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Artigo Original

TENDÊNCIAS DE COMPORTAMENTO SEDENTÁRIO ENTRE ESTUDANTES DO SUL DO BRASIL

Lilian Messias Sampaio Brito[1], Deise Cristiane Moser[2], Maiara Cristina Tadiotto[3] , Francisco José de Menezes-Junior[4], Ana Claudia Kapp Titski[5], Fabrício Cieslak[6], Patrícia Ribeiro Paes Corazza[7], Jorge Mota[8], Luis Paulo Gomes Mascarenhas[9], Neiva Leite[10].

[1] p.h.D., Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[2] Master, Universidade Federal de Santa Catarina, Florianópolis, Brasil.
[3] p.h.D, Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[4] Master, Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[5] p.h.D., Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[6] p.h.D., Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[7] p.h.D., Universidade Federal do Paraná, Curitiba, Paraná, Brasil,
[8]phD,Universidade do Porto, Portugal,
[9] p.hD.Universidade do Centro-Oeste do Paraná, Irati, Paraná, Brasil
[10]phD, Universidade Federal do Paraná, Curitiba, Paraná, Brasil and Universidade do Porto, Portugal,

Resumo

Introdução: O comportamento sedentário tem sido motivo de preocupação para os pesquisadores no mundo, especialmente no Brasil. Objetivo: Este estudo comparou a atividade física moderada-vigorosa e o comportamento sedentário em dois anos de dois levantamentos (2008 e 2017), relacionando esses comportamentos à circunferência abdominal. Métodos: Estudo transversal, com 1.783 alunos, de ambos os sexos, com idade entre 10 e 17 anos: 2008 (n = 977) e 2017 (n = 806). Os estudos foram realizados em escolas públicas de um município do sul do Brasil. O nível de atividade física foi avaliado por meio de um questionário de gasto energético. A circunferência abdominal foi considerada alta ≥ 75º percentil para idade e sexo. Os estudantes foram agrupados de acordo com os níveis de atividade física moderada-vigorosa. O tempo sentado foi considerado comportamento sedentário. Resultados: A proporção de meninos ativos em 2008 (62,2%) foi maior do que em 2017 (34,1%; p <0,001), enquanto a frequência de obesidade abdominal foi maior em 2017 (meninos 36,3%, meninas 25,5%) do que em 2008 (15,7% e 10,5%; p <0,001, respectivamente). Em 2017, houve um aumento de 2,8 vezes no risco de prevalência de circunferência abdominal aumentada em relação a 2008 (p <0,001), que foi diretamente relacionado ao aumento de 16,5 vezes no risco de comportamento sedentário elevado (p <0,001) e duas vezes de aumento em quem pratica atividade física moderada-vigorosa < 60min / dia (p <0,001). Conclusão: O risco de obesidade abdominal aumentou na última década em ambos os sexos, o que parece ser principalmente devido ao comportamento sedentário, além do menor nível de atividade física moderada-vigorosa em meninos.

Palavras-chave: Comportamento sedentário, Circunferência abdominal, Antropometria, Adolescentes, Atividade física.

Original Article

TRENDS IN SEDENTARY BEHAVIOR AMONG THE SOUTH BRAZILIAN STUDENTS

Abstract

Introduction: Sedentary behavior has been a matter of concern for researchers around the world, especially in Brazil. **Objective:** This study compared the moderate–vigorous physical activity and sedentary behavior between the years of two surveys (2008 and 2017), relating these behaviors to waist circumference. **Methods:** Cross sectional study, included 1783 students, both sexes, aged 10 to 17 years were considered: 2008 (n = 977) and 2017 (n = 806). The studies were carried out in public schools in the municipality of southern Brazil. The level of physical activity was assessed through an energy expenditure questionnaire. The waist circumference was considered high ≥75th percentile for age and sex. The students were grouped according to the levels of moderate–vigorous physical activity. Sitting time was used as a proxy of sedentary behavior. **Results:** The proportion of active boys in 2008 (62.2%) was higher than in 2017 (34.1%; p <0.001) while the frequency of abdominal obesity was higher in 2017 (boys 36.3%, girls 25.5%) than in 2008 (15.7% and 10.5%; p <0.001, respectively). In 2017, there was a 2.8 times increased prevalence risk of increased WC compared to 2008(p <0.001), which was directly related to 16.5 times increase in the risk of elevated sedentary behavior (p <0.001) and two times increase who practice moderate–vigorous physical activity <60min/day (p <0.001). **Conclusion:** The risk of abdominal obesity increased during the last decade in both sexes, which appears to be mainly due to the sedentary behavior, in addition to the lower level of moderate–vigorous physical activity in boys.

Keywords: Sedentary behaviors; Waist circumference; Anthropometry; Adolescents; Physical activity.

Article original

TENDANCES DU COMPORTEMENT SÉDENTAIRE CHEZ LES ÉTUDIANTS DU SUD DU BRÉSIL

Résumé

Introduction: Le comportement sédentaire a été un sujet de préoccupation pour les chercheurs du monde entier, en particulier au Brésil. **Objectif:** Cette étude a comparé une activité physique modérée à vigoureuse et un comportement sédentaire sur deux ans de deux enquêtes (2008 et 2017), en reliant ces comportements au tour de taille. **Méthodes:** Étude transversale, auprès de 1 783 élèves, des deux sexes, âgés de 10 à 17 ans : 2008 (n = 977) et 2017 (n = 806). Les études ont été menées dans des écoles publiques d'une municipalité du sud du Brésil. Le niveau d'activité physique a été évalué à l'aide d'un questionnaire sur la dépense énergétique. Le tour de taille était considéré comme élevé ≥ 75e centile pour l'âge et le sexe. Les élèves ont été regroupés selon des niveaux d'activité physique modérée à vigoureuse. Le temps passé assis était considéré comme un comportement sédentaire. **Résultats:** La proportion de garçons actifs en 2008 (62,2 %) était plus élevée qu'en 2017 (34,1 % ; p <0,001), tandis que la fréquence de l'obésité abdominale était plus élevée en 2017 (garçons 36,3 %, filles 25,5 %) qu'en 2008 (15,7 % et 10,5 % ; p<0,001, respectivement). En 2017, il y a eu une augmentation de 2,8 fois du risque de prévalence d'augmentation du tour de taille par rapport à 2008 (p < 0,001), ce qui était directement lié à l'augmentation de 16,5 fois du risque de comportement sédentaire élevé (p < 0,001) et deux fois plus élevé chez ceux qui pratiquent une activité physique modérée-vigoureuse < 60min/jour (p < 0,001). **Conclusion:** Le risque d'obésité abdominale a augmenté au cours de la dernière décennie chez les deux sexes, ce qui semble être principalement dû à un comportement sédentaire, en plus du niveau inférieur d'activité physique modérée à vigoureuse chez les garçons.

Mots clés: Comportement sédentaire, Circonférence abdominale, Anthropométrie, Adolescents, Activité physique.

Artículo original

TENDENCIAS EN EL COMPORTAMIENTO SEDENTARIO ENTRE ESTUDIANTES DEL SUR DE BRASIL

Resumen

Introducción: El comportamiento sedentario ha sido motivo de preocupación para investigadores de todo el mundo, especialmente en Brasil. **Objetivo:** Este estudio comparó la actividad física moderada-vigorosa y el comportamiento sedentario en dos años de dos encuestas (2008 y 2017), relacionando estos comportamientos con la circunferencia de la cintura. **Métodos:** Estudio transversal, con 1.783 estudiantes, de ambos sexos, con edades entre 10 y 17 años: 2008 (n = 977) y 2017 (n = 806). Los estudios se realizaron en escuelas públicas de un municipio del sur de Brasil. El nivel de actividad física se evaluó mediante un cuestionario de gasto energético. La circunferencia de la cintura se consideró alta ≥ percentil 75 para la edad y el sexo. Los estudiantes fueron agrupados de acuerdo con los niveles de actividad física moderada-vigorosa. El tiempo sentado se consideró un comportamiento sedentario. **Resultados:** La proporción de niños activos en 2008 (62,2%) fue mayor que en 2017 (34,1%; p <0,001), mientras que la frecuencia de obesidad abdominal fue mayor en 2017 (niños 36,3%, niñas 25,5%) que en 2008 (15,7% y 10,5%, p<0,001, respectivamente). En 2017, hubo un aumento de 2,8 veces en el riesgo de prevalencia de aumento de la circunferencia de la cintura en comparación con 2008 (p < 0,001), lo que estuvo directamente relacionado con el aumento de 16,5 veces en el riesgo de alto sedentarismo (p < 0,001) y el doble en quienes practican actividad física moderada-vigorosa < 60min/día (p < 0,001). **Conclusión:** El riesgo de obesidad abdominal ha aumentado en la última década en ambos sexos, lo que parece deberse principalmente al comportamiento sedentario, además del menor nivel de actividad física moderada-vigorosa en los varones.

Palabras clave: Sedentarismo, Circunferencia abdominal, Antropometría, Adolescentes, Actividad física.

Introdução

In the past decade, children and adolescents' sedentary behavior (SB) have increased, which is attributable primarily to technological entertainment activities (FERREIRA,2016; BANDEIRA,2018; RIBEIRO, 2020). Studies indicate that the increased time spent watching television, playing video games, and even using smartphones excessively, leads to reduced sleep, which contributes to inadequate eating habits that damage children and adolescents' health (BANDEIRA,2018; TEIXEIRA,2020).

The reduced participation in physical activities (PA) and higher caloric consumption have led to an increase in cardiometabolic diseases that decrease the quality of life in adolescence and adulthood4. Increased body weight and the accumulation of visceral fat also damage health because of increased systemic inflammation (KONING, 2015;CARSON, 2016; TEIXEIRA, 2020), which is associated with type 2 diabetes, high blood pressure and cholesterol and some types of câncer (KONING, 2015;CARSON, 2016; TEIXEIRA, 2020).

Accordingly, PA has been identified as an important component in a healthy lifestyle, together with adequate nutrition, both of which improve all aspects of adolescents' lives and development. Regular and adequate PA should be recognized as an element essential to normal growth and development during adolescence, as well as reduced risk of future diseases (KONING, 2015;CARSON, 2016; TEIXEIRA, 2020). To realize these health benefits, current international recommendations suggest that adolescent's practice at least 60 minutes or more per day of moderate to vigorous intensity physical activity (MVPA) most days of the week, and include muscle strength and stretching activities at least three days per week (WHO, 2019).

However, despite these recommendations, practicing MVPA regularly over 420 minutes per week is not part of most adolescents' daily reality(CARSON, 2016). Instead, the time adolescents devote to PA in their routines has declined and the time spent in SB has increased. However, no published studies to date have evaluated the 10-year trend in the time Brazilian adolescents spends in PA and SB. In this sense, two cohorts at two different times such as these are important to analyze technological changes' influence on MVPA and SB routines, as well as potential gender differences. In addition, we performed a temporal analysis in relation to changes behaviors in adolescents and how the waist circumference is associated, since these attitudes lead to the appearance of general and abdominal obesity (KONING, 2015).

The fact that comparing adolescents in different years brings indications of behaviors and public policies adopted for this population and which direction the role of physical activity or exercise is taking in this age group. Based on the considerations pointed out, the objective of this study was to analyze changes in moderate–vigorous physical activity (MVPA) and sedentary behavior (SB) and waist circumference (WC) over time (2008 and 2017) in two cohorts in adolescents.

Methods

Sample and Ethics Committee

In both studies the schools are different, but from the same municipality. In the 2008 study, the sample is representative and 2017 was for convenience. In the 2008 study, the schools included in the study were intentionally divided by Curitiba regions (north, south, east, west, and center). The schools were chosen by draw. In this way, one school from each region was included in the analyses. The students were evaluated according to their sex and age group. Probabilistic analysis was first performed on all students enrolled in each educational institution according to sex, before the sample size was evaluated according to the following criteria: (a) Total number of boys and girls; (b) 95% confidence interval; and (c) sample error of 5% and a prevalence of 50%, since the prevalence of risk factors in this population is unknown. The study was approved by the Ethics Committee on Research in Human Beings of the Federal University of Parana under registry CEP: 1466.131 / 2007-06 and CAAE: 0137.0.208.0007. The participants in the 2017 study were selected by simple random sampling, from a nominal list with all students since you serve the age group of the survey. Participants are also from one state school in the municipality of Curitiba. However, only 806 students that answered all questionnaires were subjected to anthropometric assessments (weight and height) This research was approved by the Research Ethics Committee of University Positivo - Paraná (Opinion 2,751,691/ 2018 and CAAE Registry (80779117.3.3001.0102).

Participants and Design

The data for this observational and descriptive study was collected transversely as part of an epidemiological survey. The study sample comprised 1,783 students

enrolled in public schools in the city of Curitiba, State of Paraná, in the years 2008 (*n* = 977) and 2017 (*n* = 806). Some 58.2% of the sample were girls (*n* = 1,039) and 41.8% *(n* = 744) were boys. The mean age was 14 years. Curitiba is in the southern region of Brazil, in the east of the state of Paraná, specifically in its less wavy part. It is the capital of the sixth most populous federative unit in Brazil. Curitiba uses the georeferencing system to enroll its students. That is why there are different socioeconomic levels in each school and region.

Instruments

The students were evaluated in their respective schools by the peer review team consisting of physical education specialists. waist circumference (WC) were evaluated in the morning, whereby the students were instructed to wear light clothing. The WC was measured with flexible and inextensible tape, accurate to 0.1 cm. The WC was considered elevated if above the 75th percentile for age and gender, classified according to the approach adopted by Fernandez (2004).

The level of physical activity was assessed through an energy expenditure questionnaire developed by Bouchard et al.(1983). The questionnaire consists of 96 periods, with activity log every 15-minutes, with daily activities classified into a continuum of nine intensity categories (with category 1 corresponding to the lowest intensity level), whereby the average caloric expenditure is calculated for each recorded activity. According to the estimated caloric expenditure, students were classified into four groups: active (> 420 minutes of activity per week), sufficiently active (between 300 and 419 minutes of activity per week), insufficiently active (150−299 minutes of activity per week), and inactive (less than 149 minutes of physical activity per week). The durations of periods pertaining to lying down, sitting, mild physical activity (mild PA), and moderate−vigorous physical activity (MVPA) were also recorded in minutes per day. For analysis purposes, seated time was considered SB.

Statistical Analyses

The sample power of the study was calculated *a posteriori* using software program G * power3 with the number of individuals in the full sample (1,783) and MVPA as the dependent variable, OR: 2.078; prevalence of insufficient MVPA of 60%, α of 0.05 and proportion of students (54%) that were evaluated in 2008, which

identified a power (1 − β) of 1.00 for the binomial logistic regression.

The studied variables were expressed in means and standard deviations, as well as absolute and relative frequencies. Shapiro/ Kolmogorov tests were used to assess used to assess normality of the data distribution. To estimate the differences between means, the Student t-test was applied for the parametric data while the Mann-Whitney U-test was adopted for non-parametric data. The categorical variables were assessed via Pearson / Yates chi-squared test. Odds ratio (OR) analysis with a 95% confidence interval (CI) was conducted to identify the chance of having high time in SB and WC, and insufficient PAL between 2008 and 2017, adjusted for sex and age group. For all tests a significance level of 5% was used and the sample yielded 95% test power. The Statistic 10.0 (StatsoftR) software tool was used for all analyses.

Results

The general characteristics of the study are shown in table 1. In the period 2008-2017, the mean age was similar for boys and girls. In 2008, both girls and boys were heavier and taller compared to schoolchildren in the 2017 study ($p < 0.001$).

The girls in the 2017 study had higher abdominal circumference (25.4%) than the first (10%, $p < 0.001$). Average time of MVPA and time lying down were higher for both sexes in the 2008 study, while the average levels of LPA, sitting time and sedentary time were higher in the 2017 study. Boys and girls in the 2008 study were more active than those in the 2017 study ($p < 0.001$), with exception in the group of girls who practice physical activity above 420 minutes / week. (Table 1)

Table 1 - Characteristics of adolescents analyzed. Curitiba, Paraná, PR, Brazil.

Variables	2008 girls (n=559)	2017girls (n=480)	p	2008 boys (n=418)	2017 boys (n=326)	p
Age(years)	14,1±1,5	14,0±1,2	0,62	14,0±1,5	13,9±2,0	0,30
WC (cm)	64,3±10,5[a]	66,6±8,4	<0,001*	76,6±9,4	70,3±9,4	<0,001*
PAL_mv (min/day)	25(0-640)	0(0-345)	<0,001**	85(0-545)	0(0-510)	<0,001**
PAL_light(min/day)	220(0-745)	255(15-600)	<0,001**	160(0-855)	240(30-585)	<0,001**
Sitting time(min/day)	510(0-1040)	615(195-1110)	<0,001**	495(0-895)	615(90-1020)	<0,001**
Time lying down(min/day)	580(0-1040)	525(90-900)	<0,001**	590(0-1040)	525(105-1125)	<0,001**
PAL< 149 min/week	27.8±51.0	3.4±18.7	<0.0001**	22.0±45.7	3.7±19.4	0.01*
PAL<299 -150 min/week	238.4±43.1	210	0.03*	240±38.4	210	0.003*
PAL <419 -300 min/week	342.2±26.3	315	0.0001*	351.2±27.3	315	0.008*
> 420 min/week	948.1±658.4	881.1±409.0	0.80	1055.1±528.8	914.7±503.8	0.004*

NOTE: Values expressed as means ± SD; WC waist circumference; * t test (parametric variables); for non-parametric variables; ** Mann-Whitney test;

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278 Table 2 shows the relative frequencies of weight gain, increased circumference,

279 and different cuts in physical activity levels between 2008 and 2017.

Table 2. Relative frequencies of abdominal circumference and different cuts in physical activity levels between 2008 and 2017. Curitiba,Paraná,PR, Brazil.

Variables	2008 girls (%) (n=559)	2017girls (%) (n=480)	p	2008 boys (%) (n=418)	2017 boys (%) (n=326)	p
Abdominal obesity	10.0	25.4	<0,001*	15.1	36.2	<0.001*
> 420 minutes/week	34	30.8	<0,001*	62.2	34.1	<0.0001*
<419-300 minutes/week	54.5	54.8	0.58	29.2	48.1	0.35
150-299 minutes/week	11.5	2.3	0.69	8.6	3.1	0.92
<149 minutes/week	12.1	--	N/A	---	14.7	N/A

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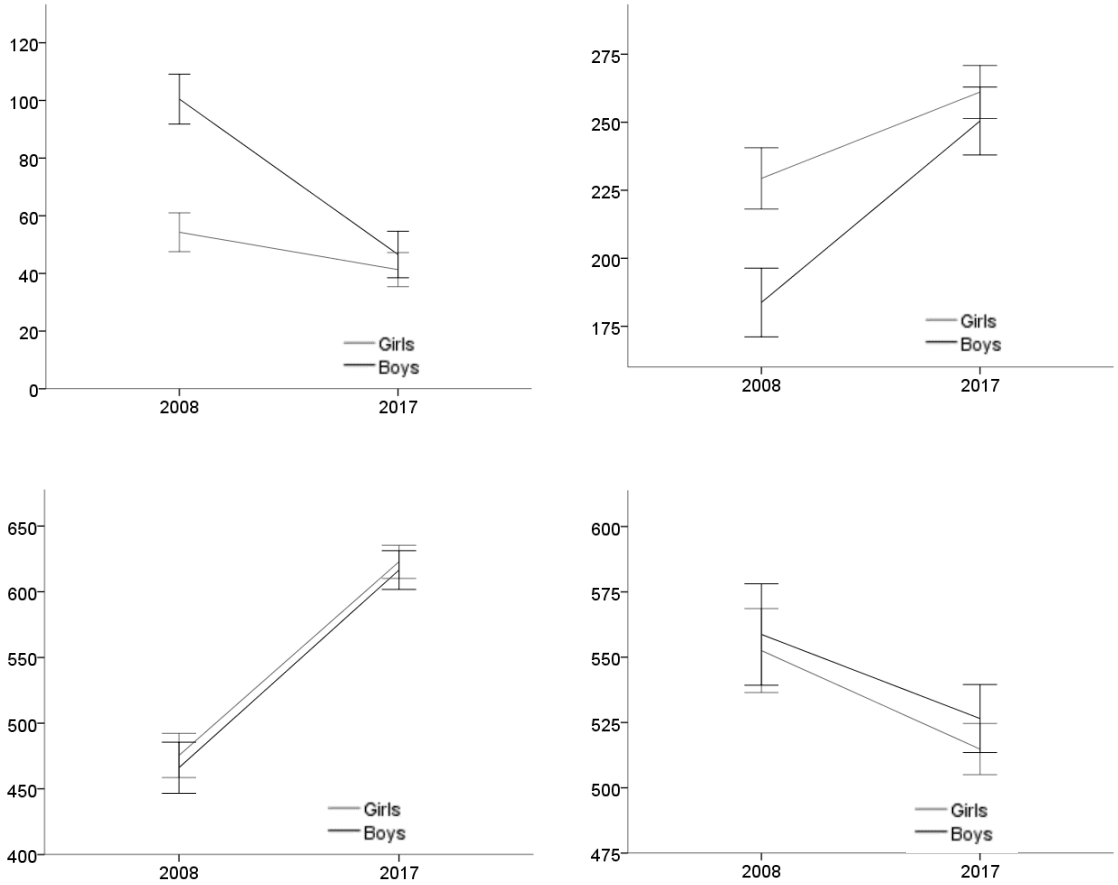
Figure 1 presents a comparison between boys and girls in both periods in terms of the daily time (in minutes) spent in MVPA, light PA, sitting and lying down activities.

Figure 1. Chart of the changes in the practice of light, moderate-vigorous physical activities, sitting and lying down time in girls and boys between 2008 and 2017. A - Average practice of MVPA (min / day); B - Mean time in PA-mild (min / day); C - Average sitting time in (min / day); D - Mean of lying down time (min / day).



Source: The autor (2019);

Table 3 shows the risk for changes in lifestyle and waist circumference adjusted for sex and age. Over the 10-year period analyzed in this study, there was a significant increase in the risk of elevated WC, insufficient PA levels and SB (p <0.001).

Table 3- Risk of chance for changes in lifestyle and abdominal circumference. Curitiba, PR, Brazil.

	Odds Ratio OR	Confidence Interval (CI)			p
High WC	**2.879**	(2.215	-	3.740)	<0.001
SB>300min/day	**16.482**	(7.947	-	34.181)	<0.001
PAL<420/week	**2.078**	(1.682	-	2.567)	<0.001

Note: WC(waist circumference); SB (sedentary behavior); PAL (physical activity level); * adjusted by sex and age ** reference 2008;

Source: The Author (2019)

Discussion

The present study compared the practice of physical activities, sedentary behavior, and abdominal obesity of two cohorts of adolescents over a period of 10 years (2008 and 2017) and revealed that adolescents evaluated in 2017 presented worse outcomes than those evaluated in 2008, corroborating with other studies (SCHAAN, 2019; YANG, 2019; WHO,2020). Boys also presented lower frequency and time in MVPA than in fun activities. This reduction in PA and increase in SB in adolescents in recent years is worrisome. However, this is the first study that verified the time spent by Brazilian adolescents in physical activity and sedentary behavior in the period after 10 years.

Studies such as Yang et al.(2019) pointed out that the practice of physical activity reduces the excess risk associated with sitting time. According to the World Health Organization (WHO), children and adolescents should be encouraged to perform at least 60 minutes of MVPA daily and that PA performed in amounts over 60 minutes

per day provides additional health benefits.

In 2018, the Global Action Plan on Physical Activity (2018–2030) first adopted the reduction of sedentary behavior as one strategy for the prevention and control of chronic global disease (MCMILLAN, 2015). From this perspective, a systematic review study showed that most Brazilian adolescents spent more than two hours per day on screen time (RIBEIRO, 2020). Similarly, 36% of Americans, 59.2% of Spanish adolescents, and 80.6% of Canadians exhibit the same behavior (WHO, 2020). These alarming results generate the need for special attention to SB. In the present study, the risk of adolescents staying more than two hours per day in a sitting position increased approximately 16.5-fold over the last decade. In addition, students spent more time sitting in 2017, with a significant difference, showing that there was an increase in sedentary behavior, especially in activities related to electronic games, cell phone use, always in a sitting position.

Another similar study among American adolescents found that in 2001–2016, the estimated prevalence of watching television or video games for at least two hours in the general period remained low and stable and the estimated prevalence of computer use during leisure time increased across all age groups (WHO, 2020). In Brazil, television time has declined over the last ten years, so there has been a change in behavior among young people, particularly among boys, where cell phone and smartphone technology has gained adherence from the public, which we define as recreational time. Accompanying this increase, there was an increase in studies reporting strategies to reduce screen-time exposure (STIERLIN, 2015; GUERRA, 2016; WAFA, 2016).

Wafa et al. (2016) showed strong evidence that interventions aimed at reducing recreational time and increasing physical activity or adopting a healthier diet were effective for improving or maintaining weight. In contrast, Andermo et al.(2015) observed a small effect among interventions where the goal was to reduce sedentary behavior and therefore concluded that future studies should involve both children and families in strategies to reduce sedentary behavior.

In Brazil, the results of the National School Health Survey (PeNSE, 2015), which involved Brazilian adolescents in the ninth grade of elementary education throughout all regions of the country and used the cut-off point of >300 min/week to define MVPA, found that 44.0% of boys reported engaging in weekly physical activity (PA) for ≥300 minutes, while slightly more than 25.0% of girls were in this group.

These results were similar to those found in our 2017 study (35.9% for boys). However, among girls, our results were higher than those found in PeNSE (54.8%) and higher than the average found in the state of Paraná (38.5%) (CUREAU, 2019). Another nationwide school-based study involving Brazilian adolescents aged 12–17 years in municipalities with >100,000 inhabitants, known as the Cardiovascular Risk Study in Adolescents (ERICA, 2016), showed that more than half of Brazilian adolescents living in medium- and large-size cities does not reach the recommendation of at least 300 min/week of physical activity in leisure for health promotion. This percentage is even higher among girls, surpassing 70.0%. In Curitiba, 67.7% of the girls and 40.7% of the boys engaged in PA for >300 minutes/week, these frequencies were much higher than those found in our study, which is possibly because ERICA analyzed PA with a lower cut-off than ours (CURITIBA, 2018).

This study found that, in both years, the risk of elevated WC, insufficient PA levels and SB increased significantly among school children in the southern region of Brazil. These results support the concern that overweight and obesity levels are escalating. However, recent studies have begun to associate excess weight with behavioral factors such as sitting time associated with the use of cell phones, tablets and other electronics (STIERLIN, 2015; GUERRA, 2016; WAFA, 2016). Long periods of sitting may increase the accumulation of body fat in the abdominal region, a factor that leads to larger abdominal circumference sizes and other cardiometabolic risks, beginning in early childhood and extending into adult life. Previous studies have shown an association between increased visceral fat, abdominal obesity and increased hypertension, the onset of type 2 diabetes, and some types of cancer and cardiovascular diseases (YOUNG, 216; RAJJO, 2017;GOLESTANZADEH, 2019;RING-DIMITRIOU, 2019; LIMA, 2020;PADILLA-MOLEDO, 2020;TOZO, 2020).

Interventions that stimulate the transition from complete physical inactivity to some activity, regardless of the amount or intensity of physical activity initially practiced, may have an immediate impact on the health of these adolescents. This strategy may be used complementary to programs aimed at maintaining or gradually increasing the practice of physical activity. Outdoor active leisure activities are suitable ways of promoting PA in adolescence (RAJJO, 2017;GOLESTANZADEH, 2019;RING-DIMITRIOU, 2019; LIMA, 2020).

Moderate intensity physical activities, such as walking, pedaling or playing sports, bring significant health benefits, especially in regard to energy balance and

weight control (RING-DIMITRIOU, 2019; YOUNG, 2016). For adults, the recommendation of the American Heart Association is "Sit "Less, move more", because there is insufficient evidence regarding the exact amount of sedentary behavior negatively correlated with the maximization of the benefits to cardiovascular health (EKLUND, 2016). Ekelund et al. showed that one hour of MVPA daily can eliminate the harmful effects of eight hours of sitting time in men and women. Nevertheless, sedentary screen time is likely to be more harmful to children and adolescents than to adults. ·

In the face of what is observed in adults, the question that many researchers have been asking themselves is: does the amount of physical activity practiced by more physically active children compensate for the possible effects of sedentary behavior on health? It is noteworthy that this was the first study that compared the behavior of Brazilian adolescents with different levels of PA over a 10-year period. However, there is a need for further research to clarify what exactly children do during the time spent sitting. It is presumed that they were on their cell phones or using their computers for recreation. In addition, due to the increased portability of electronic devices, the time spent in the lying position should also be considered and future studies should seek to identify the time spent on sleep and the time spent on electronic media. In this sense, it is known that the lying position has been used to watch television and, more recently, to use smartphones with various entertainment tools such as games and social media apps as these factors may affect sleep pattern and routine (WAFA, 2016; AANDERMO, 2020;WHO, 2020). The greater amount of time spent awake and the smaller amount of restful sleep can lead to daytime drowsiness, attention deficits and hinder the execution of daily activities, compromising their health as well as their performance at work and school(WAFA, 2016). Future studies should fill these gaps in order to allow a better understanding of the changes in the use of free time by young people.

This research has some limitations that should be taken into consideration. One of them is its cross-sectional, which not allow to make inferences of causality. Another limitation was the use of an activity recall questionnaire, which should be interpreted with caution. In addition, the participants were not assessed for sexual maturation, nutritional status, eating in front of the television, amount of time sitting spent with electronic devices and with other activities. On the other hand, the instruments most commonly used in epidemiological research and in clinical practice are questionnaires and group or individual interviews, which seek to identify the discrepancies between the

actual and the desired body size, as well as associated feelings, emotions, behaviors and attitudes. In addition to being simple, practical, and cheap, they can be used in population studies and in clinical practice for a variety of purposes.

Conclusion

It is concluded that, the risk of prevalence of abdominal obesity increased in the last decade in both sexes, which appears to be associated with systemic inflammation. These results raise the concern about the appearance of cardiometabolic risk factors in schoolchildren. Moreover, the lower practice of MVPA in boys may be associated with changes that more directly affected males, with more active daily activities being replaced by video game use. It is therefore important to reduce the sedentary leisure habits among adolescents of both sexes, in addition to encouraging the practice of MVPA, a habit that is associated with health promotion in all age groups.

Declaração de conflito de interesses

Não nenhum conflito de interesses no presente estudo.

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