
SEDENTARY BEHAVIOR AT LEISURE TIME AND ITS ASSOCIATION WITH PHYSICAL ACTIVITY IN SCHOOL CONTEXT OF CHILDREN IN SOUTHERN BRAZIL

COMPORTAMENTO SEDENTÁRIO NO LAZER E SUA ASSOCIAÇÃO COM ATIVIDADE FÍSICA NO CONTEXTO ESCOLAR DE CRIANÇAS NO SUL DO BRASIL

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RESUMO

O objetivo foi investigar a prevalência de comportamento sedentário no lazer e sua associação com indicadores demográficos, turno de estudo e atividade física no contexto escolar de crianças da rede municipal de ensino de Florianópolis, SC. O instrumento utilizado na amostra representativa de escolares do 2º ao 5º ano foi o questionário *online* Web-CAAFE, com indicações de atividades realizadas e alimentos consumidos no dia anterior. Dentre as 1831 crianças investigadas (8,75 anos [DP±1,03]; 52,2% sexo masculino), o comportamento sedentário no lazer foi de 56,1% (IC95%: 51,1; 61,1). Verificou-se uma associação do desfecho com o aumento da idade (7 anos: RP 1,00; 8 anos: RP 1,23; 9 anos: RP 1,40; 10 anos: RP 1,45; p<0,001) e com a inatividade física no turno de estudo (RP 1,36 [IC95%: 1,21; 1,52]). Conclui-se que a proximidade com a adolescência e a falta de atividade física no contexto escolar foram aspectos relacionados com a adoção de comportamento sedentário.

Palavras-chave: Criança. Estilo de vida sedentário. Escola.

ABSTRACT

The aim was to investigate the prevalence of sedentary behavior during leisure time and its association with demographic indicators, period and the physical activity at the school setting among children from public elementary schools in Florianópolis, SC. The instrument applied to a representative sample of schoolchildren in grades 2 through 5 was the online Web-CAAFE questionnaire, with indications of activities performed and the foods consumed on the previous day. A total of 1,831 children were investigated (8.75 years [SD±1.03]; 52.2% males), the sedentary behavior during leisure time was 56.1% (95%CI: 51.1; 61.1). There was an association between the outcome and the increase in age (seven years: PR 1.00; 8 years: PR 1.23; 9 years: PR 1.40; 10 years: PR 1.45; p<0.001) and physical inactivity during class time (PR 1.36 [95%CI: 1.21; 1.52]). The closeness to adolescence and lack of physical activity in the school environment were aspects related to the adoption of sedentary behavior.

Keywords: Child. Sedentary lifestyle. School.

Introduction

Sedentary behavior is characterized by performing cognitive activities, sitting or lying down, with no change in energy expenditure beyond resting values¹. Activities such as watching TV, playing video games, using a computer and other electronic equipment are examples of such behavior, which has become attractive at increasingly early ages, notably in childhood. This finding is reinforced by the easy access to the digital environment, as well as the reduction of levels of public safety and the lower supply of physical activity in the school environment^{2,3}. Among the negative consequences of the sedentary behavior in children's health, we highlight the greater probability of overweight^{2,4}, as well as the early occurrence of chronic non-communicable diseases^{5,6}.

An important alternative for reducing the sedentary behavior is the practice of physical activity. Some studies have shown that the level of physical activity in children is associated with academic performance^{7,8} and with indicators of physical fitness, which may result in adopting a healthier lifestyle throughout life^{7,9}. The fact that the impacts caused by physical activity and sedentary behavior are different¹⁰, reinforces that these constructs need to be studied in a complementary way to achieve more concrete results¹¹ in order to identify where interventions can be more effective and efficient.

With the aim of expanding opportunities of a physically active lifestyle since childhood, schools emerge as an environment of relevant applicability, specially Physical Education classes within the school curriculum^{12,13}. Opportunities for encouraging an active lifestyle can be found within different contexts, among which are Physical Education classes, structured physical activity programs, ways of going to school and even recreation activities¹⁴.

The complexity of factors associated with sedentary behavior in childhood, and its future repercussions throughout life, reinforce the importance of studies on this behavior with physical activity in schoolchildren, proposing their coexistence. However, there is a gap regarding the measurement and identification of these behaviors adopted in the first years of formal education. Therefore, the objective of this study was to investigate the prevalence of sedentary behavior in leisure time and its association with demographic indicators, school period and physical activity within the school context in children of the municipal schools of Florianópolis, SC.

Methodological procedures

This is a cross-sectional study with a representative sample of schoolchildren from 2nd to 5th grade of Florianópolis Municipal Teaching Network, Santa Catarina. Data were collected from August to October 2013, through the Food Consumption and Physical Activity of Schoolchildren Monitoring System (*Consumo Alimentar e Atividade Física de Escolares* (Web-CAAFE)). Thirty-four out of a total of 36 municipal schools participated in the study. Two were excluded due to the lack of computer labs or lack of access to the internet, considering that the measurement should be carried out in the school. The sampling process consisted in the random selection of four classes, one class from each school grade (2nd to 5th grade) in each participating school. The sample calculation considered 50% as the expected outcome prevalence, with 3% as the confidence limit and a delineation effect of 2.5. Thus, the expected sample was 2,665 students.

The instrument used (Web-CAAFE) was designed based on focus group^{15,16}, usability¹⁷ and validity of the sections of food consumption¹⁸ and physical activity¹⁹. As for the reproducibility of physical activity and sedentary behaviors, the questionnaire was applied twice in the same day, with the agreement verified in 28 of the 32 existing activities through the McNemar test¹⁹. The Web-CAAFE was structured in an illustrative and interactive way allowing students to self-report on the computer the activities performed and the food consumed on the previous day. The CAAFE operating flow can be viewed at <http://www.caafe.ufsc.br/portal/9/detalhes>.

In this study, trained researchers followed a standardized protocol to provide instructions for completing the questionnaire, with the aid of two banners that presented illustrations of food and physical activities. The questionnaire filling, in the classroom, initially had, at least, one researcher. Then, students went to the computer lab, accompanied by the researcher and they individually answered the questionnaire. Students were instructed to request assistance from the researcher in case of having difficulties to fill in the questionnaire. Data collection was carried out Monday through Friday, providing data on

sedentary behavior and physical activity for a weekend day (Sunday) and four weekdays (Monday to Thursday). Therefore, the children who answered the questionnaire on Monday reported their Sunday activities and these data were treated as missings (34.6%) due to lack of information regarding the school period.

The study outcome was obtained by the screen with the question: "*Click on the activities that you did yesterday morning/afternoon*", considered according to the school period. As an answer, the software showed screens with 32 illustrative icons, which correspond to 23 physical activities (including domestic activities) and nine sedentary activities in three periods of the day (morning, afternoon and night). Thus, sedentary behavior in the counter-period was defined as reporting at least one sedentary behavior out of nine possibilities (studying/drawing, watching TV, using the computer, playing video games, listening to music, playing on the cell phone, playing with dolls, toy cars, board games).

The sociodemographic variables investigated were: gender (male and female), age (7, 8, 9 and 10 years) and school period (morning or afternoon). As for the physical activity indicators in the school context, the type of travel to school was defined by the questions: "*How did you come to school yesterday?*" And "*How did you get home yesterday?*". Children who reported going to or returning from school on foot, bicycle or skateboard on, at least, one of the routes were considered active. The weekly number of Physical Education classes was reported by the school and the categorization of the variable respected the determination of at least three classes a week, according to the Official Curriculum Framework for Elementary Education²⁰. Acceptance of Physical Education classes took into account the question: "*What do you think of Physical Education classes?*", which had five icons in a hedonic scale as answer options. A dichotomic recategorization was made regarding negative acceptance (extreme disgust and moderate disgust) and positive (extreme liking, moderate liking and indifferent). For the variable of practice of physical activity in the school period, the categories were created from the answers to the question: "*Click on the activities you did yesterday morning/afternoon*", categorized in: "*Active, without Physical Education class; Active, with Physical Education class; Passive, regardless of Physical Education class*".

We used the Stata software, version 13.0 (*Stata Corporation, College Station, United States*) to analyze the data. Descriptive statistics included absolute and relative frequencies (%), mean and standard deviation (SD). In the inferential statistics, Pearson's chi-square test was used in the crude analyzes and the *Poisson* regression in adjusted analyzes, taking into account the groups as conglomerates. The hierarchical model of analysis included the demographic variables and the school period in the first level, and the indicators of physical activity in the school in the second level, with the purpose of control of confounding. We used the backward selection strategy to select the variables, considering $p \leq 0.20$ to remain in the model. Results with $p \leq 0.05$ values were considered statistically significant. Results were expressed in prevalence ratios (PR) and respective 95% confidence intervals (95% CI).

This study was approved by the Ethics Committee on Human Research of Universidade Federal de Santa Catarina (Opinion #2250/11). As it was a research with children, the informed consent form (ICF) was sent to the children's parents/guardians prior to the data collection. The research was carried out only with students who presented the ICF signed on the day previously scheduled and who agreed to participate through oral consent.

Results

2,928 students were invited to participate in the study, of which 2,359 returned the consent form signed by their parents/guardians. Of these, 2,224 children accepted to participate in the study and performed the data collection (response percentage = 76.0%). For

the analysis of this study, 1,831 schoolchildren, aged 7-10 years old at the time of data collection, were included. The participants' mean age was 8.75 years ($SD \pm 1.03$), the majority of students were male (52.2%) and attending the afternoon period (52.6%). As for the indicators of physical activity in the school, there was a predominance of the passive behavior regarding the school travel (51.2%), the occurrence of three or more Physical Education classes per week (70.6%) and positive acceptance (77.4%). A total of 35.8% of schoolchildren reported inactivity (passive travel to and from school) during their class period, regardless of whether or not they attended Physical Education classes the previous day. The sample characterization is described in Table 1.

Table 1. Sociodemographic characteristics and indicators of physical activity in the school context in schoolchildren aged 7 to 10 years in the municipal school system. Florianópolis, SC, Brazil, 2013 (n = 1,831).

Variables	n	%	Missing (%)
Gender			-
Male	955	52.2	
Female	876	47.8	
Age (full year)			
7	261	14.3	
8	477	26.1	
10	543	29.6	
School period			-
Morning	868	47.4	
Afternoon	963	52.6	
Travel to school			34.6
Passive	613	51.2	
Active	584	48.8	
Number of Physical Education classes (weekly)			-
≤ 2	539	29.4	
≥ 3	1292	70.6	
Acceptance of Physical Education classes			-
Negative	413	22.6	
Positive	1418	77.4	
Status of physical activity in school period			34.6
Active, without Physical Education classes	350	29.2	
Active, with Physical Education classes	418	34.9	
Passive, regardless of Physical Education classes	429	35.8	

* Source: The authors

The analysis of the factors associated with the sedentary behavior in the counter-period is presented in Table 2.

Table 2. Crude and adjusted association between sociodemographic characteristics and physical activity indicators in the school context with sedentary behavior in the counter period in schoolchildren aged 7 to 10 years in the municipal school system. Florianópolis / SC, Brazil, 2013 (n = 1,831)

Variable	Sedentary Behavior at Leisure Time				
	%	Crude Analysis		Adjusted Analysis	
		PR (CI95%)	P	PR (CI95%)	P
Gender			0.775 ^a		0.753 ^a
Male	56.5	1.00		1.00	
Female	55.7	0.99 (0.88; 1.10)		0.98 (0.88; 1.09)	
Age			0.001 ^b		0.001 ^b
7 years	43.7	1.00		1.00	
8 years	53.7	1.23 (1.00; 1.51)		1.23 (1.00; 1.51)	
9 years	56.9	1.30 (1.04; 1.64)		1.30 (1.04; 1.64)	
10 years	63.5	1.45 (1.16; 1.83)		1.45 (1.16; 1.83)	
School period			0.699 ^a		0.865 ^a
Morning	57.0	1.00		1.00	
Afternoon	55.4	0.97 (0.83; 1.14)		1.01 (0.92; 1.10)	
Travel to school			0.100 ^a		0.115 ^a
Passive	56.0	1.00		1.00	
Active	52.1	0.93 (0.85; 1.02)		0.92 (0.83; 1.02)	
Number of Physical Ed classes			0.351 ^a		0.538 ^a
≤2 classes/week	54.0	1.00		1.00	
≥3 classes/week	57.0	1.06 (0.94; 1.19)		1.04 (0.91; 1.18)	
Acceptance of Physical Ed classes			0.468 ^a		0.554 ^a
Negative	55.7	1.00		1.00	
Positive	56.3	0.96 (0.86; 1.07)		1.06 (0.87; 1.30)	
Physical activities in the period			<0,001 ^b		<0,001 ^a
Active, without Physical Ed classes	47.4	1.00		1.00	
Active, with Physical Ed classes	49.3	1.04 (0.90; 1.20)		1.06 (0.92; 1.21)	
Passive, regardless of Physical Ed classes	64.1	1.35 (1.19; 1.53)		1.36 (1.21; 1.52)	

Notas: PR (Prevalence Ratio); CI95% (Confidence Interval of 95%); %; P-value obtained by Wald test for: ^a Heterogeneity and ^b Trend; Poisson regression with adjustments by levels, being: Level 1: adjusted by gender, age and school period; Level 2: adjusted by at least one active travel to school, number of Physical Education classes, acceptance of Physical Education class and physical activities in the period.

Source: Authors

The prevalence of sedentary behavior in after-school periods was 56.1% (CI 95%: 51.1, 61.1). After the adjusted analysis, we observed a direct association of the outcome as age increased (7 years: RP 1.00, 8 years: RP 1.23, 9 years: RP 1.40, 10 years: RP 1.45; P

<0.001) and also with physical inactivity during the school period (RP 1.36 [CI 95%: 1.21, 1.52]). The other sociodemographic variables and indicators of physical activity in the school did not present a significant association with the sedentary behavior in the after-school period.

Discussion

This study indicated that the most children had a sedentary behavior in the after-school period, with emphasis on the oldest and those who were inactive during the school period. Studies analyzing sedentary behavior in countries with different economic characteristics found the same association with age, justified by the students' perception of the activities: physical activities were considered less attractive and activities related to the use of screen (computer, videogame, television, etc.) more attractive^{21,22}. According to the literature review carried out by Guerra, Farias Júnior and Florindo²³, high levels of body weight and lower levels of physical activity are risk factors associated to sedentary behavior. These results point toward a common direction in the school population in different realities: students are exposed to a technological, nutritional and physical activity transition, which allow them access to greater opportunities for sedentary behavior, altered eating habits and reduced physical activity.

The other socio-demographic variables, gender and school period, did not show a significant association with sedentary leisure behavior in schoolchildren from second to fifth grade. Thus, unlike studies performed with schoolchildren at more advanced grades than the present sample, the adoption of hypokinetic behaviors does not distinguish between gender in the pre-pubertal stage²⁴. We noticed the influence of environmental and biological factors, such as gender and maturity, with behavioral variables. Hormonal changes, physical aptitude and increase of responsibilities taken are among the verified reasons^{8,24}.

As for the indicators of physical activity within the school, the travel to school is a domain of physical activity that needs to be encouraged in children, since it plays an important role in the usual physical activities performed by this population, especially at older ages²⁵. It seems that, since this is an age group that has just entered second childhood, few studies investigate on this area, due to the children's dependence from family members on habitual transportation^{26,27}. Our study showed no statistical difference in school travel, for there is a regulation that establishes the proximity between the child's/adolescent's domicile and the municipal school²⁸. This is an opportunity for the professionals of education and public health, who should encourage an active behavior, considering the benefits it provides. A systematic review, which considered only the association of active travel to school with health-related physical abilities, pointed out these benefits, with statistical significance in body composition, flexibility, cardiorespiratory and muscular fitness²⁹. However, some risks also seem to be linked to the reduced practice of physical activity in schoolchildren travel, which is characterized by a steady decrease³⁰. Melo et al.³⁰ discussed aspects related to the social and built environment, with emphasis on safety and accompaniment of the child on the way to school.

There was no association between the number of Physical Education classes (as well as its acceptance by students) and the sedentary behavior in the counter-period. National and international studies presented, through direct and indirect measures, the number of classes per week as a significant variable for the adoption of active or sedentary behaviors^{3, 31}. A possible explanation to justify the divergence of this information with the present study are the age groups (10 to 16 years)³¹. Thus, the problem of curricular reduction of Physical Education classes throughout formal education must be considered, due to the need for academic performance in earlier stages of education³¹, as well as the structure of Physical

Education classes⁵. As an impact of this scenario on the health of schoolchildren, the replacement of mild to moderate physical activity practices, such as Physical Education classes, with sedentary behaviors, may lead to musculoskeletal and metabolic health problems³².

The literature reports that the increase in routine physical activity is related to the increase in Physical Education class attendance³³, and that the commitment to classes are more evident in those who practice physical activity outside school³⁴. In another study carried out in the city of Pelotas (RS) with students aged 10 to 12 years, sedentary behavior was associated with the school environment, with a higher prevalence according to the decrease of students' participation in curricular Physical Education classes³⁵. It is known that the school environment is conducive to reduction with sedentary behavior²³; however, the present study did not find significant results involving the Physical Education class. This data instigates the discussion about the practice of physical activity in activities with and without structural organization, such as, for example, school break time.

Guedes and Guedes³⁶ argue that there is a challenge in the school environment, seen as an important domain of physical activity in childhood. In it, the adoption of a healthier and physically active lifestyle may take place during and after the period of schooling, which deserves to be built and encouraged³⁶. To this end, programs involving primarily exercises and physical activities, with proposals related to motor development and their respective skills and abilities, should be encouraged and carried out during and after school time, so that children carry the positive reflexes of these experiences throughout their lives³⁴.

Among the limitations of the study, we first mention the exclusion of two city schools due to lack of a computer lab or Internet access. The sample did not reach the value estimated by the sample calculation, but the study was able to identify the associations investigated. Also, the self-report of the information collected through the web-based questionnaire could be identified, which may have underestimated or overestimated the responses of physically active and sedentary activities. However, this limitation pervades most of the studies that use questionnaires. The Web-CAAFE questionnaire was designed by formative research that included discussions with teachers and managers of the Municipal Education Network of Florianópolis¹⁵⁻¹⁷. In addition, the questionnaire was submitted to validity and reproducibility tests^{18,19}. We would also like to point out that this is a cross-sectional study, which does not allow the cause-effect relationship between sedentary behavior and its behavioral and sociodemographic variables. However, cross-sectional researches are also important as to the representativeness of the researched population, with descriptive potential, ease of financial resources and statistical analysis.

The physical activities carried out on the school period, leisure period and on the travel to-from school presented in the questionnaire allowed, mostly, only the choice of the type of activity practiced, without controlling the variables that indicate frequency, intensity and duration of activities, reflecting a certain lack on the contribution of these domains for the total level of physical activity. It should be noted that the Web-CAAFE questionnaire was designed based on the cognitive abilities of 7 to 10-year-old children, whose developmental stage would not allow adequate response on the frequency, duration and intensity of physical activity⁷. Among the strengths of our study, we highlight the representative sample of schoolchildren in the municipal network, the tested and validated questionnaire, the specificity of the instrument for the target population, as well as its relevance to the presentation of an online version for this population in full technological transition.

When considering negative and positive aspects of the present study, we would appreciate and encourage suggestions of practical applications in the school environment to improve the educational reality applied to students between the second and fifth grade of

elementary school. The practice of physical activity in the school environment has a protective factor regardless of the existence of structured activities, which presuppose the presence of safe and perceptible environments by the students to carry out physical activity, in order to reflect in lower sedentary leisure behaviors.

Conclusions

Based on the findings presented in this study, the proximity to adolescence and the lack of physical activity within the school context are aspects strongly related to the sedentary behavior in the school counter-shift. Therefore, the importance of the school to a healthier lifestyle is determinant, through stimuli of physical activities that lead to the enjoyment and the autonomy for these practices in moments of leisure. This way, we encourage future studies to use this data to support practical applications that are intended to promote health interventions within this context.

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