sample calculation, the software used was *Statcalc* Epi info. The estimate of the sample size considered expected prevalence in 50%, a confidence interval is 95%, and tolerable error at 5 percentage points. For the association analysis, in addition to the above variables, statistical power of 80% and *Odds Ratio* (OR) of 1.2, and a minimum sample of 3,876 adolescents is required for each survey. 20% of students were added to the minimum sample for cases of possible losses.

According to IBGE information¹³, the State of Sergipe is composed of 75 municipalities, is divided geographically into eight territories by the Secretary of State for Planning. According to data available from the State Department of Education, the enrollment of the high school, held in 2010, was 58,301 students throughout the state network, distributed in 155

teaching units. In 2015, the population enrolled in the network was 62,933 students, distributed in 160 teaching units. The maintenance of the same methodological procedure and sample planning for the development of the two research surveys is emphasized.

Considering the minimum sample required for the study, its distribution was carried out according to the size of the teaching units giving the criteria of INEP - National Institute of Educational Studies and Research Anísio Teixeira (1 = up to 199 students; 2 = 200 to 499 students; 3 = 500+ students). Thus, for all territories to be representatively contemplated with the three sizes of the schools, the criterion was the raffle of 25% of the state's teaching units, totaling 39 (2011) and 42 (2016) schools distributed in 30 municipalities.

The sample was distributed stratified and proportional to the geographic territories of the state, with a random selection of the municipalities and the representative teaching units of each subgroup. Then, classes by the simple random process were raffled by series and shift (day and night), considering an average of 20 students/class. The criteria adopted for the inclusion of students in the sample were: the student is enrolled in high school, being present on the day of collection, and answering the questionnaire accordingly.

As a collection instrument, the GSHS (*Global Student Health Survey*)²⁹. This included questions involving variables: sociodemographic, eating habits, health conditions, hygiene, physical activities, perception of health and stress, violence, use of drugs and alcohol, behaviors, and relationships. The collection was performed by physical education teachers duly trained to apply the instrument.

To proceed with the collection, authorization was obtained from the Secretary of State for Education, the directors of the Regional Boards of Education (DRE's), and the directors of the schools for the participation of the institutions in the research. Underage students received a Negative Consent Term (*Parental Passive Consent Form*) for the authorization of parents or guardians, and on the day of data collection, they signed a nodding agreement voluntarily conditioning their participation in the research. Those over or equal to 18 years of age signed the Free and Informed Consent Form.

Dependent Variables

The outcomes of this study were the insufficient level of physical activity (ILPA) in leisure, at school (participation in Physical Education classes), and displacement. To estimate ILPA at leisure, the following question was used: "What leisure activity do you prefer?". For ILPA at school there was asked: "During a typical normal week, in how many physical

education classes do you participate?". The ILPA in displacement was measured through the questions: "During the last 7 days, on how many days have you walked or cycled to go and return from school?" and "During the last 7 days, how much time on average have you spent to go from home to school and go back to your home (add up the time it takes you to go and get back from school)?"

Regarding ILPA at leisure, the items indicated as playing sports, exercising, swimming, or cycling were classified as active leisure; and the items: play dominoes or cards, watch TV, play video games, use the computer and chat with friends were classified as inactive leisure. Regarding the question regarding ILPA in school, the answers were recorded in no participation (inactive) and one or more participation (active) in physical education classes. Regarding the outcome of ILPA in commuting, students who reported not going to school on foot or by bicycle any day and those who, regardless of weekly attendance, spent less than 20 minutes in duration, added to the round-trip time, were classified as inactive and the rest as active.

Independent variables

The independent variables considered were gender, age group, grade, shift, disapproval, place of residence, skin color, mother's schooling, and family income.

The data were analyzed in the SPSS for Windows (version 15.0). Descriptive statistics expressed in absolute and relative frequencies were performed. Bivariate analysis was performed by applying the Chi-square test and, to evaluate the association between the variables, crude and adjusted binary logistic regression was used, represented because of chance (*Odds Ratio*). Variables with p -value $< 0.20^{10}$ in the crude analysis were maintained in the adjusted model. The level of significance adopted for the entire analysis was $p < 0.05^{10}$.

RESULTS

Data were collected from 9,438 (2011=4,717; 2016=4,721) adolescents, and 1,295 (2011=725; 2016=570) for being older than 19 years of age (2011=709; 2016=549), not answering essential questions such as sex (2011=03; 2016=12) and age (2011=02; 2016=06) and/or leaving several questions (>50%) unresponsive (2011=11; 2016=03), resulting in a final sample of 8143 adolescents (2011=3992;

2016=4151). The highest proportion of students was female, aged 16-17 years old, attending the 1st year of high school in the day shift of study, living in the urban area, brown skin color, and with high rates of disapproval in both surveys (Table 1). It can also be seen that the mothers of these students, mostly, had a low level of education. The variable that differentiated between the years was family income.

Table 2 shows the prevalence for each outcome, which differ according to demographic and socioeconomic characteristics. The overall prevalence of ILPA in Leisure time was 47.8% and 43.1%; in physical education classes, it was 25.4% and 29.6%; in displacement, were 70.7% and 75%, respectively, in 2011 and 2016.

ILPA at Leisure was more prevalent among female school children, aged 14-15 years old, who attended the 3rd year of high school, day shift, without failure index, residents of the rural area, white-skinned and whose mothers had high school completed in both surveys. Only family income differed between two years, in which in 2011 the highest prevalence was among those who lived above 2 minimum wages and, in 2016, for those with income between 1 and 2 minimum wages.

The ILPA School showed a higher predominance for female adolescents, among the older ones, who were in the 3rd year of high school, night shift, who did not have disapproval, residents of the urban area, whose mothers did not study and had low family income in both years of collection. Only skin color differed in the predominance between years, being in 2011 the most prevalent white color and, in 2016, the color in the other category.

The ILPA in Displacement was more hegemonic for males, younger, night shift, who did not have disapproval, residents of the rural area and whose mothers had a higher education level in both periods of the research. In addition, in 2011 the ILPA prevailed among those of the 3rd year, self-declared black and with income above 2 minimum wages. In 2016, it predominated among those of the 1st year, white skin color and with an income of less than 1 minimum wage.

When comparing the prevalence of ILPAs among the surveys, it was observed that, concerning all independent variables, the Leisure domain was more prevalent in 2011 than in 2016; contrary to what was visualized for the outcomes in School and Displacement, because their prevalence was higher in 2016.

Table 3 presents the crude logistic regression analysis of ILPA in different contexts. In 2011, the variables associated with the leisure outcome were gender, age, grade, shift, and failure rate. Those who associated ILPA at school were gender, shift, place of residence, and skin color. Regarding the ILPA in

displacement, there was an association only with the place of residence and family income.

In 2016 there was an association with ILPA in leisure about gender, age, grade, shift, disapproval, and skin color. The ILPA at school was associated with

gender, shift, place of residence and family income. With the ILPA in Displacement, the association occurred with age, shift and place of residence.

Table 1. Socioeconomic and demographic characterization of the sample according to the 2011 and 2016 surveys.

Variable	Inquiry 2011			Inquiry 2016		
	n	%	IC (95%)	N	%	IC (95%)
Gender						
Male	1544	38,7	(36,25 - 41,18)	1759	42,4	(40,07 - 44,68)
Female	2448	61,3	(59,39 - 63,25)	2392	57,6	(55,64 - 59,60)
Age group						
14-15	729	18,3	(15,46 - 21,07)	755	18,2	(15,44 - 20,94)
16-17	2069	51,8	(49,68 - 53,98)	2216	53,4	(51,31 - 55,46)
18-19	1194	29,9	(27,31 - 32,51)	1180	28,4	(25,85 - 31,00)
Student grade						
1º year	1650	41,3	(38,96 - 43,71)	1597	38,5	(36,09 - 40,86)
2º year	1343	33,6	(31,11 - 36,17)	1373	33,1	(30,59 - 35,56)
3º year	999	25,0	(22,34 - 27,71)	1181	28,5	(25,88 - 31,02)
Shift of study						
Diurnal	2653	66,5	(64,66 - 68,25)	2930	70,6	(68,93 - 72,23)
Nocturnal	1339	33,5	(31,01 - 36,07)	1221	29,4	(26,86 - 31,97)
Disapproval						
Yes	1994	50,1	(47,92 - 52,31)	2241	54,4	(52,32 - 56,44)
No	1985	49,9	(47,69 - 52,09)	1880	45,6	(43,37 - 47,87)
Place of residence						
Urban area	2389	61,0	(59,07 - 62,98)	2352	57,7	(55,72 - 59,71)
Rural area	1526	39,0	(36,53 - 41,42)	1723	42,3	(39,95 - 44,61)
Race/Ethnicity						
White	846	21,4	(18,61 - 24,13)	778	18,9	(16,13 - 21,63)
Black	328	8,3	(5,30 - 11,27)	326	7,9	(4,98 - 10,84)
Indigenous/native	2728	68,9	(67,17 - 70,64)	2938	71,3	(69,66 - 72,93)
Others	57	1,4	(1,65 - 4,53)	79	1,9	(1,11 - 4,94)
Mother's education						
Did not study	456	12,1	(9,09 - 15,07)	493	13,4	(10,36 - 16,37)
Incomplete primary school ^a	2019	53,5	(51,32 - 55,67)	1595	43,2	(40,80 - 45,67)
H.S Incomplete ^b	403	10,7	(7,66 - 13,69)	665	18,0	(15,10 - 20,95)
H.S Complete	601	15,9	(12,99 - 18,85)	477	12,9	(9,92 - 15,94)
Higher education complete	295	7,8	(4,75 - 10,88)	459	12,4	(9,42 - 15,46)
Family income						
< 1 minimum wage	1283	32,9	(30,28 - 35,42)	2337	60,1	(58,11 - 62,08)
1 - 2 minimum wages	1554	39,8	(37,36 - 42,23)	1108	28,5	(25,83 - 31,15)
> 2 minimum wages	1068	27,3	(24,68 - 30,02)	444	11,4	(8,46 - 14,37)

^a Primary school; ^b High school

Table 2. Prevalence of Insufficient Level of Physical Activity in Leisure, Physical Education Classes and Home-School Commuting, 2011 and 2016.

Variable	ILPA ^a - 2011						ILPA - 2016					
	%	Leisure IC (95%)	%	School IC (95%)	%	Displacement IC (95%)	%	Leisure IC (95%)	%	School IC (95%)	%	Displacement IC (95%)
Gender												
Male	27,3	23,01 - 31,57	20,6	16,10 - 25,06	71,1	68,38 - 73,89	25,1	21,06 - 29,17	23,8	19,70 - 27,89	75,8	73,48 - 78,18
Female	60,8	58,29 - 63,28	26,8	23,37 - 30,21	70,4	68,22 - 72,64	56,4	53,72 - 59,03	33,9	30,58 - 37,13	74,4	72,35 - 76,52
Age group												
14 - 15	50,8	45,72 - 55,95	22,2	15,75 - 28,63	72,4	68,53 - 76,35	47,9	42,79 - 53,09	27,1	21,03 - 33,23	78,7	75,39 - 82,08
16 - 17	49,5	46,38 - 52,54	24,9	21,08 - 28,62	70,0	67,55 - 72,38	44,2	41,12 - 47,36	29,6	26,07 - 33,09	74,2	72,01 - 76,35
18 - 19	43,1	38,83 - 47,44	24,9	19,94 - 29,88	70,9	67,76 - 74,10	37,9	33,43 - 42,44	31,2	26,44 - 35,95	74,2	71,23 - 77,20
Student grade												
1 ^o year	44,7	41,04 - 48,27	24,5	20,21 - 28,70	69,3	66,60 - 72,10	39,0	35,16 - 42,85	29,1	24,99 - 33,29	76,7	74,25 - 79,12
2 ^o year	49,3	45,45 - 53,12	22,8	18,08 - 27,54	71,6	68,64 - 74,48	44,0	40,05 - 47,99	28,8	24,26 - 33,24	73,4	70,58 - 76,17
3 ^o year	51,1	46,71 - 55,41	26,4	21,01 - 31,72	71,8	68,38 - 75,14	47,7	43,51 - 51,80	31,2	26,43 - 35,92	74,7	71,81 - 77,66
Shift of study												
Diurnal	49,5	46,77 - 52,20	21,4	18,04 - 24,84	69,7	67,56 - 71,85	46,2	43,58 - 48,90	27,8	24,68 - 30,86	73,8	71,95 - 75,74
Nocturnal	44,5	40,51 - 48,53	30,3	25,73 - 34,78	72,7	69,82 - 75,61	35,6	31,10 - 40,14	34,0	29,39 - 38,55	77,9	75,20 - 80,63
Disapproval												
Yes	43,4	40,04 - 46,69	24,3	20,49 - 28,21	69,6	67,09 - 72,09	38,8	35,56 - 42,06	29,1	25,55 - 32,56	73,8	71,65 - 76,01
No	52,3	49,29 - 55,39	24,4	20,57 - 28,28	71,6	69,22 - 74,01	48,3	45,06 - 51,57	30,1	26,31 - 33,89	76,4	74,20 - 78,68
Place of residence												
Urban area	47,9	44,94 - 50,77	26,0	22,52 - 29,48	68,9	66,59 - 71,18	43,1	40,07 - 46,19	32,1	28,72 - 35,41	72,5	70,31 - 74,63
Rural area	48,1	44,50 - 51,75	21,9	17,42 - 26,36	73,6	70,94 - 76,25	43,3	39,79 - 46,91	26,1	22,02 - 30,17	79,2	76,94 - 81,40
Race/Ethnicity												
White	50,1	45,28 - 54,84	28,2	22,49 - 34,00	73,1	69,49 - 76,69	47,0	41,83 - 52,09	33,0	27,22 - 38,76	76,2	72,71 - 79,70
Black	42,2	33,88 - 50,42	20,1	10,25 - 29,87	73,5	67,72 - 79,21	36,1	27,39 - 44,88	30,4	21,31 - 39,43	75,2	69,71 - 80,77
Indigenous/native	48,1	45,35 - 50,79	23,9	20,55 - 27,16	69,8	67,73 - 71,96	42,8	40,05 - 45,54	28,5	25,42 - 31,57	74,9	73,05 - 76,77
Others	49,1	30,60 - 67,64	19,6	3,84 - 43,12	64,8	48,99 - 80,64	43,6	26,92 - 60,26	33,3	15,21 - 51,45	64,1	50,81 - 77,40
Mother's education												
Did not study	43,0	36,05 - 49,98	26,6	18,68 - 34,56	68,7	63,48 - 73,99	42,9	36,16 - 49,55	30,9	23,51 - 38,25	75,1	70,53 - 79,57
In. primary school ^b	48,6	45,48 - 51,77	25,1	21,31 - 28,94	69,3	66,81 - 71,78	43,4	39,69 - 47,10	29,4	25,31 - 33,58	73,3	70,65 - 75,87
H.S Incomplete ^c	46,9	39,68 - 54,02	25,3	16,74 - 33,77	69,9	64,40 - 75,44	43,1	37,30 - 48,80	29,2	22,82 - 35,66	75,6	71,80 - 79,45
H.S Complete	50,1	44,42 - 55,74	22,8	15,81 - 29,86	73,3	69,04 - 77,49	46,5	39,92 - 53,10	30,0	22,48 - 37,56	72,2	67,42 - 77,04
Higher education complete	47,4	38,99 - 55,78	18,9	8,49 - 29,40	76,8	71,12 - 82,56	41,7	34,71 - 48,70	27,1	19,24 - 34,95	79,5	75,26 - 83,73
Family income												
< 1 minimum wage ^d	48,0	44,04 - 51,96	25,7	20,98 - 30,48	68,2	65,03 - 71,35	43,6	40,55 - 46,66	31,6	28,21 - 34,95	76,2	74,22 - 78,27
1 - 2	47,2	43,56 - 50,83	25,3	20,94 - 29,61	71,0	68,20 - 73,71	44,1	39,66 - 48,48	27,4	22,40 - 32,44	73,3	70,20 - 76,39
>2	49,0	44,64 - 53,27	21,7	16,38 - 27,09	73,6	70,47 - 76,80	39,1	31,80 - 46,38	23,9	15,71 - 32,02	72,5	67,51 - 77,51

^a insufficient level of physical activity; ^b primary school; ^c high school; ^d minimum wage

Table 3. Gross logistic regression analysis of insufficient level of physical activity in its domains associated with demographic and socioeconomic factors.

Variable	Category	ILPA ^a - 2011			ILPA - 2016		
		OR (IC95%) Leisure	OR (IC 95%) School	OR (IC 95%) Displacement	OR (IC 95%) Leisure	OR (IC 95%) School	OR (IC 95%) Displacement
Gender	Male	1	1	1,03 (0,90 – 1,19)	1	1	1,07 (0,93 – 1,25)
	Female	4,13 (3,59 – 4,75)	1,41 (1,21 – 1,65)	1	3,85 (3,37 – 4,41)	1,63 (1,43 – 1,88)	1
<i>P value</i>		<0,001	<0,001	0,643	<0,001	<0,001	0,317
Age group	14 – 15	1,36 (1,13 – 1,64)	1	1,07 (0,87 – 1,33)	1,50 (1,25 – 1,81)	1	1,28 (1,03 – 1,61)
	16 – 17	1,29 (1,12 – 1,49)	1,16 (0,95 – 1,42)	0,95 (0,81 – 1,12)	1,29 (1,12 – 1,50)	1,12 (0,94 – 1,36)	0,99 (0,85 – 1,18)
	18 – 19	1	1,16 (0,93 – 1,45)	1	1	1,21 (0,99 – 1,49)	1
<i>P value</i>		0,001	0,317	0,461	<0,001	0,163	0,038
Student grade	1 ^o Year	1	1	1	1	1	1
	2 ^o Year	1,20 (1,04 – 1,39)	0,91 (0,77 – 1,08)	1,11 (0,94 – 1,31)	1,23 (1,06 – 1,42)	0,98 (0,84 – 1,15)	0,83 (0,71 – 0,99)
	3 ^o Year	1,29 (1,10 – 1,51)	1,10 (0,92 – 1,33)	1,12 (0,94 – 1,34)	1,42 (1,22 – 1,66)	1,10 (0,93 – 1,30)	0,89 (0,75 – 1,08)
<i>P value</i>		0,003	0,143	0,310	<0,001	0,362	0,124
Shift of study	Diurnal	1,22 (1,07 – 1,39)	1	1	1,55 (1,35 – 1,78)	1	1
	Nocturnal	1	1,58 (1,37 – 1,85)	1,15 (0,99 – 1,35)	1	1,33 (1,16 – 1,55)	1,24 (1,06 – 1,47)
<i>P value</i>		0,003	<0,001	0,056	<0,001	<0,001	0,007
Disapproval	Yes	1	1	1	1	1	1
	No	1,43 (1,26 – 1,63)	1,00 (0,87 – 1,16)	1,10 (0,96 – 1,27)	1,47 (1,30 – 1,67)	1,05 (0,92 – 1,20)	1,15 (0,99 – 1,33)
<i>P value</i>		<0,001	0,954	0,172	<0,001	0,465	0,060
Residence	Urban area	1	1,25 (1,08 – 1,46)	1	1	1,33 (1,16 – 1,53)	1
	Rural area	1,01 (0,89 – 1,15)	1	1,25 (1,09 – 1,46)	1,00 (0,89 – 1,14)	1	1,44 (1,24 – 1,68)
<i>P value</i>		0,873	0,004	0,002	0,891	<0,001	<0,001
Race/Ethnicity	White	1,03 (0,61 – 1,78)	1,61 (0,82 – 3,17)	1,47 (0,83 – 2,63)	1,14 (0,72 – 1,83)	0,98 (0,60 – 1,61)	1,79 (1,10 – 2,93)
	Black	0,75 (0,43 – 1,33)	1,02 (0,50 – 2,10)	1,50 (0,81 – 2,77)	0,73 (0,44 – 1,21)	0,87 (0,51 – 1,48)	1,70 (1,00 – 2,89)
	Indigenous/native	0,96 (0,57 – 1,62)	1,28 (0,66 – 2,49)	1,25 (0,71 – 2,21)	0,96 (0,61 – 1,52)	0,79 (0,49 – 1,28)	1,67 (1,04 – 2,68)
	Others	1	1	1	1	1	1
<i>P value</i>		0,117	0,012	0,161	0,011	0,087	0,143
Mother's education	Did not study	1	1,55 (1,08 – 2,33)	1	1	1,20 (0,91 – 1,59)	1
	In. primary school ^b	1,25 (1,02 – 1,54)	1,43 (1,05 – 1,96)	1,02 (0,82 – 1,28)	1,02 (0,83 – 1,25)	1,12 (0,89 – 1,42)	0,91 (0,72 – 1,16)
	H.S Incomplete ^c	1,16 (0,89 – 1,53)	1,44 (0,99 – 2,10)	1,05 (0,78 – 1,43)	1,00 (0,80 – 1,28)	1,11 (0,85 – 1,45)	1,03 (0,78 – 1,36)
	H.S Complete	1,32 (1,04 – 1,70)	1,26 (0,89 – 1,80)	1,24 (0,95 – 1,64)	1,15 (0,90 – 1,49)	1,15 (0,87 – 1,54)	0,86 (0,65 – 1,16)
	Higher education complete	1,19 (0,89 – 1,61)	1	1,50 (1,07 – 2,13)	0,95 (0,74 – 1,23)	1	1,28 (0,94 – 1,76)
<i>P value</i>		0,194	0,124	0,053	0,647	0,777	0,069
Family income	< 1 minimum wage ^d	1	1,24 (1,03 – 1,51)	1	1	1,47 (1,16 – 1,86)	1
	1 - 2	0,96 (0,83 – 1,12)	1,21 (1,01 – 1,47)	1,14 (0,97 – 1,34)	1,01 (0,88 – 1,17)	1,20 (0,93 – 1,56)	0,85 (0,72 – 1,01)
	>2	1,03 (0,88 – 1,22)	1	1,30 (1,08 – 1,57)	0,83 (0,67 – 1,02)	1	0,82 (0,65 – 1,04)
<i>P value</i>		0,679	0,053	0,019	0,172	0,001	0,087

^a insufficient level of physical activity; ^b primary school; ^c high school; ^d minimum wage

In the Adjusted Regression Analysis (Table 4), it was observed that, in 2011, female and 3rd year high school students were more likely to be insufficiently active during leisure time. In 2016, in addition to women and the most advanced in the series, those who studied for the day and had white skin color had higher chances of this ILPA.

The adolescents who had the most chances of ILPA at school in 2011, after adjusting the variables, corresponding to the female, night shift, urban residents, and white skin groups. The same chances are repeated with the results of 2016, except for skin

color that was not significant for that year, and for family income, in which those with higher socioeconomic levels were less likely to participate in physical education classes.

As for the ILPA Displacement, after the variables were adjusted, the students who studied at night shift sat in the rural area, whose mothers completed higher education; and those with family income above 2 minimum wages are the groups that were most likely to be insufficiently active. And in 2016, the odds were maintained, except for the family income in this context of Physical Activity.

Table 4. Adjusted logistic regression analysis of insufficient level of physical activity in its domains associated with demographic and socioeconomic factors.

Variable	Category	ILPA - 2011			ILPA - 2016		
		OR (IC 95%) Leisure	OR (IC 95%) School	OR (IC 95%) Displacement	OR (IC 95%) Leisure	OR (IC 95%) School	OR (IC 95%) Displacement
Gender	Male	1	1	--	1	1	--
	Female	4,07 (3,52 – 4,72)	1,40 (1,19 – 1,66)	--	3,67 (3,18 – 4,25)	1,75 (1,51 – 2,04)	--
<i>P-value</i>		<0,001	<0,001	--	<0,001	<0,001	--
Age group	14 – 15	1,28 (0,97 – 1,71)	--	--	1,25 (0,94 – 1,67)	0,90 (0,73 – 1,14)	1
	16 – 17	1,16 (0,97 – 1,39)	--	--	1,11 (0,92 – 1,33)	0,99 (0,84 – 1,18)	0,80 (0,62 – 1,05)
	18 – 19	1	--	--	1	1	0,80 (0,57 – 1,14)
	<i>P-value</i>	0,186	--	--	0,312	0,649	0,271
Student grade	1 ^o Year	1	1	--	1	--	1
	2 ^o Year	1,22 (1,02 – 1,46)	0,90 (0,75 – 1,09)	--	1,19 (1,00 – 1,43)	--	0,92 (0,75 – 1,14)
	3 ^o Year	1,34 (1,10 – 1,66)	1,06 (0,87 – 1,29)	--	1,32 (1,08 – 1,62)	--	0,99 (0,79 – 1,27)
	<i>P-value</i>	0,013	0,296	--	0,022	--	0,676
Shift of study	Diurnal	1,03 (0,88 – 1,21)	1	1	1,23 (1,05 – 1,46)	1	1
	Nocturnal	1	1,63 (1,39 – 1,92)	1,25 (1,06 – 1,48)	1	1,47 (1,25 – 1,73)	1,29 (1,07 – 1,57)
<i>P-value</i>		0,672	<0,001	0,008	0,009	<0,001	0,008
Disapproval	Yes	1	--	1	1	--	1
	No	1,16 (0,98 – 1,38)	--	1,10 (0,94 – 1,29)	1,12 (0,94 – 1,33)	--	1,18 (0,96 – 1,45)
<i>P-value</i>		0,080	--	0,217	0,200	--	0,108
Residence	Urban area	--	1,41 (1,20 – 1,68)	1	--	1,51 (1,30 – 1,76)	1
	Rural area	--	1	1,34 (1,14 – 1,58)	--	1	1,41 (1,19 – 1,69)
<i>P-value</i>		--	<0,001	<0,001	--	<0,001	<0,001
Race/Ethnicity	White	1	1	1	1	1	1
	Black	0,85 (0,64 – 1,14)	0,63 (0,45 – 0,88)	1,06 (0,78 – 1,46)	0,61 (0,46 – 0,83)	0,92 (0,68 – 1,24)	0,97 (0,69 – 1,37)
	Indigenou s	0,91 (0,77 – 1,09)	0,75 (0,62 – 0,90)	0,85 (0,71 – 1,03)	0,80 (0,67 – 0,96)	0,81 (0,68 – 0,98)	0,92 (0,75 – 1,14)
	/native Others	1,20 (0,67 – 2,17)	0,71 (0,36 – 1,43)	0,66 (0,36 – 1,24)	0,89 (0,54 – 1,50)	1,20 (0,72 – 2,00)	0,50 (0,30 – 0,86)
<i>P-value</i>		0,511	0,008	0,150	0,009	0,074	0,088
Mother's education	Did not study	1	1,42 (0,96 – 2,11)	0,63 (0,43 – 0,93)	--	--	0,65 (0,46 – 0,94)

	In. primary school ^b	1,24 (0,99 – 1,55)	1,33 (0,95 – 1,87)	0,64 (0,46 – 0,89)	--	--	0,62 (0,47 – 0,84)
	H.S Incomplet e ^c	1,26 (0,94 – 1,70)	1,39 (0,94 – 2,06)	0,64 (0,44 – 0,94)	--	--	0,73 (0,53 – 1,01)
	H.S Complete Higher Education complete	1,30 (1,00 – 1,70)	1,21 (0,84 – 1,76)	0,83 (0,58 – 1,19)	--	--	0,66 (0,48 – 0,91)
		1,30 (0,94 – 1,81)	1	1	--	--	1
<i>P-value</i>		0,314	0,408	0,024	--	--	0,028
Family income	< 1 minimum wage ^d	--	1,16 (0,93 – 1,45)	1	1	1	1,27 (0,97 – 1,66)
	1 - 2	--	1,20 (0,99 – 1,48)	1,16 (0,98 – 1,40)	1,15 (0,99 – 1,35)	0,82 (0,70 – 0,97)	1,08 (0,82 – 1,43)
	>2	--	1	1,29 (1,05 – 1,59)	1,07 (0,85 – 1,34)	0,70 (0,55 – 0,90)	1
<i>P-value</i>		--	0,184	0,047	0,180	0,005	0,102

^a insufficient level of physical activity; ^b primary school; ^c high school; ^d minimum wage

DISCUSSION

The main findings highlighted prevalence of ILPA in different contexts in adolescents, especially during leisure and commuting, in 2011 and 2016. Comparing the surveys temporally, there was a trend of decline for ILPA in leisure time, while the chances of ILPA in school and commuting tended to increase. This information is important and is in line with other results of the literature, because the study studied in Brazil on indicators of PA accumulated in these domains indicated 60.8% of the students are insufficiently active²¹. In international studies, this prevalence can reach 80%, considering the same guidelines¹².

Evidence shows that demographic and socioeconomic characteristics may be factors that affect adhering to a physically active lifestyle in any context of PA^{4,11}. Other studies have found that environmental factors such as neighborhood safety and the availability of facilities and services such as parks, squares, and blocks influence the practice of PA in leisure¹⁷. In this context, PA performed in free time represented, in this study, the domain in which adolescents tended to participate more, given the decrease in the prevalence of ILPA between the two surveys. Similar results were also found on other continents^{2,8} and for this reason, a possible explanation for these findings can be attributed to environmental aspects that are attractive for the promotion of active leisure⁸.

When the analyses are stratified to identify the ILPA of young people, studies highlight that female

adolescents are less likely to participate in Leisure PA^{8,17}. These findings are consistent with the results of this study. It is noteworthy that there is a historical expectation that girls should assist parents in household duties, making their free time more limited to PA²⁶, and even when they get involved, the weekly frequency²⁴ and the average participation time is shorter when compared to boys. In addition, the presence of emotional symptoms¹¹ and the restriction of behaviors and the use of social environments are factors that interfere in adhering to PA in this domain¹⁹.

Regarding the teaching series, the more advanced young people were more likely to have ILPA in leisure than high school 1st-year students. Similar results were found in students from European countries^{17,23}. A plausible explanation may refer to the increase in school requirements for the transition to higher education levels and the beginning of work activities.

There was an association in this study for the Leisure ILPA, in 2016, related to the day shift and white skin color. These data are curious and arouse the need for further investigations to fill these gaps since, in other investigations in Brazilian cities, researchers did not obtain significant associations regarding the teaching series^{3,24}.

The ILPA at school was the one that obtained the lowest prevalence among the three domains of the study. Also, ILPA increased in this area from 2011 to 2016. In other surveys conducted in middle-upper-income countries^{20,22}, participation in Physical Education (EF) classes in high school justify the low

prevalence of ILPA in the school environment²². For this reason, improving the structure of schools, empowering teachers, and increasing the number of physical education classes in the week can reduce the unsatisfactory levels of PA of young people in this context. As well as activities focused on self-esteem⁹, motor skills, gender stereotypes, and body image⁵.

Night shift students are more likely to have a school ILPA; as well as residents of the urban area, those of white skin color, in 2011, and those with low socioeconomic status, in 2016. However, the participation of white students is more prevalent in school Physical Education and residents of rural municipalities have lower-class membership, which is justified by possible structural characteristics that differentiate geographical and economic locations²⁴.

ILPA in Displacement mainly involves distance issues³⁰ Accessibility⁷ Location¹⁸ and Public Safety¹⁶. In the last five years, much of the research focused on this theme has focused on the association or influences of natural or built environments, infrastructure^{7,19}, density of neighborhoods, and the sustainable concept of a city conducive to the fluidity of walks^{16,17}. In this study, the outcome related to PA in Displacement presented a high prevalence of ILPA when compared to other domains. In a systematic review study, researchers pointed out that active school transportation was associated with significantly higher levels of general PA in adolescents in 81.6% of the articles, which denotes the importance of inciting this domain to the goals of collective health policies¹⁵.

The night study shift showed a significant association with the displacement ILPA. It is assumed that the non-involvement of these students to active transportation is due to issues of public safety and precaution of exposure to violence, as discussed in some articles^{6,18}.

Schoolchildren living in rural areas are the most likely to be inactive when commuting to school. Results consistent with different contexts^{6,19}. Generally speaking, as described in the literature, students from urban areas live closer to the school, approximately at a distance of 1 mile or 1.6 km; report enough time to move on foot or by bike, taking an average of 10 to 15 minutes in round-trip traffic, or 20 minutes, onwards, in total travel time. The increase in distance is directly proportional to the increased use of buses and other vehicles for travel^{14,30}. Besides, urban development enables greater population density and street connectivity, which facilitates access to different locations^{7,16}.

The educational level of the parents and the family income are factors that denote a socioeconomic configuration of the students, presenting a significant

association only with the ILPA in the displacement in the two surveys. In this study, only maternal education was verified, because it was found in the answers of the questionnaire that a large portion of the participating students lived with their mother or with both parents. It was identified that the higher the level of education of the mother, the greater the chances of the students to ILPA in the displacement. Results consistent with adolescents from Latin contexts^{14,25}, in which more than 90 and up to 60%, respectively, of schoolchildren of mothers with low or no educational level, were more likely to engage in active transport; on the other hand, those whose mothers have higher education had a high prevalence of ILPA in this context. Likewise, it occurred with family income, in which, the higher it was, the more likely students are to the Displacement ILPA in this study. This is consistent with the results from Central England⁶ and Mexico¹⁴, where more than 70% of young people with low socioeconomic status went on foot or by bike to school.

In this sense, the above analyses indicate that adolescents whose mothers have a higher education level and who have a family income above 2 minimum wages have greater financial conditions for the acquisition of private vehicles and use them as a kind of precaution with traffic safety and crime issues^{6,14,24}.

This study presents some limitations that will be highlighted, the following: The transversal character study does not allow causality analyses; Despite the international recommendations of the questionnaire used in the study, the measurement of ILPA may provide bias.

The highlights of this study may arouse new applicability of PA promotion programs in different domains, respecting the specificities of each population, inciting an active lifestyle of schoolchildren, especially with a focus on specific subgroups, especially in female adolescents. Such interventions may come from social, school, and family programs to reduce ILPA over time.

CONCLUSION

The prevalence of ILPA in the leisure and commuting areas, between 2011 and 2016, remained high. When the analysis was stratified by sex, it was perceived that female adolescents had higher chances of ILPA in leisure and school. Public policies focused on increasing PA in different areas and specific subgroups are needed, especially in the female population due to greater vulnerability.

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