



PREVALENCE AND ASSOCIATED FACTORS WITH INSUFFICIENT LEISURE-TIME PHYSICAL ACTIVITY OF ADOLESCENTS: RESULTS OF A CROSS-SECTIONAL SCHOOL POPULATION-BASED STUDY

(Prevalencia y factores asociados con actividad física insuficiente de tiempo libre de adolescentes: resultados de un estudio transversal basado en la población escolar)

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Abstract

Purpose: To estimate the prevalence and associated factors with insufficient leisure-time physical activity (ILPA) among adolescents from a medium-sized city in the state of Minas Gerais, Brazil. Methods: Data from the ActVU cross-sectional survey (Uberaba - MG, Brazil) conducted between May and October 2015. High school students of both sexes (14 to 18 years old) comprised the sample. ILPA (< 300 minutes/week) was the dependent variable and sociodemographic, behavioral and health indicators were the independent variables evaluated through questionnaires. Binary logistic regression was used to estimate the Odds Ratio (OR). BMI was used as control variable. Results: 984 students participated in this study. The percentage of ILPA was 44.9% (95% CI 41.7; 48.1) and was higher among girls (57.1% vs. 29.3% in boys). Increased chance for ILPA was found in: the grade for both sexes (OR = 2.23 boys, OR = 2.28 girls), weekday screen time (OR = 1.29), excessive use of smartphone during the week (OR = 1.54) and at the weekend (OR = 1.22) among boys, studying tonight (OR=1.80), having a work (OR = 1.24), family income (OR = 1.41 for 3 to 5 minimum wages and OR = 1.65 for ≥ 6 minimum wages), weekday screen time (OR = 1.87) and dissatisfaction with the own weight (OR = 1.32) among girls. Conclusion: The prevalence of ILPA was high. Most of the associated factors were different in boys and girls.

Keywords: Motor activity, Leisure activities, Adolescents, Lifestyle. Epidemiology, Smartphone.

Resumen

Objetivo: estimar la prevalencia y los factores asociados con una actividad física insuficiente (AFI) en el tiempo libre entre los adolescentes de una ciudad mediana en el estado de Minas Gerais, Brasil. Métodos: Los datos de la encuesta transversal ActVU (Uberaba - MG, Brasil)

realizada entre mayo y octubre de 2015. Los estudiantes de secundaria de ambos sexos (de 14 a 18 años) comprendieron la muestra. AFI (<300 minutos/semana) fue la variable dependiente y los indicadores sociodemográficos, de comportamiento y de salud fueron las variables independientes evaluadas mediante cuestionarios. Se utilizó la regresión logística binaria para estimar la Odds Ratio (OR). El IMC se utilizó como variable de control. Resultados: 984 estudiantes participaron en este estudio. El porcentaje de AFI fue del 44,9% (IC95%: 41,7; 48,1) y fue mayor entre las niñas (57,1% frente al 29,3% en los niños). Se encontró una mayor probabilidad de AFI en: la calificación para ambos sexos (OR = 2.23 niños, OR = 2.28 niñas), tiempo de pantalla entre semana (OR = 1.29), uso excesivo de teléfonos inteligentes durante la semana (OR = 1.54) y los fines de semana (OR = 1.22) entre niños, que estudian esta noche (OR = 1.80), que tienen un trabajo (OR = 1.24), ingresos familiares (OR = 1.41 para 3 a 5 salarios mínimos y OR = 1.65 para ≥ 6 salarios mínimos), tiempo de pantalla entre semana (OR = 1.87) e insatisfacción con el propio peso (OR = 1.32) entre las niñas. Conclusión: la prevalencia de AFI fue alta. La mayoría de los factores asociados fueron diferentes en niños y niñas.

Palabras clave: Actividad motora, Actividades recreativas, Adolescente, Estilo de vida, Epidemiología, Teléfono Inteligente.

1. INTRODUCTION

Despite the recognized importance of regular practice of physical activity, a substantial proportion of adolescents does not have the recommended minimum levels of physical activity for health (Allison, Adlaf, Dwyer, Lysy, & Irving, 2007; Alves et al., 2012; Farias Júnior, 2008; Kozuka et al., 2006; Silva, Nahas, Peres, & Lopes, 2009). International (Allison et al., 2007; Kozuka et al., 2006) and national (Alves et al., 2012; Farias Júnior, 2008; Silva et al., 2009) researches have showed the prevalence of insufficiently active adolescents has increased over the years. Moreover, the daily use of new media technologies has gained prominence because of its association with greater vulnerability, comorbidities, affective disorders and psychic trauma in adolescents (Lourenço, Júnior, Zanetti, & Mendes, 2015; Peres et al., 2012).

Insufficient levels of physical activity (ILPA) during childhood and adolescence have been referred to as predictors of physical inactivity in adulthood (Gordon-Larsen, Nelson, & Popkin, 2004). ILPA are also consistently associated with negative health outcomes in the various populations (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998; Aragão, Lourenço, & Sousa, 2015; Hallal et al., 2012). In this sense, the monitoring of physical activity of adolescents, especially in leisure time, becomes essential for the elaboration of proposals to promote active behavior (Oca, Partida, Vázquez, Ponce, & Rivera, 2018). The promotion of physical activity in the young population is a challenge in public health in high and low-income countries, especially in the face of the continuous urban and technological changes that have been observed in recent decades.

Studies evaluating factors associated with ILPA in adolescents have presented conflicting results (Alves et al., 2012; Oehlschlaeger, Pinheiro, Horta, Gelatti, & San'Tana, 2004; Silva et al., 2009). In addition, there is no consensus as to the socio-demographic and behavioral factors associated with the insufficient level of physical activity (Alves et al., 2012; Gustafson & Rhodes, 2006; Oehlschlaeger et al., 2004; Silva et al., 2009). Some screen-based entertainment

activities are inversely associated with the practice of physical activity in adolescents. For example, a school-based epidemiological survey conducted in the Netherlands showed that excessive time watching television and using the internet/computer was associated with insufficient physical activity among adolescents (Busch, Manders, & de Leeuw, 2013). In spite of this, the use of smartphones and their relationship with leisure-time physical activity in adolescents has not yet been investigated. Considering the above, it is hypothesized that adolescents of both sexes who spend too much time using smartphones are more likely to be less active in leisure time. The objective of this study was to estimate the prevalence and associated factors with insufficient leisure-time physical activity in adolescents from a medium-sized city in the state of Minas Gerais, Brazil.

2. MATERIAL AND METHODS

The report of this study was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (von Elm et al., 2007).

2.1. Study design and context

This is a cross-sectional study based on data from the Survey on Health Behaviors and Lifestyle of Adolescents in Uberaba (ACtVU). The ACtVU was an epidemiological survey of information in a representative sample of adolescents, including boys and girls, from the public and private schools of the Brazilian city of Uberaba, Minas Gerais. The ACtVU was carried out between May and October 2015. The city of Uberaba has a municipal human development index of 0.772, a territory of 4,533.81 km², a population of 295,988 inhabitants, expected schooling of 9.94 years, Gini index of 0.50 and life expectancy at birth of 75.7 years (PNUD, IPEA, & FJP, 2013).

2.2. Population and study sample

The 10,903 students enrolled in the regular high school grades of public and private schools in the year 2015 (data provided by the Regional Superintendency of Local Education) represented the reference population. The procedure of sampling by closed conglomerates was adopted. The sample was stratified by type of institution (public and private) and proportionally to the number of students enrolled in each stratum. The drawings were random and had two stages: stage one - selection of the school; stage two - selection of classes in each school, considering the proportionality per shift (day and night).

The following criteria were used for sample calculation: reference population (N = 10,903); prevalence of the outcome (50%) and confidence interval (95%). A two-point effect in sampling design (deff) was adopted due to the sampling procedure by clusters, and the ACtVU survey investigates multiple outcome variables and, therefore, the prevalence fixed at 50% aims to maximize the sample. The sample was increased by 20% for possible losses and refusals and 10% for analyses by confounding variables. The expected sample was 979. The Epi Info™ software version 7 for Windows® was used for sample calculation. The number of classes required in the survey was calculated using $n = a \cdot b$, where "n" is the expected sample size, "a" is the average number of students per class (20 students/class, data from a pilot study) and "b" represents the number of classes. A total of 49 classes were estimated. The realization of this study was authorized by the Department of Education of the State of Minas Gerais.

2.3. Sources of information and study variables

The information was obtained in this study through two questionnaires. The COMPAC questionnaire was previously validated (Silva et al., 2013) for use in a population of adolescents to investigate health behaviors and lifestyle indicators. The second version of this instrument was used in the present study (Silva et al., 2013). The second questionnaire was constructed based on other existing instruments in the literature used in population surveys. The Portable and Mobile Internet Questionnaire (Tecno-Q) was validated for face and content (consultation with a panel of experts), clarity and test-retest reproducibility (application in adolescent population) with a seven-day interval between applications (Lourenço, Hélio Júnior, Zanetti, & Mendes, 2020). The variable from the Tecno-Q used in this study showed low reproducibility bias: Bland-Altman test = 8.38 minutes/day (95% CI: 336.4; -319.7).

The collection team was composed of teachers and students of Physical Education of the Federal University of Triângulo Mineiro. The team was trained and participated in a pilot study, both steps being supervised by the coordinator of research. The completion of the questionnaires took place in each selected school, in the classroom and during the class time. The teacher of the class was asked to remain in the room during data collection. All the adolescents in the room were eligible to participate.

Leisure-time physical activity was the dependent variable. This variable was estimated through one question with 19 options of physical activities plus one blank space with the option other. Responses from the option other were not considered in the analysis. Participants provided information on type, weekly frequency (number of days), and time per day in hours and minutes dedicated to each physical activity. Then, a score was created, in minutes, from the multiplication of the weekly frequency by the average practice time per day of each leisure-time physical activity; the minutes of the more vigorous activities were multiplied by two. Then, the gross score was dichotomized into sufficiently active during leisure time (≥ 300 min/week of leisure-time physical activities) and insufficiently active in leisure time (< 300 minutes per week of leisure-time physical activity). The reference category adopted in this study was the insufficiently active in leisure time (ILPA). The adopted cutoff point (300 minutes) is in consensus with guidelines for the target population of this study (Physical Activity Guidelines Advisory Committee, 2008).

Leisure-time physical activities were categorized into: a) moderate activities: volleyball, table tennis, surfing, fishing, walking and bowling, and b) vigorous activities: handball, capoeira, court tennis, swimming, bodybuilding, judo, gymnastics, soccer, dance, running, cycling and basketball. A compendium of energy expenditure was consulted to determine the intensity of each leisure-time physical activity (Ridley, Ainsworth, & Olds, 2008). An option of leisure-time physical activity was disregarded in the calculation of the score (stretching, code 331590; METs = 2.5).

The independent variables were the following demographic and socioeconomic indicators: age (14 and 15, 16 to 18 years), grades (1st, 2nd and 3rd year), shift (day or night), family income (up to two wages, three to five wages and six wages or more), and work situation (yes or no); behavioral variables: weekday and weekend screen time (< 2 hours/day [acceptable] and ≥ 2 hours/day [harmful]) (American Academy of Pediatrics, 2001), weekday and weekend use of smartphones (normal use [< 313 min/day] and excessive use [≥ 313 min/day]) (Cha & Seo, 2018), and participation in physical education classes (yes or no); and health variables:

satisfaction with weight (yes and no) and self-rated health (positive or negative). Body mass index (BMI) was calculated using the equation: $BMI = \frac{\text{body mass (kg)}}{\text{height (meter)}^2}$ using height measurements (WCS® stadiometer, Wood Portable Compact model, 1mm graduation) and body mass (Wiso® digital scale, model w949, 100g graduation).

2.4. Statistical analyses

Data were analyzed using absolute and relative frequency and confidence intervals (95% CI). The chi-square test (χ^2) was applied for comparisons of proportions. The measure of association adopted was the Odds Ratio, estimated by the binary logistic regression (crude and adjusted analyses). In the adjusted analyses, the hierarchical model was followed. The backward selection of variables was adopted (if the p value of the Wald test ≤ 0.10). The level of significance was set at $p < 0.05$. The analyses were conducted with stratification by sex. BMI was a control variable in the adjusted analyses. All analyses were performed considering sample weights and structural information from the plan using the Statistical Package for Social Science version 21 (SPSS Inc., Chicago, USA).

This study has no conflict of interest and the methodological procedures of the project were approved by the ethics and local research committee of the Federal University of Triângulo Mineiro (protocol number 994.772/2015). All participants were informed about the objectives and possible risks inherent in the research; voluntary participation was expressed by means of self-authorization (over 18 years of age) and authorization of parents/guardians (under 18 years of age) through the signing of informed consent term.

3. RESULTS

3.1. Socio-demographic characteristics, physical activity and prevalence of ILPA of the participants

A total of 984 adolescents participated in the study, of which 45.0% were boys. In the sample, 80.2% of the adolescents reported watching TV and 61.9% used computer/video games during the week; 95.5% had smartphones, 96.9% of whom used it to access the Internet.

The prevalence of ILPA was 45.1% (95% CI: 40.9, 49.3), being lower among boys (28.9%, 95% CI: 24.2, 34.1) than girls (57.9%, 95% CI: 51.0, 62.7, $\chi^2 = 80.5$, $p < 0.001$). Three out of four adolescents reported at least one leisure-time physical activity (75.2%, 95% CI: 71.5, 78.5); this proportion was 86.7% (95% CI: 82.8, 89.8) among boys and 65.8% (95% CI: 61.7, 69.7) among girls ($\chi^2 = 56.7$, $p < 0.001$). Soccer (55.6%) and walking (37.5%) were the most commonly observed leisure-time physical activities among boys and girls, respectively.

3.2. Associated factors with ILPA in girls

In the crude analyses, only participation in physical education classes and satisfaction with weight were not associated with insufficient level of leisure-time physical activity (Table 1).

In the adjusted analysis, there were lower chances of insufficient leisure-time physical activity for the adolescents of the second year (14% ↓OR), night shift (53% ↓OR), who had a work (17% ↓OR), with a family income of 3 to 5 minimum wages (47% ↓OR) and 6 minimum wages or more (24% ↓OR), and weekend screen time ≥ 2 h/day (18% ↓OR). An increased chance was identified for adolescents of the last grade (123% ↑OR), of weekday screen time (29% ↑OR), with excessive use of smartphones during the weekdays and weekends (54% and 22% ↑OR) and those who negatively assessed their health status (28% ↑OR).

Table 1. Prevalence of ILPA and associated factors among girls. Odds Ratio (OR) for crude and adjusted analyses - Binary Logistic Regression. ACtVU study. Uberaba - MG, Brazil, 2015.

Variables	n	%**	Crude			p	Adjusted [‡]			p
			OR	(95% CI)			OR	(95% CI)		
Age^a						<0.001*				0.474*
14-15 years	212	39.7	1				1			
16 to 18 years	322	60.3	0.71	0.67	0.75		1.04	0.93	1.16	
Grades^a						<0.001*				<0.001*
1st	245	46.6	1				1			
2nd	172	32.7	0.85	0.79	0.90		0.86	0.80	0.94	
3rd	109	20.7	1.58	1.46	1.71		2.23	2.00	2.51	
Shift^a						<0.001				<0.001
Day	427	80.0	1				1			
Night	107	20.0	0.82	0.77	0.88		0.47	0.42	0.53	
Work^a						<0.001				<0.001
No	401	75.8	1				1			
Yes	128	24.2	0.89	0.84			0.83	0.75	0.92	
Family income^a						<0.001*				<0.001*
up to 2 wages	207	39.8	1				1			
3 to 5 wages	224	43.2	0.78	0.73	0.83		0.53	0.50	0.58	
6 or more wages	88	17.0	0.77	0.71	0.84		0.76	0.67	0.88	
Weekday screen time^b						0.031				<0.001
< 2 hours/day	145	32.3	1				1			
≥ 2 hours/day	304	67.7	1.10	1.01	1.15		1.29	1.16	1.43	
Weekend screen time^b						<0.001				<0.001
< 2 hours/day	123	27.0	1				1			
≥ 2 hours/day	332	73.0	0.75	0.70	0.81		0.82	0.74	0.92	
Weekday smartphone use^b						<0.001				0.001
Usó normal	160	34.7	1				1			
Usó excessivo	301	65.3	1.51	1.41	1.61		1.54	1.38	1.73	
Weekend smartphone use^b						<0.001				<0.001
Usó normal	109	24.0	1				1			
Usó excessivo	346	76.0	1.51	1.40	1.62		1.22	1.08	1.38	
Physical Education class^b						0.54				0.64
No	165	31.3	1				1			

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Yes	362	68.7	0.94	0.88	1.00	0.98	0.88	1.08
Satisfaction with weight^c						0.153		0.316
Yes	183	35.1	1			1		
No	339	64.9	0.96	0.90	1.02	0.95	0.87	1.05
Self-rated of health^c						<0.001		<0.001
Positive	339	64.0	1			1		
Negative	191	36.0	1.20	1.13	1.27	1.28	1.18	1.41

BMI: body mass index.

¥ Controlled to BMI and variables with *Wald* p value ≤0.10 (bold)

*Linear-trends *Wald* test

**Valid percentage

^a First level variables; ^b Second level variables; ^c Third level variables.

3.3. Associated factors with ILPA in boys

Table 2 shows the crude and adjusted analyses of the factors associated with insufficient leisure-time physical activity among boys. In the crude analyses, only the grade and the weekend screen time were not associated with insufficient level of leisure-time physical activity. In the adjusted analyses, there were lower chances of insufficient physical activity for adolescents in the older age group (22% ↓OR), who make excessive use of smartphones at weekdays and weekends (20% and 40% ↓OR, respectively) and those who participated in physical education classes (55% ↓OR). Conversely, higher chances were identified among adolescents of the last grade (128% ↑OR), night shift (80% ↑OR), who did not have a work (24% ↑OR), with higher family income (41% and 65% ↑OR), with screen time (87% ↑OR), dissatisfied with body weight (32% ↑OR) and who negatively assessed their health status (273% ↑OR).

Table 2. Prevalence of ILPA and associated factors among boys. Odds Ratio (OR) for crude and adjusted analyses - Binary Logistic Regression. ACtVU study. Uberaba-MG, Brazil, 2015.

Variables	n	%	Crude			p	Adjusted [¥]			p
			OR	(95% CI)			OR	(95% CI)		
Age^a						0.001*				<0.001*
14-15 years	162	38.6	1				1			
16 to 18 years	258	61.4	1.12	1.05	1.21		0.78	0.68	0.89	
Grades^a										<0.001*
1st	232	56.3	1			0.291*	1			
2nd	123	29.9	0.97	0.89	1.05		1.06	0.93	1.21	
3rd	57	13.8	1.09	0.98	1.21		2.28	1.91	2.71	
Shift^a						0.001				<0.001
Day	307	73.1	1				1			
Night	113	26.9	1.13	1.05	1.12		1.80	1.57	2.06	
Work^a						<0.001				<0.001
No	258	61.6	1				1			
Yes	161	38.4	1.17	1.09	1.26		1.24	1.10	1.40	
Family income^a						<0.001*				<0.001*
up to 2 wages	123	30.3	1				1			

3 to 5 wages	182	44.8	1.32	1.21	1.43	1.41	1.23	1.60
6 or more wages	101	24.9	1.40	1.27	1.54	1.65	1.42	1.91
Weekday screen time^b						<0.001		0.139
< 2 hours/day	129	35.3	1			1		
≥ 2 hours/day	236	64.7	1.18	1.09	1.28	1.09	0.97	1.23
Weekend screen time^b						0.150		<0.001
< 2 hours/day	120	32.7	1			1		
≥ 2 hours/day	247	67.3	1.06	0.98	1.15	1.87	1.66	2.10
Weekday smartphone use^b						<0.001		0.003
Uso normal	171	50.3	1			1		
Uso excessivo	169	49.7	0.73	0.68	0.79	0.80	0.69	0.93
Weekend smartphone use^b						<0.001		<0.001
Uso normal	144	42.6	1			1		
Uso excessivo	194	57.4	0.66	0.61	0.72	0.60	0.52	0.70
Physical Education class^b						<0.001		<0.001
No	63	15.2	1			1		
Yes	352	84.8	0.51	0.46	0.56	0.45	0.37	0.53
Satisfaction with weight^c						<0.001		<0.001
Yes	196	48.4	1			1		
No	209	51.6	1.31	1.22	1.41	1.32	1.18	1.49
Self-rated of health^c						<0.001		<0.001
Positive	333	80.0	1			1		
Negative	83	20.0	3.57	3.29	3.88	3.73	3.17	4.40

BMI: body mass index.

¥ Controlled to BMI and variables with *Wald* p value ≤0.10 (bold)

*Linear-trends *Wald* test

**Valid percentage

^a First level variables; ^b Second level variables; ^c Third level variables.

4. DISCUSSION

The present study investigated the prevalence and factors associated with ILPA among adolescents from a medium-sized city in the state of Minas Gerais, Brazil. It was identified that four out of ten adolescents did not perform a minimum of 300 min/week of leisure-time physical activity. Our results also revealed that among the factors associated with odds ratios were, for the most part, opposite in boys and girls. There was an association between ILPA with sociodemographic, behavioral and health variables in both sexes. Only age, participation in physical education classes, and satisfaction with body weight among girls, and weekday screen time among boys were not associated with ILPA. Until the publication of this study, to our knowledge, no other epidemiological survey investigated the relationship of the use of smartphone with levels of leisure-time physical activity in Brazilian adolescents.

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In this study, four out of ten adolescents did not perform 300 min/week of leisure-time physical activity. This result is consistent with other epidemiological studies in international and national scenarios (Alves et al., 2012, p. 201; Farias Júnior, 2008; Koezuka et al., 2006; Silva et al., 2009) conducted with similar age groups. A survey conducted with data from the Risk Behavior Survey (USA) and the Ontario Student Drug Use Survey (Canada) observed the decline in physical activity patterns among adolescents in the 14-18 years age group (Allison et al., 2007). In Brazil, the results of the National Survey of School Health conducted with students from the ninth year of elementary education in public and private schools showed that 63.1% of adolescents are insufficiently active (Bivar et al., 2012). Other national investigations showed that the frequency of insufficiently active adolescents varied from 39% (Oehlschlaeger et al., 2004) to 58.5% (Vasques & Lopes, 2009) in different regions of the country. The heterogeneous methods of the studies with respect to the type of instrument used, the place of accomplishment, cut-off points and the operational definition adopted to estimate the insufficient level of physical activity may partially explain the discrepancies of the presented prevalences (Tassitano et al., 2007).

In the present study, the ILPA differed between sexes. Boys presented lower prevalence when compared to girls. Among the physical activities investigated, soccer was the most prevalent practice among boys, and walking among girls. Our findings reinforce previous results on boys being more active in leisure time than girls (Alves et al., 2012; Oehlschlaeger et al., 2004). Furthermore, previous studies have shown the preference of boys for soccer as physical activity in the free time (Ceschini, Andrade, Oliveira, Júnior, & Matsudo, 2009), as well as the option of the girls for physical activities of lower intensity (Alves et al., 2012) such as walking.

Boys of the older age group were less likely to present an ILPA. Our results differ from other surveys with Brazilian adolescents, which showed an inverse association (Ceschini et al., 2009; Oehlschlaeger et al., 2004; Vasques & Lopes, 2009) or no association (Moraes et al., 2009) between these variables. Current literature suggests that the level of physical activity of adolescents declines with advancing age (DUMITH et al., 2011). Dumith and colleagues (2011) performed a meta-analysis of prospective studies to investigate changes in physical activity throughout adolescence. An overall mean reduction of 7% per year in physical activity was reported by the authors. They also showed that older boys had greater declines in physical activity. Marani and colleagues (2008) showed that male adolescents obtained high mean values in variables from the Healthy Habits Perception Questionnaire, being the highest values found for the practice of health-related physical activity. Our results are inconsistent with the current state of research in this area and we attribute this disagreement to particular characteristics of our sample, such as greater knowledge of older adolescents in our sample about the benefits of practicing physical activity, as pointed out in the study of Marani and colleagues (2008).

In the present study, adolescents of both sexes of the more advanced grade had a greater chance of presenting an ILPA. Adolescents in the final grade are less active in leisure hours, as in other contexts of physical activity (Lourenço, Pires, Leite, Sousa, & Mendes, 2017). A previous study of our group showed that adolescents from the third grade of high school were also the least active during the trip to school (Lourenço, Pires, et al., 2017). In Brazil, the last grade of high school precedes the student's admission to universities, and most of these students have the objective of undergoing the admission test after completing this stage (Sparta & B Gomes, 2005). In this sense, we consider that the preoccupation with achieving this goal may lead the

student to give priority to studies to the detriment of leisure-time physical activities in order to become time-efficient. Also, a school-based survey showed that "lack of time" and having "many tasks" to do were among the most prevalent barriers, regardless of sex, to perform leisure-time physical activities (D. F. Dias, Loch, & Ronque, 2015). A study conducted by Marani et al. (2008), with high school adolescents from a state public school of Lodrina, Brazil, showed that the main barriers to practice physical activity are related to the "lack of time" and "lack of motivation" in both sexes (Marani et al., 2008). This result partially supports the hypothesis of time-efficiency possibly adopted by the adolescents in our study.

Boys who studied at the night shift showed a greater chance of presenting ILPA. For the girls, the association was reversed. A number of epidemiological surveys with representative samples of Brazilian teenage students did not present the information on the level of physical activity stratified by the shift (Alves et al., 2012; Ceschini et al., 2009; Júnior & De, 2008; Moraes et al., 2009; Vasques & Lopes, 2009). A systematic review of physical activity in Brazilian adolescents also did not mention this information (Tassitano et al., 2007). However, in a more recent study, Silva and colleagues (Silva et al., 2009) showed that among adolescents from the southern region of Brazil, night-shift students were more inactive than their day-shift peers, in a sex-adjusted analysis. Other negative health behaviors have already been identified among students of the night shift (Fischer, Oliveira, Teixeira, Teixeira, & Amaral, 2003). Fischer and colleagues (2003) investigated the life and health conditions and psychosocial development of 354 adolescents (57.3% boys and 42.7% girls) who studied at night in the city of São Paulo. They found problems with sleep time, alcohol and tobacco consumption, daytime sleepiness, physical tiredness and body aches. Adolescents who work are more frequently found to study at night (80%) than during the daytime (30%). Moreover, adolescents who work during the night had lower energy expenditure in free-time physical activities compared to those who did not work (Gambardella & Gotlieb, 1998). The results point to a negative load associated with studying at night. However, this does not seem to apply to leisure-time physical activity among girls.

In the present study, boys who have a work were more likely to ILPA. The opposite was identified for girls. Other negative health outcomes have already been demonstrated among employed adolescents (Fischer et al., 2003). This association may be related to sexes asymmetry in the labor market (Kon, 2014) and the need for psychosomatic recovery (BARROS & SANTOS, 2005). According to Kon (2014), the labor characteristics of men and women are asymmetrical in relation to the type and effort required by work tasks. Boys culturally perform work tasks that require greater physical effort, implying, therefore, greater physical exhaustion. In this sense, the workload can be a barrier to the practice of physical activity in leisure moments as a psychosomatic recovery activity (Barros & Santos, 2005). However, the opposite may happen among women. Women culturally perform less intense work tasks (Kon, 2014), resulting in less physical exhaustion and contributing to a better understanding of physical activity as a form of psychosomatic recovery. In addition, it has been shown that leisure-time physical activity contributes to a lower perception of stress among adolescents (Lourenço, Júnior, Zanetti, & Mendes, 2017).

Girls in the highest family income groups showed a reduced chance of ILPA. An opposite association was identified among boys in our study. It is assumed that socioeconomic status is a determining factor that influences the level of physical activity of young people (Alves et al., 2012; Oehlschlaeger et al., 2004). Alves and colleagues (2012) investigated the physical inactivity of children and adolescents, among teenage students from the capital of a state in the northeastern region of Brazil and reported that adolescents of both sexes of the lower economic

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classes were less inactive than their peers in higher economic classes. A similar result was shown in a study in the capital of another state in the northeast region (Júnior & De, 2008). In the study, girls from higher economic classes were more inactive than their peers of lower economic classes, and no association was identified among boys (Júnior & De, 2008). On the other hand, in the study developed by Oehlschlaeger and colleagues (2004) in a city in the south of Brazil, adolescents of the lower economic class were more inactive than their peers. Despite the methodological differences between the studies, it is possible to identify the existence of a pattern in the relationship between the level of physical activity and the economic class of adolescents from different regions of the country. Additionally, the analysis of only one of the cited studies was stratified by sex. In this sense, our results confirm the socioeconomic level as a determinant of the level of leisure-time physical activity. However, our results add information to this discussion by revealing that the socioeconomic level can determine in a different way the physical activity in the leisure time of boys and girls.

In this study, excessive screen time was positively associated with the ILPA among adolescents of both sexes. An inverse association was identified at the weekend only among girls. Epidemiological surveys have demonstrated that excessive screen time is associated with physical inactivity (Busch et al., 2013; P. J. P. Dias et al., 2014) in adolescents. Busch and colleagues (Busch et al., 2013) conducted a survey of 2425 German adolescents to investigate the association between screen time activities and health behavior and outcomes. For the entire sample, their results showed that both TV time and excessive internet usage (≥ 14 hours/week) were associated with being less physically active. There was no statistical significance in the analyses stratified by sex. A study with Brazilian students showed that adolescents who did not perform at least 300 min/week of physical activity were 25% more likely to spend four hours or more a day watching TV, playing video games or using the computer (P. J. P. Dias et al., 2014). This study did not perform a sex-adjusted analysis. Besides the association with physical inactivity, screen time is associated with reduced physical fitness and other important health outcomes (Carson et al., 2016) in the pediatric population. A recent systematic review pointed out that longer screen time was associated with low physical fitness in young people (Carson et al., 2016). From a physiological perspective, remaining in activities of sedentary behavior such as sitting before a screen is related to lower metabolic demands (Júdice, Hamilton, Sardinha, Zderic, & Silva, 2016). On the other hand, even small interruptions in this behavior, such as the transition from sitting, getting up and returning to sitting, have a modest impact on metabolic demand (Júdice et al., 2016). Thus, the recommendation that adolescents should not avoid excessive screen time, or at least interrupt the sitting time, is reinforced. Furthermore, considering the unusual result of an inverse association among the girls in this study, it is necessary to better explore the screen time considering differences between sexes, between weekdays and weekends, and even other cutoff points for excessive screen time.

The excessive use of smartphones presented inverse results between the sexes. Among the girls in this study, excessive use of smartphones was associated with a greater chance of ILPA. However, this association was contrary when it comes to boys. This result partially refutes the hypothesis that we formulated. A review study (Peres et al., 2012) showed that the indiscriminate use of gadgets is related to psychic traumas and can impact on the affective health of children and young people. Moreover, previous studies (Busch et al., 2013; P. J. P. Dias et al., 2014), likewise the present study, showed that other screen-based entertainment activities are associated with insufficient physical activity. The results found in this study allow the inference that the time of use of smartphones by boys may not compete and/or negatively influence the availability and time to practice physical activities of higher intensities (moderate to vigorous)

during leisure moments. However, nothing is known about the influence of the use of these technologies on physical activities with other intensities, as for example light physical activities, and in other domains of physical activity such as displacement and activities of daily living. The use of smartphones is much disseminated. These gadgets can be used as a stimulus tool for practicing physical activity (Glynn et al., 2013). Much of the content of smartphone apps available at virtual stores is in the Health and Fitness category. Many of the available applications can, by the way, induce physical activity (Glynn et al., 2013) and young people can benefit from them. However, considering the findings of the present study, this may be true for boys, but not for girls. Further studies are needed to better explore the relationship between physical activity and the use of smartphones by young people.

In the present study, boys participating in physical education classes showed a lower chance of being less active during leisure time. The school is characterized as a favorable environment for health promotion and physical activity (WHO, 2009). A longitudinal study conducted in the United States with schoolchildren (Gordon-Larsen, McMurray, & Popkin, 2000) showed that higher weekly attendance to physical education classes increased the chances of students meeting the recommendations of moderate to vigorous intensity physical activity. In this sense, participation in physical education classes contributes to behavior changes and to increased habitual physical activity among school adolescents (Barros et al., 2009; Gordon-Larsen et al., 2000), consonant with the results of the present study.

Male adolescents dissatisfied with body weight were more likely to be insufficiently active at leisure. Dissatisfaction with body weight can be understood as dissatisfaction of adolescents with the perception of the own body (Slade, 1994). Although limited to the only component of body shape, dissatisfaction with weight body may reflect the adolescents' displeasure with the size and shape of their body, i.e. their body image (Slade, 1994). Previous studies have shown that dissatisfaction with body image and body weight are related to eating disorders, weight disorders and other important negative health outcomes in adolescents (Cohane & Pope, 2001; Langoni, Aerts, Alves, & Câmara, 2014; Miranda, Conti, Bastos, & Ferreira, 2011; Santos, Tassitano, do Nascimento, Marina de Moraes, & Cabral, 2011). Brazilian adolescents of both sexes with overweight and obesity reported high levels of body dissatisfaction (Miranda et al., 2011). Langoni and colleagues (2014) reported that insufficiently active adolescents were 39% more likely to be dissatisfied with body image than active adolescents, however, this association lost significance after adjusting to sex. On the other hand, it is known that adolescents may have the distorted perception between the current weight and the ideal weight (Santos et al., 2011). In this sense, although we did not make a clear distinction about the current weight and ideal weight of adolescents, our analyses were stratified by sex and adjusted to BMI. Finally, the need for leisure-time physical activities among schoolchildren is stressed, especially among boys, considering the positive impact of physical activity on health (WHO, 2009).

Adolescents of both sexes with negative perceptions of health were more prone to insufficient level of leisure-time physical activity. Other studies with Brazilian and non-Brazilian adolescents showed similar results (Mendonça & Farias Júnior, 2012; Vancea, Barbosa, Menezes, Santos, & de Barros, 2011). A systematic review of studies with a population of non-Brazilian adolescents showed an association between physical activity and positive health perception (Vancea et al., 2011). A school population-based survey in of adolescents from a capital city in northeastern Brazil found that less physically active adolescents of both sexes were up to three-fold more likely to negatively perceive their health (Mendonça & Farias Júnior, 2012). The perception of health status reflects a global assessment of the current health state including

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components of physical, psychological and social health (Currie et al., 2008). It is speculated that the association between the practice of physical activity and the perception of health is explained by biopsychosocial pathways (Vancea et al., 2011). Thus, physical activity would act as an agent activating excitatory neuro-hormonal pathways, generating a sensation of pleasure and well-being, acting as a facilitator in social integration, producing body changes (such as weight loss and improved self-esteem and satisfaction with weight, for example).

Among the limitations of the present study we can highlight: i) the cross-sectional design that investigates exposures and outcomes reported in a single point in time, making it impossible to understand the causality between variables; ii) the evaluation of leisure-time physical activity through a questionnaire, which may favor bias in the information because adolescents may not faithfully remember the activities practiced and the time dedicated to them, thus overestimating the time spent in vigorous activities and underestimating moderate activities (Hussey, Bell, & Gormley, 2007). However, the questionnaires are the more feasible instruments for data collection in large-scale epidemiological researches. Furthermore, the psychometric characteristics of the questionnaires adopted in the present study were acceptable (Lourenço et al., 2020; Silva et al., 2013).

As strong aspects of the study, we highlight the pioneer investigation of the relationship between the use of smartphones and leisure-time physical activities. However, the lack of studies of this nature among Brazilian adolescents made it impossible to compare and further discuss the results. The set of complex characteristics and the successful conduction of the methodological procedures employed together with the size and robustness of the selected sample indicate the external validity of the results of the present study, with possibility of generalization for adolescents aged between 14 and 18 years, enrolled in the public and private network of the municipality of Uberaba, Minas Gerais, Brazil. Moreover, the findings of the present study may contribute to the implementation of strategies to encourage physical activities in this population subgroup.

4. CONCLUSION

In this study, four out of ten adolescents did not perform 300 min/week of moderate to vigorous leisure-time activities, with a higher prevalence among girls. The associated factors showed distinct associations between boys and girls in our study sample.

The results presented by this study provide important information to support the proposition of health interventions, especially information related to gender difference. Future multicomponent interventions on physical activity should consider that boys and girls may have different determinants for not performing the minimum amount of physical activity for health.

Bibliografía

- Allison, K. R., Adlaf, E. M., Dwyer, J. J., Lysy, D. C., & Irving, H. M. (2007). The decline in physical activity among adolescent students: A cross-national comparison. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 97-100. Retrieved June 10, 2016, from <http://www.jstor.org/stable/41995771> <https://doi.org/10.1007/BF03404317>

- Alves, C. F. de A., Silval, R. de C. R., Assis, A. M. O., de Oliveira Souza, C., de Jesus Pintoll, E., & Frainer, D. E. S. (2012). Fatores associados à inatividade física em adolescentes de 10-14 anos de idade, matriculados na rede pública de ensino do município de Salvador, BA. *Rev Bras Epidemiol*, 15(4), 858-70. Retrieved June 10, 2016, from <http://www.scielo.org/pdf/rbepid/v15n4/16.pdf> <https://doi.org/10.1590/S1415-790X2012000400016>
- American Academy of Pediatrics. (2001). Children, adolescents, and television. *Pediatrics*, 107(2), 423-426. Retrieved May 4, 2014, from <http://pediatrics.aappublications.org/content/107/2/423> <https://doi.org/10.1542/peds.107.2.423>
- Andersen, R. E., Crespo, C. J., Bartlett, S. J., Cheskin, L. J., & Pratt, M. (1998). Relationship of physical activity and television watching with body weight and level of fatness among children: Results from the Third National Health and Nutrition Examination Survey. *JAMA*, 279(12), 938-942. <https://doi.org/10.1001/jama.279.12.938>
- Aragão, D., Lourenço, C. L. M., & Sousa, T. F. de. (2015). Inatividade física em crianças: Uma revisão sistemática de estudos realizados no Brasil. *Rev. Bras. Ciên. Saúde/Revista de Atenção à Saúde*, 13(45), 87-93. Retrieved October 1, 2015, from http://seer.uscs.edu.br/index.php/revista_ciencias_saude/article/view/2873 <https://doi.org/10.13037/ras.vol13n45.2873>
- Barros, M. V. G. de, & Santos, S. G. dos. (2005). A atividade física como fator de qualidade de vida e saúde do trabalhador. De <http://www.Eps.Ufsc.Br/ergon/revista/artigos/saray.Pdf>.
- Barros, M. V. G. de, Nahas, M. V., Hallal, P. C., Farias Júnior, J. C. de, Florindo, A. A., Barros, S. S. H. de, & others. (2009). Effectiveness of a school-based intervention on physical activity for high school students in Brazil: The Saude na Boa project. *J Phys Act Health*, 6(2), 163-9. <https://doi.org/10.1123/jpah.6.2.163>
- Bivar, W., Abrantes, F. J., Ramos, R. L. O., Neto, W. J. S., Simões, P. C. M., Tai, D. W., & de Magalhães, M. S. (2012). Instituto Brasileiro de Geografia e estatística. Pesquisa Nacional de Saúde do Escolar 2012. Rio de Janeiro. Retrieved June 28, 2016, from <http://biblioteca.ibge.gov.br/visualizacao/livros/liv64436.pdf>
- Busch, V., Manders, L. A., & de Leeuw, J. R. J. (2013). Screen time associated with health behaviors and outcomes in adolescents. *American Journal of Health Behavior*, 37(6), 819-830. <https://doi.org/10.5993/AJHB.37.6.11>
- Carson, V., Hunter, S., Kuzik, N., Gray, C. E., Poitras, V. J., Chaput, J.-P., Saunders, T. J., et al. (2016). Systematic review of sedentary behaviour and health indicators in school-aged children and youth: An update. *Applied Physiology, Nutrition, and Metabolism*, 41(Suppl 3), S240-265. <https://doi.org/10.1139/apnm-2015-0630>
- Ceschini, F. L., Andrade, D. R., Oliveira, L. C., Júnior, J. F. A., & Matsudo, V. K. R. (2009). Prevalence of physical inactivity and associated factors among high school students from

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state's public schools. *Jornal de Pediatria*, 0(0). Retrieved July 13, 2014, from http://www.jped.com.br/conteudo/Ing_resumo.asp?varArtigo=1975&cod=&idSecao=1
<https://doi.org/10.2223/JPED.1915>

- Cha, S.-S., & Seo, B.-K. (2018). Smartphone use and smartphone addiction in middle school students in Korea: Prevalence, social networking service, and game use. *Health psychology open*, 5(1), 2055102918755046. <https://doi.org/10.1177/2055102918755046>
- Cohane, G. H., & Pope, H. G. (2001). Body image in boys: A review of the literature. *The International Journal of Eating Disorders*, 29(4), 373-379. <https://doi.org/10.1002/eat.1033>
- Currie, C., Gabhainn, S. N., Godeau, E., Roberts, C., Smith, R., Currie, D., Pickett, W., et al. (Eds.). (2008). *Inequalities in young people's health: HBSC international report from the 2005/2006 survey*. Health policy for children and adolescents. Copenhagen: WHO.
- Dias, D. F., Loch, M. R., & Ronque, E. R. V. (2015). Barreiras percebidas à prática de atividades físicas no lazer e fatores associados em adolescentes. *Ciência & Saúde*
Coletiva, 20(11), 3339-3350. Retrieved June 25, 2018, from http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232015001103339&lng=pt&tlng=pt <https://doi.org/10.1590/1413-812320152011.00592014>
- Dias, P. J. P., Domingos, I. P., Ferreira, M. G., Muraro, A. P., Sichieri, R., & Gonçalves-Silva, R. M. V. (2014). Prevalence and factors associated with sedentary behavior in adolescents. *Revista de Saúde Pública*, 48(2), 266-274. Retrieved January 5, 2016, from http://www.scielo.br/scielo.php?script=sci_abstract&pid=S0034-89102014000200266&lng=pt&nrm=iso&tlng=pt <https://doi.org/10.1590/S0034-8910.2014048004635>
- Dumith, S. C., Gigante, D. P., Domingues, M. R., & Kohl, H. W. (2011). Physical activity change during adolescence: A systematic review and a pooled analysis. *International Journal of Epidemiology*, 40(3), 685-698. Retrieved April 24, 2016, from <http://ije.oxfordjournals.org/content/40/3/685> <https://doi.org/10.1093/ije/dyq272>
- von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. *PLoS Medicine*, e296, 4(10), 1623-1627. Retrieved May 27, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2020495/>
<https://doi.org/10.1097/EDE.0b013e3181577654>
- Farias Júnior, J. C. (2008). Associação entre prevalência de inatividade física e indicadores de condição socioeconômica em adolescentes. *Revista Brasileira de Medicina do Esporte*, 14(2), 109-114. Retrieved June 10, 2016, from http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1517-86922008000200005&lng=en&nrm=iso&tlng=pt <https://doi.org/10.1590/S1517-86922008000200005>

- Fischer, F. M., Oliveira, D. C., Teixeira, L. R., Teixeira, M. C. T. V., & Amaral, M. A. do. (2003). Efeitos do trabalho sobre a saúde de adolescentes. *Ciência & Saúde Coletiva*, 8, 973-984. <https://doi.org/10.1590/S1413-81232003000400019>
- Gambardella, A. M. D., & Gotlieb, S. L. D. (1998). Dispendio energético de adolescentes estudantes do período noturno. *Revista de Saúde Pública*, 32, 413-419. Retrieved July 2, 2018, from <https://www.scielo.org/article/rsp/1998.v32n5/413-419> <https://doi.org/10.1590/S0034-89101998000500003>
- Glynn, L. G., Hayes, P. S., Casey, M., Glynn, F., Alvarez-Iglesias, A., Newell, J., ÓLaighin, G., et al. (2013). SMART MOVE-a smartphone-based intervention to promote physical activity in primary care: Study protocol for a randomized controlled trial. *Trials*, 14(1), 157. Retrieved May 30, 2014, from <http://www.biomedcentral.com/content/pdf/1745-6215-14-157.pdf> <https://doi.org/10.1186/1745-6215-14-157>
- Gordon-Larsen, P., McMurray, R. G., & Popkin, B. M. (2000). Determinants of adolescent physical activity and inactivity patterns. *Pediatrics*, 105(6), e83-e83. Retrieved June 10, 2016, from <http://pediatrics.aappublications.org/content/105/6/e83> <https://doi.org/10.1542/peds.105.6.e83>
- Gordon-Larsen, P., Nelson, M. C., & Popkin, B. M. (2004). Longitudinal physical activity and sedentary behavior trends: Adolescence to adulthood. *American Journal of Preventive Medicine*, 27(4), 277-283. <https://doi.org/10.1016/j.amepre.2004.07.006>
- Gustafson, S. L., & Rhodes, R. E. (2006). Parental correlates of physical activity in children and early adolescents. *Sports Medicine (Auckland, N.Z.)*, 36(1), 79-97. <https://doi.org/10.2165/00007256-200636010-00006>
- Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Lancet Physical Activity Series Working Group. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. *The Lancet*, [London], 380(9838), 247-257. [https://doi.org/10.1016/S0140-6736\(12\)60646-1](https://doi.org/10.1016/S0140-6736(12)60646-1)
- Hussey, J., Bell, C., & Gormley, J. (2007). The measurement of physical activity in children. *Physical Therapy Reviews*, 12(1), 52-58. Retrieved June 10, 2016, from <http://www.tandfonline.com/doi/full/10.1179/108331907X174989> <https://doi.org/10.1179/108331907X174989>
- Júdice, P. B., Hamilton, M. T., Sardinha, L. B., Zderic, T. W., & Silva, A. M. (2016). What is the metabolic and energy cost of sitting, standing and sit/stand transitions? *European Journal of Applied Physiology*, 116(2), 263-273. Retrieved June 28, 2018, from <http://link.springer.com/10.1007/s00421-015-3279-5> <https://doi.org/10.1007/s00421-015-3279-5>
- Júnior, F., & De, J. C. (2008). Association between prevalence of physical inactivity and indicators of socio-economic status in adolescents. *Revista Brasileira de Medicina do Esporte*, 14(2), 109-114. Retrieved June 27, 2018, from http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1517-86922008000200005&lng=en&nrm=iso&tlng=pt

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- Koezuka, N., Koo, M., Allison, K. R., Adlaf, E. M., Dwyer, J. J. M., Faulkner, G., & Goodman, J. (2006). The relationship between sedentary activities and physical inactivity among adolescents: Results from the Canadian Community Health Survey. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 39(4), 515-522. <https://doi.org/10.1016/j.jadohealth.2006.02.005>
- Kon, A. (2014). Mercado de trabalho, assimetrias de gênero e políticas públicas: Considerações teóricas. *RP3-Revista de Pesquisa em Políticas Públicas*, (2). <https://doi.org/10.18829/rp3.v0i2.10154>
- Langoni, P. O. de O., Aerts, D. R. G. de C., Alves, G. G., & Câmara, S. G. (2014). Insatisfação com a imagem corporal e fatores associados em adolescentes escolares. *Diaphora*, 12(1), 23-30. Retrieved July 2, 2018, from <http://www.sprgs.org.br/diaphora/ojs/index.php/diaphora/article/view/44>
- Lourenço, C. L. M., Hélio Júnior, J., Zanetti, H. R., & Mendes, E. L. (2020). Validade e reprodutibilidade de um questionário sobre uso de tecnologias portáteis e internet móvel em adolescentes brasileiros. *Revista Tecnologia e Sociedade*, no prelo. <https://doi.org/10.3895/rts.v16n40.9869>
- Lourenço, C. L. M., Júnior, G. N. de O., Zanetti, H. R., & Mendes, E. L. (2017). Atividade física no lazer como critério discriminante do menor nível de estresse percebido em adolescentes. *Revista Brasileira de Ciência e Movimento*, 25(3), 97. Retrieved June 25, 2018, from <https://portalrevistas.ucb.br/index.php/RBCM/article/view/90>
- Lourenço, C. L. M., Pires, M. R., Leite, M. A. F. de J., Sousa, T. F. de, & Mendes, E. L. (2017). Deslocamento passivo para escola e fatores associados em adolescentes. *Journal of Physical Education*, 28(1), 2831. Retrieved May 27, 2017, from <http://periodicos.uem.br/ojs/index.php/RevEducFis/article/view/33595> <https://doi.org/10.4025/jphyseduc.v28i1.2831>
- Lourenço, C. L. M., Júnior, J. H., Zanetti, H. R., & Mendes, E. L. (2015). Nomofobia: O vício em gadgets pode ir muito além! *Multi-Science Journal*, 1(3), 53-55. Retrieved June 10, 2016, from <https://www.ifgoiano.edu.br/periodicos/index.php/multiscience/article/view/118> <https://doi.org/10.33837/msj.v1i3.118>
- Marani, F., de Oliveira, A. R., & Guedes, D. P. (2008). Indicadores comportamentais associados à prática de atividade física e saúde em escolares do ensino médio. *Revista brasileira de Ciência e Movimento*, 14(4), 63-70.
- Mendonça, G., & Farias Júnior, J. C. (2012). Percepção de saúde e fatores associados em adolescentes. *Revista Brasileira de Atividade Física & Saúde*, 17(3), 174-180. Retrieved June 10, 2016, from <https://periodicos.ufpel.edu.br/ojs2/index.php/RBAFS/article/view/1855/0>
- Miranda, V. P. N., Conti, M. A., Bastos, R., & Ferreira, M. E. C. (2011). Insatisfação corporal em adolescentes brasileiros de municípios de pequeno porte de Minas Gerais. *Jornal Brasileiro de Psiquiatria*, 60(3), 190-197. Retrieved July 3, 2018, from

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0047-20852011000300007 &lng=pt&lng=pt <https://doi.org/10.1590/S0047-20852011000300007>

- Moraes, A. C. F. de, Fernandes, C. A. M., Elias, R. G. M., Nakashima, A. T. A., Reichert, F. F., & Falcão, M. C. (2009). Prevalence of physical inactivity and associated factors in adolescents. *Revista da Associação Médica Brasileira*, 55(5), 523-528. Retrieved July 13, 2014, from http://www.scielo.br/scielo.php?pid=S0104-42302009000500013&script=sci_arttext&lng=es <https://doi.org/10.1590/S0104-42302009000500013>
- Oca, V. C. M. de, Partida, S. L., Vázquez, F. L., Ponce, B. C., & Rivera, P. J. (2018). Effects on BMI of a Program to promote healthy habits for adolescents and their parents. *Revista sobre la infancia y la adolescencia*, (15), 58-69. Retrieved October 24, 2020, from <https://polipapers.upv.es/index.php/reinad/article/view/7516>
- Oehlschlaeger, M. H. K., Pinheiro, R. T., Horta, B., Gelatti, C., & San'Tana, P. (2004). Prevalência e fatores associados ao sedentarismo em adolescentes de área urbana. *Revista de Saúde Pública*, 38(2), 157-163. Retrieved June 10, 2016, from <http://www.revistas.usp.br/rsp/article/download/31696/33582> <https://doi.org/10.1590/S0034-89102004000200002>
- Peres, J., Dias, A. C. S., Suassuna, A. M. V., Almeida, M. A., Guedes, S. A., & Sanches, G. P. (2012). Cultura tecnológica e vulnerabilidade ao trauma psíquico. *O mundo da Saúde*, 36(2), 303-10. Retrieved June 20, 2015, from http://bvsm.s.saude.gov.br/bvs/artigos/mundo_saude/cultura_tecnologica_vulnerabilidade_trauma_psiquico.pdf <https://doi.org/10.15343/0104-78092012362303310>
- Physical Activity Guidelines Advisory Committee. (2008). *Physical Activity Guidelines Advisory Committee Report, 2008*. Washington, DC: U.S.: Department of Health and Human Services.
- PNUD, IPEA, & FJP. (2013). *Atlas do Desenvolvimento Humano no Brasil*. Retrieved September 20, 2017, from <http://www.atlasbrasil.org.br/2013/pt/>
- Ridley, K., Ainsworth, B. E., & Olds, T. S. (2008). Development of a Compendium of Energy Expenditures for Youth. *The International Journal of Behavioral Nutrition and Physical Activity*, 5(1), 45. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2564974/> <https://doi.org/10.1186/1479-5868-5-45>
- Santos, E. M. C., Tassitano, R. M., do Nascimento, W. M. F., Marina de Moraes, V. P., & Cabral, P. C. (2011). Satisfação com o peso corporal e fatores associados em estudantes do ensino médio. *Revista Paulista de Pediatria*, 29(2), 214-223. <https://doi.org/10.1590/S0103-05822011000200013>
- Silva, K. S. da, Lopes, A. D. S., Hoefelmann, L. P., Cabral, L. G. de A., De Bem, M. F. L., Barros, M. V. G. de, & Nahas, M. V. (2013). Projeto COMPAC (Comportamentos dos Adolescentes Catarinenses): Aspectos metodológicos, operacionais e éticos. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 15(1), 1-15. Retrieved May 4,

PREVALENCE AND ASSOCIATED FACTORS WITH INSUFFICIENT LEISURE-TIME PHYSICAL
ACTIVITY OF ADOLESCENTS: RESULTS OF A CROSS-SECTIONAL SCHOOL POPULATION-BASED
STUDY

2014, from <http://www.periodicos.ufsc.br/index.php/rbcdh/article/view/26515>
<https://doi.org/10.5007/1980-0037.2013v15n1p1>

- Silva, K. S., Nahas, M. V., Peres, K. G., & Lopes, A. da S. (2009). Fatores associados à atividade física, comportamento sedentário e participação na Educação Física em estudantes do Ensino Médio em Santa Catarina, Brasil. *Cad Saude Publica*, 25(10), 2187-200. Retrieved June 20, 2015, from <http://www.scielo.br/pdf/csp/v25n10/10.pdf>
<https://doi.org/10.1590/S0102-311X2009001000010>
- Slade, P. D. (1994). What is body image? *Behaviour Research and Therapy*, 32(5), 497-502. Retrieved from <http://www.sciencedirect.com/science/article/pii/0005796794901368>
[https://doi.org/10.1016/0005-7967\(94\)90136-8](https://doi.org/10.1016/0005-7967(94)90136-8)
- Sparta, M., & B Gomes, W. (2005). Importância atribuída ao ingresso na educação superior por alunos do ensino médio. *Revista Brasileira de Orientação Profissional*, 6(2).
- Tassitano, R. M., Bezerra, J., Tenório, M. C. M., Colares, V., Barros, M. de, Hallal, P. C., & others. (2007). Atividade física em adolescentes brasileiros: Uma revisão sistemática. *Rev Bras Cineantropom Desempenho Hum*, 9(1), 55-60. Retrieved June 30, 2016, from <http://www.ceap.br/material/MAT23022012201228.pdf>
- Vancea, L. A., Barbosa, J. M. V., Menezes, A. S., Santos, C. M., & de Barros, M. V. G. (2011). Associação entre atividade física e percepção de saúde em adolescentes: Revisão sistemática. *Revista Brasileira de Atividade Física & Saúde*, 16(3), 246-254. Retrieved June 20, 2016, from <https://periodicos.ufpel.edu.br/ojs2/index.php/RBAFS/article/view/609>
- Vasques, D. G., & Lopes, A. da S. (2009). Fatores associados à atividade física e aos comportamentos sedentários em adolescentes. *Rev Bras Cineantropom Desempenho Hum*, 11(1), 59-66. Retrieved June 10, 2016, from https://www.researchgate.net/profile/Adair_Lopes/publication/242152370_Fatores_associados_atividade_fisica_e_aos_comportamentos_sedentrios_em_adolescentes/links/0deec532313a927039000000.pdf <https://doi.org/10.5007/1980-0037.2009v11n1p59>
- World Health Organization. (2009). A practical guide to developing and implementing school policy on diet and physical activity. Geneva: World Health Organization. Regional Office for the Eastern Mediterranean. Retrieved from <http://applications.emro.who.int/dsaf/dsa1038.pdf?ua=1>