RELIABILITY OF A SEDENTARY BEHAVIOR QUESTIONNAIRE IN STUDENTS

Fidedignidade de um questionário de comportamento sedentário em escolares

Fidedignidad de un cuestionario de conducta sedentaria de escolares

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ABSTRACT

Objective: To evaluate the reliability of a sedentary behavior questionnaire. **Methods:** Cross-sectional study with 1,119 students from 9 to 15 years old from seven public schools in Curitiba, Paraná, Brazil, between March and December 2015. The questionnaire consists of 13 items divided into five aspects (screen time, educational, cultural, social and transportation) in which the participants reported time spent in sedentary activities (hours and/or minutes) in a typical week. For the reliability analysis, two applications of the questionnaire were performed and the intraclass correlation coefficient evaluated the reproducibility, Bland-Altman scatter plot assessed the concordance between the two test-retest measurements, and Cronbach's alpha, the internal consistency of the questionnaire, adopting 5% as significance level. **Results:** The intraclass correlation coefficient and Cronbach's alpha presented values greater than 0.70, being higher on weekdays than on weekends. The two applications of the questionnaire presented a mean difference of 228.27 minutes/week, with 95% confidence interval of 175.86 to 280.68. The limits of agreement ranged from 2,015.33 to -1,558.79 minutes/week. **Conclusion:** The questionnaire presented satisfactory reliability and can be used to measure sedentary behavior in students from 9 to 15 years old of public schools.

Descriptors: Reproducibility of Results; Surveys and Questionnaires; Sedentary Lifestyle; Students.

RESUMO

Objetivo: Avaliar a fidedignidade de um questionário de comportamento sedentário. Métodos: Estudo transversal realizado com 1.119 escolares, de 9 a 15 anos de idade, de sete escolas públicas de Curitiba, Paraná, Brasil, entre março e dezembro de 2015. O questionário é composto por 13 itens, divididos em cinco aspectos (tempo de tela, educacional, cultural, social e transporte), em que os participantes relatam o tempo gasto em atividades sedentárias (horas e/ou minutos) durante uma semana típica. Para a análise de fidedignidade do questionário, realizaram-se duas aplicações do questionário e o coeficiente de Correlação Intraclasse avaliou a reprodutibilidade, o diagrama de dispersão de Bland Altman, a concordância entre as duas medidas teste-reteste e o alpha de Cronbach, a consistência interna do questionário, adotando-se o nível de significância de 5%. Resultados: O coeficiente de correlação intraclasse e o alpha de Cronbach apresentaram valores maiores que 0,70, sendo maiores nos dias de semana do que nos fins de semana. As duas aplicações do questionário apresentaram uma diferença média de 228,27 minutos/semana, com intervalo de confiança de 95%, de 175,86 a 280,68. O limite de concordância variou de 2.015,33 a 1.558,79 minutos/semana. Conclusão: O questionário apresentou fidedignidade satisfatória, podendo ser utilizado para mensurar o comportamento sedentário em escolares de 9 a 15 anos de escolas públicas.

Descritores: Reprodutibilidade dos Testes; Inquéritos e Questionários; Estilo de Vida Sedentário; Estudantes.

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RESUMEN

Objetivo: *Evaluar la fidedignidad de un cuestionario de conducta sedentaria.* **Métodos:** *Estudio transversal realizado con 1.119 escolares entre 9 y 15 años de edad de siete escuelas públicas de Curitiba, Paraná, Brasil, entre marzo y diciembre de 2015. El cuestionario tiene 13 ítems divididos en cinco aspectos (tiempo en la pantalla, educacional, cultural, social y transporte) en el cual los participantes relatan el tiempo gastado en las actividades sedentarias (las horas y/o los minutos) durante una semana típica. Para el análisis de la fidedignidad del cuestionario se realizaron dos aplicaciones del cuestionario. El coeficiente de Correlación Intraclase evaluó la reproductibilidad, el diagrama de dispersión de Bland Altman evaluó la concordancia entre las dos medidas test-retest y el alpha de Cronbach evaluó la consistencia interna del cuestionario adoptándose el nivel de significancia del 5%.* **Resultados:** *El coeficiente de correlación intraclase y el alpha de Cronbach presentaron valores mayores que 0,70, siendo mayores en los días de la semana que en los fines de semana. Las dos aplicaciones del cuestionario presentaron una diferencia media de 228,27 minutos/semana con intervalo de confianza del 95%, entre 175,86 y 280,68. El límite de la concordancia ha variado entre 2.015,33 y 1.558,79 minutos/semana.* **Conclusión:** *El cuestionario presentó la fidedignidad satisfactoria y puede ser utilizado para mensurar la conducta sedentaria de escolares entre 9 y 15 años de escuelas públicas.*

Descriptores: *Reproductibilidad de los Resultados; Encuestas y Cuestionarios; Estilo de Vida Sedentario; Estudiantes.*

INTRODUCTION

Sedentary behavior can be defined as the exposure to activities with low energy expenditure of up to 1.5 metabolic equivalents (METs)[1]. This behavior has rapidly emerged as an important issue for public health, as the object of study for different health outcomes[2,3].

Regardless of the individual's level of physical activity, excessive time in sedentary activities represents a potential risk factor for people's health, as this is positively associated with increased risk of cardiometabolic diseases and all-cause mortality, and a variety of physiological and psychological disorders[4]. Sedentary behavior accounts for 38% of all-cause mortality (approximately 433,000 deaths/year) in 54 countries[5]. Thus, even in individuals who follow the recommendations of moderate- to vigorous-intensity physical activities, prolonged time spent in sedentary behavior can, by itself, cause harmful effects to health[5].

According to the current recommendations, children and adolescents should dedicate a maximum of two hours per day to sedentary activities[6]. Based on these recommendations, evidence has shown a high prevalence of adolescents excessively exposed to such behavior. According to the transnational study "Health Behavior in School-age Children" (HBSC), developed by the World Health Organization (WHO) and conducted in the period 2013-2014 in 42 countries in Europe and North America, the students aged 11, 13, and 15 years, who watched television for two or more hours during the week, accounted for 50%, 62% and 63% of the schoolchildren, respectively[7].

National data based on the National School-based Health Survey (*Pesquisa Nacional de Saúde do Escolar - PeNSE*) shows that the habit of watching television for more than two hours per week was reported by approximately 60% of 9th graders, and is higher in the Southeast region (62.7%)[8]. Other studies report prevalence of sedentary behavior around 50 to 80%[9-11].

As seen, sedentary behavior is an important health-compromising factor for children and adolescents, and is very prevalent in this phase of life[9-11]. When dealing with health promotion in this population, accurate assessment of sedentary behavior is essential for monitoring trends in this behavior, examining the effects on health, and evaluating the effectiveness of interventions. However, the instruments used to assess sedentary behavior usually only evaluate the screen time. Children and adolescents also engage in other sedentary activities[12].

In order to evaluate the global sedentary behavior of Australian adolescents, researchers have developed the Adolescent Sedentary Activity Questionnaire (ASAQ)[13], which has undergone cross-cultural adaptation and been tested for its reproducibility in the Brazilian context[14]. This questionnaire presents itself as an alternative for the understanding of the adolescent's sedentary behavior, and addresses, in addition to the screen time, social, educational, cultural and transportation aspects, in order to obtain the adolescent's global sedentary time. In the original instrument, as in its Portuguese version, the internal consistency of the instrument has not been tested. In its Portuguese version, its reproducibility was tested in 12- to 17-year-old adolescents, presenting high levels of Intraclass Correlation Coefficient (ICC) for the total sedentary time during the week (ICC=0.88; 95%CI=0.82-0.91) and on the weekend (ICC=0.77; 95%CI=0.68-0.84)[14].

Thus, there is a need to test the reproducibility and the internal consistency of this instrument, since it can be interpreted differently depending on the age and social context in which the students are inserted. Schoolchildren of a younger group (9 to 11 years old) may have a poorer understanding of the questions in the questionnaire, which may decrease its reliability.

In order to test whether the sedentary behavior questionnaire ASAQ could be used by both children and adolescents, from different regions of Brazil, the objective of this study was to evaluate the reliability of a sedentary behavior questionnaire.

METHODS

This is a cross-sectional study, with a purposive sampling, carried out with 9- to 15-year-old students enrolled in public schools in the city of Curitiba, Paraná, Brazil. According to the 2015 School Census, conducted by the Anísio Teixeira National Institute for Educational Studies and Research (*Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira - INEP*), 133,081 students of both sexes were enrolled in the morning shift of elementary and high school in state and municipal facilities of the educational network of the city[15].

In order to develop the present study, the minimum sample size was calculated using the GPower program, version 3.1.7. Considering an effect size of 0.20, alpha (α) of 0.05, and power of 0.95, the minimum sample size required for the proposed analysis is 314 students. To analyze the information, considering the age range, it was decided to segment the sample into three groups, as suggested by the WHO[7]: 9 and 10 years, 11 and 12 years and 13 to 15 years, which resulted in a minimum required final sample of 942 students. However, at the end of the data collection process, 1,119 schoolchildren of both sexes, aged between 9 and 15 years, took part in this study, totaling 177 participants beyond the minimum calculated.

For data collection, seven schools were purposely selected, namely three state ones and four municipal schools of the public education network, and two classes per grade were selected for each school. All students in these classes were invited to participate in the research.

Data collection was carried out from March to December 2015, by a trained team composed of professors and students of the Physical Education Program of the Center for Studies on Physical Activity and Health (*Centro de Estudos de Atividade Física e Saúde - CEAFS*) of the Federal University of Paraná (UFPR), supervised by the lead researcher.

The schools were initially asked to authorize the study and, on the day prior to data collection, the students were given the Informed Consent Form (ICF), for parents or guardians to authorize their children to participate in the study, and the adolescents above 12 years old received the Informed Assent Form for them to sign indicating agreement to take part in the study. On the scheduled date for data collection, in possession of these documents, the students answered the questionnaire in the classroom during regular school hours, based on previous guidelines of the application group.

Only 9 to 15-year-old students participated in this study, with schoolchildren aged <9.0 years and >15.9 years excluded. The study did not include students who did not present the ICF signed by their parents or guardians, the adolescents above 12 years who had not signed the assent form, and those who refused to participate in data collection. Cases in which the student filled out the questionnaire incorrectly or withdrew from the study were regarded as sample loss.

For sample characterization, the adolescents answered questions about socio-demographic and economic aspects: sex, age, work, housing, type of residence, socioeconomic class, and schooling of the father and mother.

For assessment of the socioeconomic class, the study used the Brazil Criterion for Economic Classification (*Critério de Classificação Econômica Brasil - CCEB*)[16], which counts the number of items available in the participant's residence. The students reported if they had each item of the list in their home, and their quantity, the schooling of the head of the family or the one responsible for their finantial support, and the presence of utility service (piped water and street paving). Because of the sample size in each category, the students were classified into the following classes: A (the highest), B1 + B2, C1 + C2 and D/E (the lowest ones), and the parents' schooling was grouped into two categories: ≤8 years of study and >8 years of study.

The Adolescent Sedentary Activity Questionnaire (ASAQ)[14] consists of 13 items, divided into five aspects (screen time, educational, cultural, social, and transportation), in which the participants report the time spent in sedentary activities in hours and/or minutes during each day of the week and during a typical weekend.

The students were invited to remember their daily activities and report the hours and minutes they normally spend in each one, at two different times. Some questions were explained in further detail, like those concerning the use of the computer for leisure, being emphasized that this activity includes reading WhatsApp, Messenger, Facebook, e-mail, chat and blogs in social networks.

In questions addressing transportation to school or church on weekends, it was emphasized that this item means attending classes or community meetings for cultural and/or religious activities. Whenever adolescents scored two activities at the same time, for example, reading for pleasure in front of the TV, only one activity was computed, not counting the time twice[14].

The questionnaire administration followed some procedures in order to avoid potential errors: a) verification of each student's answers for clarification of some aspects, such as the need to consider that the sedentary time can not extrapolate 24 hours a day, asking the adolescents to remember the time of sleep and the time spent in physical activities, so that the measurement of sedentary time is not overestimated; b) the analysis of other aspects that could lead to mistakes in completing the questionnaire, such as excessive time spent in one single activity, double counting activities that can be performed simultaneously, incomplete fields, activities related to transportation during business days; and c) emphasize the importance of remembering a typical and normal week when answering the questions[14].

Reliability was analyzed through test-retest reproducibility and internal consistency. Reproducibility was estimated using the repeated measurement procedure, with a seven-day interval between applications, using procedures identical to those adopted at the first application[12,14]. Adolescents who did not attend the scheduled day and time for replication of the questionnaire were not considered in the study.

The number of minutes spent by the adolescents in each sedentary activity, as well as the total time (the sum of all sedentary activities), was calculated for weekdays, for the weekend and for the five aspects (screen time, educational, cultural, social and transportation). Additionally, the results were stratified by age group: 9 and 10 years, 11 and 12 years, and 13 to 15 years.

For description of the variables stratified by age group, absolute and relative frequency distribution were used. The intraclass correlation coefficient (ICC) was used to determine the test-retest reproducibility of the questionnaire, and the Bland–Altman scatter plot to verify the absolute agreement between the questionnaire application replicates. The internal consistency of the instrument was verified by means of Cronbach's alpha, considering only the questionnaires applied at the first moment. Statistical analyzes were performed using the SPSS program, version 21.0, adopting 5% as the significance level.

The Ethics Committee in Research with Human Beings of the Federal University of Paraná (Approval No. 722.529) approved the present study, which is in agreement with Resolution nº 466/2012 of the National Health Council (*Conselho Nacional de Saúde - CNS*).

RESULTS

A total of 1,119 schoolchildren, aged between 9 and 15 years old, participated in the study, 50.4% (n=564) males and 49.6% (n=555) females. The majority of schoolchildren did not work (n=1064; 95.4%), lived with father and mother (n=685; 61.2%) in a single- ou double-storey house (n=1001; 89.5%), belong to socioeconomic class B (n=622; 55.6%), and have father (n=642; 57.4%) and mother (n=721; 64.4%) with more than eight years of schooling. Table I presents the sociodemographic and economic characteristics of the schoolchildren, aged 9 to 15 years old, distributed in age groups.

Table II presents the results of the test-retest reproducibility analysis, both total and stratified by age group. The ICCs presented values higher than 0.70. The variables concerning educational aspects and transportation, at the ages of 11 and 12 years, presented ICC of 0.67 and 0.59 on weekdays, and of 0.56 and 0.52 on weekends, respectively. At the ages of 9 and 10, at the weekend, the cultural and social variables presented ICC of 0.57 and 0.54, respectively. Reproducibility showed higher values on weekdays than on weekends.

Table III presents the results of the analysis of internal consistency, both total and stratified by age group. When analyzing the internal consistency of the instrument, Cronbach's alpha proved higher than 0.70, and was higher on weekdays than on weekends. For the group aged 9 to 10 years, Cronbach's alpha ranged from 0.55 to 0.91; for the group aged 11 to 12 years, it ranged from 0.45 to 0.89; and for the group of 13- to 15-year-olds, it ranged from 0.44 to 0.87.

Table I - Sociodemographic and economic characteristics of the schoolchildren, aged 9 to 15 years, distributed in age groups. Curitiba, Paraná, Brazil, 2015.

Variable	All n	All %	9 and 10 years n	9 and 10 years %	11 and 12 years n	11 and 12 years %	13 to 15 years n	13 to 15 years %
All	1119	100	321	28.7	347	31.0	451	40.3
Sex								
Male	564	50.4	169	52.6	173	49.9	222	49.2
Female	555	49.6	152	47.4	174	50.1	229	50.8
Job*								
Yes	51	4.6	0	0	11	3.2	40	8.9
No	1064	95.4	321	100	334	96.8	409	91.1
Who do you live with								
With father and mother	685	61.2	195	60.7	222	64.0	268	59.4
With father or mother	360	32.2	102	31.8	97	28.0	161	35.7
Others	74	6.6	24	7.5	28	8.0	22	4.9
Type of residence**								
House/ multistory house	1001	89.5	287	89.4	307	88.5	407	90.4
Apartment /other	117	10.5	34	10.6	40	11.5	43	9.6
Economic class								
A	147	13.1	34	10.6	46	13.3	67	14.9
B1+B2	622	55.6	163	50.8	212	61.1	247	54.8
C1+C2	335	29.9	120	37.4	84	24.2	131	29.0
D/E	15	1.4	4	1.2	5	1.4	6	1.3
Fathers's scholing								
≤ 8 years of study	477	42.6	170	53.0	126	36.3	181	40.1
> 8 years of study	642	57.4	151	47.0	221	63.7	270	59.9
Mathers's scholing								
≤ 8 years of study	398	35.6	141	43.9	103	29.7	154	34.1
> 8 years of study	721	64.4	180	56.1	244	70.3	297	65.9

n: number of the corresponding sample; *: 4 participants did not present data referring to the variable Job; **: 1 participant did not present data referring to the variable Type of residence

Table II - Measures of test-retest reproducibility of the questionnaire, total and stratified by age group, considering the continuous measure of sedentary behavior. Curitiba, Paraná, Brazil, 2015.

Variable		Chronological age		
	Total	9 and 10 years	11 and 12 years	13 to 15 years
	ICC (95% CI)	ICC (95% CI)	ICC (95% CI)	ICC (95% CI)
All week	**0.92 (0.91-0.93)**	**0.91 (0.88-0.92)**	**0.91 (0.89-0.93)**	**0.93 (0.91-0.94)**
Screen time	0.91 (0.90-0.92)	0.88 (0.85-0.90)	0.90 (0.88-0.92)	0.91 (0.90-0.93)
Educational	0.79 (0.76-0.81)	0.80 (0.75-0.84)	0.70 (0.63-0.75)	0.79 (0.75-0.83)
Cultural	0.81 (0.79-0.83)	0.80 (0.76-0.84)	0.81 (0.76-0.84)	0.82 (0.78-0.85)
Social	0.84 (0.82-0.86)	0.73 (0.66-0.78)	0.80 (0.76-0.84)	0.84 (0.80-0.86)
Transportation	0.70 (0.67-0.74)	0.72 (0.65-0.78)	0.63 (0.54-0.70)	0.74 (0.68-0.78)
Weekdays	**0.90 (0.89-0.91)**	**0.88 (0.86-0.91)**	**0.88 (0.85-0.90)**	**0.91 (0.89-0.92)**
Screen time	0.88 (0.87-0.89)	0.86 (0.82-0.89)	0.87 (0.84-0.89)	0.88 (0.86-0.90)
Educational	0.77 (0.74-0.79)	0.79 (0.73-0.83)	0.67 (0.59-0.73)	0.76 (0.71-0.80)
Cultural	0.76 (0.74-0.79)	0.79 (0.74-0.83)	0.77 (0.72-0.82)	0.74 (0.69-0.79)
Social	0.80 (0.78-0.82)	0.68 (0.60-0.74)	0.79 (0.74-0.83)	0.79 (0.74-0.82)
Transportation	0.65 (0.60-0.69)	0.62 (0.53-0.70)	0.59 (0.49-0.67)	0.71 (0.65-0.76)
Weekend	**0.83 (0.81-0.85)**	**0.78 (0.72-0.82)**	**0.83 (0.79-0.86)**	**0.84 (0.81-0.87)**
Screen time	0.83 (0.81-0.85)	0.74 (0.68-0.79)	0.84 (0.80-0.87)	0.84 (0.81-0.87)
Educational	0.64 (0.60-0.68)	0.71 (0.64-0.77)	0.56 (0.46-0.64)	0.64 (0.57-0.70)
Cultural	0.70 (0.66-0.73)	0.57 (0.46-0.65)	0.73 (0.67-0.78)	0.73 (0.68-0.78)
Social	0.71 (0.68-0.75)	0.54 (0.43-0.63)	0.67 (0.59-0.73)	0.75 (0.70-0.79)
Transportation	0.61 (0.56-0.65)	0.67 (0.59-0.74)	0.52 (0.41-0.61)	0.60 (0.52-0.67)

ICC: Intraclass Correlation Coefficient; 95% CI: 95% confidence interval

Table III - Measures of internal consistency of the questionnaire, total and stratified by age group, considering the continuous measure of sedentary behavior. Curitiba, Paraná, Brazil, 2015.

| | | | Chronological age | |
| | Total | 9 and 10 years | 11 and 12 years | 13 to 15 years |
Variable	α	α	α	α
All week	**0.89**	**0.91**	**0.89**	**0.87**
Screen time	0.83	0.85	0.84	0.81
Educational	0.82	0.85	0.81	0.81
Cultural	0.82	0.84	0.81	0.80
Social	0.76	0.79	0.74	0.76
Transportation	0.82	0.81	0.81	0.84
Weekdays	**0.87**	**0.89**	**0.87**	**0.86**
Screen time	0.82	0.83	0.81	0.80
Educational	0.81	0.83	0.81	0.80
Cultural	0.79	0.80	0.80	0.78
Social	0.83	0.85	0.82	0.82
Transportation	0.86	0.85	0.85	0.87
Weekend	**0.74**	**0.77**	**0.73**	**0.71**
Screen time	0.62	0.65	0.61	0.60
Educational	0.60	0.66	0.56	0.57
Cultural	0.55	0.56	0.56	0.51
Social	0.48	0.55	0.45	0.44
Transportation	0.55	0.58	0.52	0.56

α: Cronbach's alpha

Figure 1 shows the Bland-Altman scatter plot for absolute agreement between the two applications of the questionnaire. When analyzing the minutes of total sedentary behavior, weekdays and weekends included, there was a mean difference between the two measures of approximately four hours, with confidence intervals varying from 175.86 to 280.68. The limits of agreement demonstrate variability in the agreement between the measures of the first and the second application of the questionnaire.
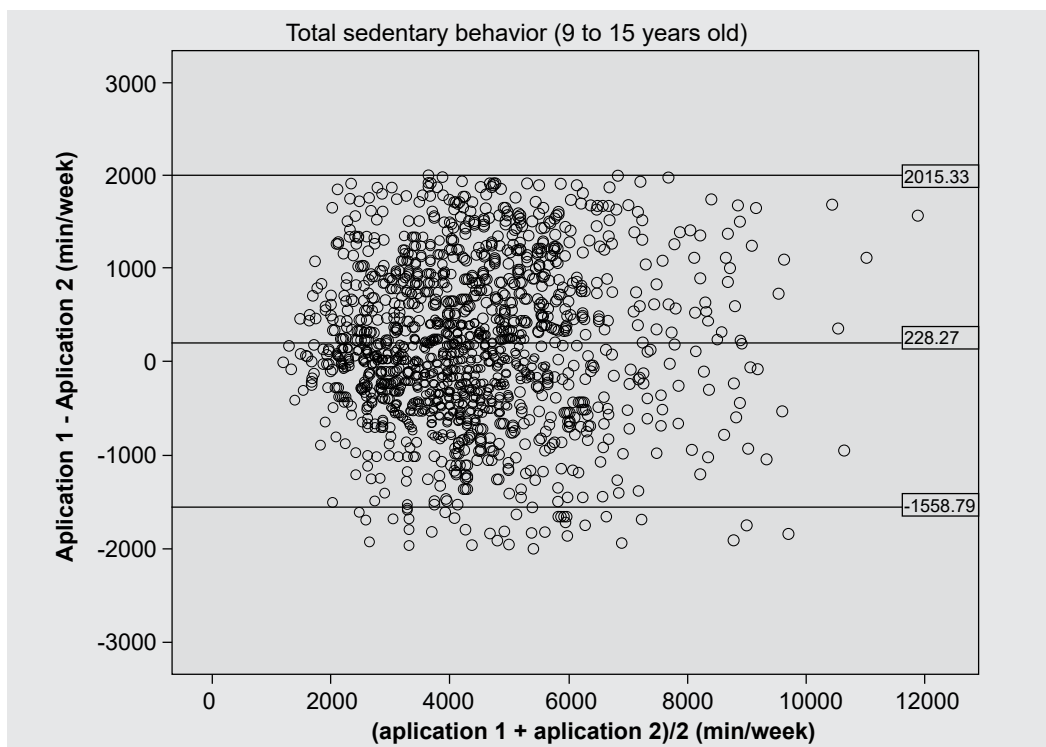

Figure 1 - Bland-Altman plot to quantify the agreement between the application replicates - test-retest of the sedentary behavior questionnaire of 9-to 15-year-old students. Curitiba, Paraná, Brazil, 2015.

DISCUSSION

Sedentary behavior, especially prolonged sitting time, represents a potential risk for people's health as it is positively associated with increased risk of cardiometabolic diseases, all-cause mortality, and a variety of physiological and psychological conditions[4,17]. It is related to an unhealthy lifestyle in childhood and adolescence[4,17].

In a systematic review, authors examined the relationship between sedentary behavior and health indicators in children and adolescents, aged 5 to 17 years, and found that increased sedentary behavior is associated with increased cardiometabolic risk, decreased physical fitness, low scores on self-esteem, and the increase in excess weight and obesity[18].

In the context of health promotion in childhood and adolescence, adequate monitoring of sedentary behavior is necessary, considering its association with health risk factors, both in childhood and in adulthood[4,17]. Therefore, the use of reliable instruments for evaluation of sedentary behavior in children and adolescents aims to improve the quality of information collected on this risk behavior[12], which is the target of this study.

The Adolescent Sedentary Activity Questionnaire[13] presented satisfactory levels of test-retest reproducibility in the current study, with ICC above 0.70. ICC less than 0.40 expresses low correlation; between 0.40 and 0.75, good correlation, and greater than 0.75 it expresses excellent correlation[19].

There is a great variation in the coefficients of test-retest reproducibility of the questionnaires of sedentary behavior in adolescents. In a systematic review, it was found that the ICC for test-retest reproducibility of questionnaires ranged from 0.21 to 0.91. Such discrepancies can be attributed to the age heterogeneity among the students participating in the studies, as well as to differences in the interval between the test and retest applications[12].

The seven-day interval between questionnaire replicates can affect the reproducibility levels. Using prolonged intervals between the applications of the instrument can favor changes in the activities practiced, thus resulting in underestimation of reproducibility. On the other hand, should the interval be too short, the memory effect can occur, thus causing the reproducibility of the instrument to be overestimated[13].

The instrument analyzed in the current study presented psychometric aspects similar to the original instruments[13,14] and to results found in the literature[20-22], being suitable for evaluation of sedentary behavior in schoolchildren aged 9 to 15 years. In the present study, reproducibility data presented higher values on weekdays than on weekends. Such results converge with the original studies[13,14].

This tendency is due to the fact that weekday behaviors are generally characterized by the school routine, while weekends are more unstable, that is, they vary according to time of social, cultural and even educational commitments, the possibility to spend more time in front of the TV and the computer, climatic conditions, and the existence of opportunities for the practice of physical activity[23]. Thus, in the present investigation, the higher ICC values for the weekdays, compared to the days on weekends, suggest behavioral variability, rather than low instrument reliability.

The variables addressing educational and transportation activities, at 11 and 12 years, presented ICC values ranging from 0.50 to 0.70. Ttransportation is a limitation of the study, since a single question evaluates the displacement without differentiating a long-distance journey from a simple trip to the market[14]. However, educational is a variable assessed by means of four questions, which can vary greatly from week to week, depending on the school period and the demands of each school.

In the present study, at the ages of 9 and 10 years, the variables addressing cultural and social activities presented ICC ranging from 0.50 to 0.60 on weekends. The cultural variable is evaluated by three questions involving reading, crafts and musical instrument. Low coefficients may reflect characteristics inherent to the patterns of these activities that, unlike the educational activities, do not follow a pre-established routine and can vary from week to week, based on the interests of the children.

As for the social variable, it consists of activities like enjoying idle moments, attending classes at school on Saturdays, or going to church. "Idle moments" may present as a difficult variable for an accurate recall by the child, since it can comprise much of the time out of the school setting. The downward trend seen in ICC values converges with findings of studies that used the same instrument in adolescents, especially in the cultural, social and transportation aspects[13,14].

The results shown in the present study for the internal consistency of the instrument presented satisfactory levels (>0.70), similar to results found in the literature[24,25]. An instrument is considered to have adequate levels of internal consistency when the value of α is equal to or greater than 0.70[26]. In the present investigation, Cronbach's alpha presented lower values on weekends (α=0.44 to 0.77). Schoolchildren may find it difficult to remember the activities

performed during the weekend, because these days lack a predetermined routine, which happens during the week, and this may have contributed to the lower values of internal consistency of the questionnaire.

The Bland-Altman analysis performed in this study demonstrated variability in the agreement of responses according to each individual's total sedentary behavior time. Such result denotes a natural variability of the student's behavior on the evaluation dates, as well as the difficulty remembering some activities[27].

The 95% CI, in the concordance analysis performed in this study, presents significant variations that need to be considered. It should be noted, however, that despite the decrease in consistency of total sedentary time responses in most cases, the values were within the 95% confidence interval, presenting results similar to the original study[14]. There was no excess of discordant values of high magnitude, and most of the individual differences between the two measures were within the recommended limits.

The highlights of this study are: the large sample size, with adequate power for the proposed analyses, in addition to the sample origin, from state and municipal schools, and its age diversity, which provided the evaluation of both children and adolescents. With regard to the limitations, it stands out the lack of concurrent validation with use of a gold standard instrument, such as the accelerometer, and that subjective measures can be influenced by responses that are socially accepted or expected by the groups of children and adolescents[28]. In addition, since this study led the schoolchildren to recall the sedentary behavior practiced at different periods (different weeks for the two applications), changes in sedentary behavior that occurred during this period have the potential to influence the measures of reproducibility.

Thus, the relevance of investigating the sedentary behavior of schoolchildren for health promotion has been demonstrated[4,5,9-12], since its precise evaluation is key for the monitoring of behavioral trends in these students, in order to examine its harmful effects on health when it influences mortality, in addition to assessing whether the interventions have been proving effective.

It is suggested that further studies be carried out for evaluation of the concurrent validity of the instrument with use of accelerometry.

CONCLUSION

The questionnaire analyzed in this study presented satisfactory reliability and can be used to measure sedentary behavior in 9- to 15-year-old students of public schools.

CONFLICTS OF INTEREST

The authors state that there is no conflict of interest.

CONTRIBUTIONS

Eliane Denise Araújo Bacil and **Wagner de Campos** contributed to the study design, data analysis, writing and final revision of the manuscript**. Thiago Silva Piola** contributed to data analysis, writing and final revision of the manuscript. **Priscila Iumi Watanabe, Michael Pereira da Silva** and **Rosimeide Francisco dos Santos Legnani** contributed to the writing and final revision of the manuscript.

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