

# Prevalence of insufficient physical activity in adolescents in South Brazil

## *Prevalência de atividade física insuficiente em adolescentes do Sul do Brasil*

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**Abstract** – The purpose of the study was to estimate the prevalence of insufficient physical activity and associated factors in adolescents 10 to 19 years old living in the Health Districts of Restinga and Extremo Sul of Porto Alegre, RS. A population-based, cross-sectional study was conducted by a systematic sampling with 967 adolescents randomly selected. Data was collected by using a questionnaire with the following variables: gender, age, skin color, if currently studying, occupation, socioeconomic status, weight and height, as well as insufficient physical activity, which was defined as less than 300 minutes per week of physical activity, not counting physical education classes. The prevalence of insufficient physical activity found was 70.5%: 58.9% in boys and 81.9% in girls. The higher prevalence of insufficient levels of PA was found among adolescents who are not studying ( $p=0.01$ ) and next by those who are between 16 and 19 years old ( $p=0.05$ ). In boys it was observed that as they got older, physical activity decreased ( $p=0.05$ ). The most types of activities found were field soccer and riding bikes for boys, and walking and field soccer for girls. In conclusion, the prevalence of insufficient physical activity found in the adolescents evaluated was high. Being a girl, not studying, and between the ages of 16 and 19, were factors that increased the levels of insufficient physical activity. This reveals, therefore, the importance to developed interventions to promote the practice of physical activity in this population.

**Key words:** Cross-sectional studies; Epidemiology; Motor activity; Socioeconomic factors.

**Resumo** – O objetivo do estudo foi estimar a prevalência de atividade física insuficiente e fatores associados em adolescentes de 10 a 19 anos, residentes nos Distritos Sanitários da Restinga e Extremo Sul, Porto Alegre, RS. Este é um estudo transversal de base populacional por amostragem sistemática, com 967 adolescentes selecionados de forma randomizada, os quais responderam um questionário composto pelas seguintes variáveis: sexo, idade, cor da pele, estar estudando, ocupação, nível socioeconômico, massa corporal e estatura, e atividade física insuficiente; definida como prática menor que 300 minutos semanais de atividade física, sem contar as aulas de educação física. A prevalência de atividade física insuficiente encontrada foi de 70,5%, sendo 58,9% nos meninos e 81,9% nas meninas. As prevalências mais altas de níveis insuficientes de AF foram observadas nos adolescentes que não se encontram estudando ( $p=0,01$ ), sucedidos pelos da faixa etária entre 16 e 19 anos ( $p=0,05$ ). Nos meninos, observou-se que, com o aumento da idade, ocorreu diminuição na prática de atividade física ( $p=0,05$ ). Dentre os tipos de atividade, o futebol de campo e o andar de bicicleta mostraram-se os mais frequentes para os meninos, e a caminhada e o futebol de campo para as meninas. Conclui-se que foi elevada a prevalência de atividade física insuficiente nos adolescentes avaliados. Sexo feminino, não estar estudando e estar na faixa etária entre 16 e 19 anos, foram fatores que aumentaram os níveis de atividade física insuficiente. Assim, revela-se a importância de que sejam desenvolvidas intervenções para promoção da prática de atividade física nessa população.

**Palavras-chave:** Atividade motora; Epidemiologia; Estudos transversais; Fatores socioeconômicos.

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## INTRODUCTION

The regular practice of physical activity has been identified as an important indicator of a population's health, as well as presenting an inverse relation with chronic-degenerative diseases and morbimortality. Two million deaths are attributable to insufficient physical activity every year worldwide<sup>1,2</sup>.

During adolescence, the practice of physical activity presents evidence of benefits associated with skeletal health, bone mineral density, as well as the control of blood pressure and metabolic disorders<sup>3-7</sup>. As for the positive effects of the practice of physical activity in adolescence for health in adulthood, we know that there is a lower risk of hypertension<sup>3,4,6,7</sup>, type 2 diabetes<sup>7</sup>, dyslipidemia<sup>6</sup>, obesity<sup>7</sup>, as well as decreasing the risk of osteoporosis<sup>8</sup>.

Acquiring healthy habits such as proper nutrition and regular physical activity is more effective as it is encouraged and consolidated in childhood and adolescence<sup>9-13</sup>. Moreover, initiatives in public health often face a difficulty in bringing about changes in behavior patterns when they focus on the adult population because their habits have already been created.

In Brazil, the representative population-based studies addressing physical activity in adolescents demonstrate a great variability in the prevalence related to the instrument used and the age bracket evaluated resulting in values ranging between 39 and 94%<sup>14-18</sup>. However, initiatives with the purpose of evaluating health, including physical activity, are necessary and reinforce the intention to confer rationality to the interventions, establishing it as a tool and strategy for planning and promoting health.

Therefore, the objective of this study was to estimate the prevalence of insufficient physical activity in adolescents in the Health Districts of Restinga and Extremo Sul in the city of Porto Alegre, RS, and its association with independent variables: gender, age, skin color, if currently studying, occupation, socioeconomic status, and body mass index (BMI).

## METHODS

This research is part of an extensive survey that assessed children (0-36 months old), adolescents (10-19 years old), and adults (20 years old or more) living in the Health Districts of Restinga and Extremo Sul of Porto Alegre, RS. The study was conducted by Moinhos de Vento Hospital in partnership with the Ministry of Health as a way to build a health district for this community. The population-based, cross-sectional study was by systematic sampling, and the institutionalized individuals were excluded from the sample. A loss was considered when the adolescent sampled was not found after two visit attempts on alternate days and times by the interviewer and a pre-scheduled visit by the field supervisor. The same procedure was adopted for refusals, which was at least three attempts with a negative response from the adolescent.

The research project was approved by the Ethics Committee of the Moinhos de Vento Hospital in accordance with Protocol 2009/28 and

the work done fully complied with the ethical principles contained in the Declaration of Helsinki (2000) and the specific legislation of this country.

The calculation of sample size was estimated based on the study by Bastos et al.<sup>19</sup> who found a prevalence of insufficient physical activity of 69.8% with a confidence interval of 95% (CI95%) (66.7 - 72.9). A prevalence of 73% insufficient physical activity was used and an acceptable error of three percentage points. The confidence level was 95% plus an additional 10% for losses and refusals, resulting in 841 individuals. The number of adolescents per household is 0.5 according to the Brazilian Institute of Geography and Statistics (Census 2000)<sup>20</sup>, so an estimation was made of 1682 visits to households.

The sampling was carried out in multiple stages beginning from the 121 census sectors in the health districts of Restinga and Extremo Sul, and 117 sectors were visited because they are inhabited, thus ensuring the stratification of the socioeconomic status. A total of 32,067 households were identified, of which 29,929 were inhabited. From these, 1,750 were selected by the screen of 17 homes for a systematic selection of households.

A total of 967 adolescents were interviewed between the ages of 10 and 19 years old. After obtaining an informed consent from the parents or a responsible adult, the adolescents answered a standardized questionnaire, pre-coded and pre-tested, administered by interviewers who had undergone training of 80 hours, with questions related to the outcome of physical activity and the following associated variables: age, skin color, if currently studying, occupation, socioeconomic status, and self-reported weight and height. In order to ensure the reliability of the answers, a quality control by telephone was done with 10% of the respondents.

Insufficient physical activity was defined as less than 300 minutes of physical activity per week, not counting physical education classes<sup>4</sup>. The questionnaire was validated by Bastos et al.<sup>19</sup> using the domains of transportation and recreation. The Economic Classification Criterion of Brazil was used for the classification of the socioeconomic status, as indicated by the Brazilian Association of Research Companies. Body weight and height were used to calculate the BMI, computed using the following formula:  $BMI = (\text{body mass in kg})^2 / (\text{height in meters})$  and were classified into three categories: normal:  $< 25 \text{ kg/m}^2$ ; overweight:  $25\text{-}29.9 \text{ kg/m}^2$ ; obese:  $\geq 30 \text{ kg/m}^2$ .

The data was digitized using the program Office Remark (Gravic Inc., Philadelphia, United States) with automatic checks for consistency. A descriptive analysis was performed with calculations of ratios and confidence intervals of 95%. In the rough analysis, the prevalence of the outcome was calculated for the categories of the independent variables. Significance was assessed by the chi-square test or linear trend. The Poisson regression<sup>21</sup> was used for the multivariable analysis with the order of entry of the variables being according to the hierarchical model of causality<sup>22</sup> as determined *a priori*. We used the forward selection technique and kept in the model all the variables resulting in  $p > 0.20$ . A significance level of 5% was used considering all two-tailed tests.

## RESULTS

A total of 1000 adolescents were found in the homes randomly selected, and of these 967 were interviewed, of which 487 were boys, and this constituted a representative sample. The refusal rate was 3.3%, and of the 33 adolescents who refused to answer the questionnaire, 17 were boys. The prevalence of insufficient physical activity was 70.5% with 58.9% for boys and 81.9% for girls. Of the respondents, 15.3% said that they were working, and 58% of these get to work in a proactive way.

Table 1 shows the description of the sample in relation to the independent variables and their association with insufficient physical activity, stratified by gender. In both genders, the highest prevalence of insufficient physical activity was found in adolescents who are not studying, which was 94.6% in girls and 80.7% in boys, and the next highest was in the age bracket between 16 and 19 years old: 85.8% in girls and 66.5% in boys.

**Table 1.** Prevalence of insufficient physical activity among adolescents (n=967) according to independent variables

Variable	Description of sample n (%)	% of insufficient physical activity			
		Boys	p	Girls	p
Age			0.06		0.12
10-12 yrs. old	293 (30.3)	56.0		79.7	
13-15 yrs. old	323 (33.4)	54.4		79.2	
16-19 yrs. old	351 (36.3)	66.5		85.8	
Skin color			1.00		0.20
White	646 (67.0)	59.0		80.4	
Not white	318 (33.0)	59.0		85.2	
Currently studying			<0.01		<0.01
No	131 (13.6)	80.7		94.6	
Yes	836 (86.4)	56.0		79.7	
Socioeconomic status*			0.58		0.58
A-B	288 (30.1)	60.1		80.0	
C	573 (59.9)	59.2		82.9	
D-E	96 (10.0)	53.7		81.8	
BMI			0.39		0.58
Normal	628 (73.6)	56.2		83.0	
Overweight	181 (21.2)	62.9		79.0	
Obese	44 (5.2)	54.2		85.0	

\* Brazilian Association of Research Companies. Brazil economic classification criterion. BMI: Body Mass Index

Table 2 lists the unadjusted and adjusted prevalence ratios for independent variables and their association with insufficient physical activity in boys. A tendency was found in the unadjusted analysis that a decrease in physical activity occurs with increasing age, and this relationship is confirmed in the adjusted analysis. The variable not currently studying was related to the highest prevalence of insufficient physical activity both in the unadjusted and adjusted analysis. The remaining variables did not show any significant association with the insufficient practice of physical activity, also in both the analyses (unadjusted and adjusted).

**Table 2.** Unadjusted and adjusted prevalence ratios for independent variables associated with physical activity among adolescent boys (n=487)

Variable	Unadjusted		Adjusted	
	PR	p	PR	p
Age		0.06		0.05
10-12 yrs. old	1.00		1.00	
13-15 yrs. old	0.97 (0.80 - 1.19)		0.97 (0.80 - 1.19)	
16 -19 yrs. old	1.19 (0.99 - 1.42)		1.19 (0.99 - 1.42)	
Skin color		1.00		0.96
White	1.00		1.00	
Not white	1.00 (0.85 - 1.17)		1.00 (0.87 - 1.17)	
Currently studying		<0.01		<0.01
No	1.00		1.00	
Yes	0.69 (0.60 - 0.81)		0.73 (0.61 - 0.89)	
Socioeconomic status*		0.55		0.62
A-B	1.00		1.00	
C	0.99 (0.84 - 1.16)		0.98 (0.84 - 1.15)	
D-E	0.89 (0.65 - 1.22)		0.86 (0.63 - 1.17)	
BMI		0.53		0.57
Normal	1.00		1.00	
Overweight	1.12 (0.94 - 1.34)		1.10 (0.92 - 1.31)	
Obese	0.96 (0.66 - 1.41)		0.97 (0.65 - 1.45)	

\* Brazilian Association of Research Companies. Brazil economic classification criterion. PR: Prevalence ratios; BMI: Body Mass Index

Table 3 lists the unadjusted and adjusted prevalence ratios for independent variables and their association with insufficient physical activity in girls. In the unadjusted and adjusted analysis, the variable related to the highest prevalence of insufficient physical activity was not currently studying. The remaining variables did not show any relationship to the practice of physical activity.

**Table 3.** Unadjusted and adjusted prevalence ratios for independent variables associated with physical activity among adolescent girls (n=480)

Variable	Unadjusted		Adjusted	
	PR	p	PR	p
Age		0.13		0.10
10-12 yrs. old	1.00		1.00	
13-15 yrs. old	0.99 (0.89 - 1.12)		1.00 (0.89 - 1.12)	
16 -19 yrs. old	1.08 (0.97 - 1.19)		1.08 (0.98 - 1.20)	
Skin color		0.18		0.13
White	1.00		1.00	
Not white	1.06 (0.97 - 1.15)		1.07 (0.98 - 1.16)	
Currently studying		<0.01		<0.01
No	1.00		1.00	
Yes	0.84 (0.78 - 0.91)		0.85 (0.78 - 0.94)	
Socioeconomic status*		0.62		0.76
A-B	1.00		1.00	
C	1.04 (0.94 - 1.14)		1.02 (0.92 - 1.13)	
D-E	1.02 (0.88 - 1.19)		0.97 (0.84 - 1.13)	
BMI		0.72		0.78
Normal	1.00		1.00	
Overweight	0.95 (0.84 - 1.08)		0.96 (0.85 - 1.09)	
Obese	1.02 (0.85 - 1.24)		1.03 (0.85 - 1.24)	

\* Brazilian Association of Research Companies. Brazil economic classification criterion. PR: Prevalence ratios; BMI: Body Mass Index

Table 4 presents a list of the types of activities that are the most frequently stratified by gender. For boys, the most common practice was field soccer followed by riding bikes, and futsal. For girls it was walking followed by field soccer, and volleyball.

**Table 4.** Types of activities that are the most frequent by gender among adolescents (n = 967)

Activity	Boys (%)	Girls (%)
Field Soccer	74.5	31.9
Futsal	17.5	7.5
Walking	10.2	32.5
Basketball	5.4	4.4
Dancing	3.5	16.3
Volleyball	12.1	30.0
Bodybuilding	7.0	3.1
Dodgeball	1.6	1.9
Running	11.8	7.5
Working out at a fitness center	1.8	6.3
Riding bikes	39.5	25.0

## DISCUSSION

Insufficient physical activity was high in adolescents in the Health Districts of Restinga and Extremo Sul in the city of Porto Alegre, RS with a prevalence of 70.5%. The girls had even more alarming results with 81.9% versus 58.9% in boys. This result corroborates findings in adolescents between the ages of 10 to 19 in the city of Pelotas, RS that used the same instrument and evaluation criteria, which observed a prevalence of 69.8% with a level of 82.1% for girls versus 56.5% for boys<sup>19</sup>.

However, this result differs from other studies held in different contexts in Brazil, showing a higher percentage of insufficient physical activity in relation to the following studies. Oehlschlaeger et al.<sup>17</sup> evaluated adolescents between the ages of 15 to 19 living in the city of Pelotas-RS and the prevalence of physical inactivity found was of 39% (22% for boys and 55% for girls), classifying sedentary habits as less than 20 minutes of physical activity at least three times per week; Hallal et al.<sup>16</sup>, using the same outcome definition as this study, identified a level of inactivity of 58.2% in adolescents between the ages of 10 to 12 in Pelotas-RS; and Farias Jr.<sup>11</sup> reported a prevalence of physical inactivity of 55.9% in adolescents between the ages of 14 to 18 (45.5% for boys and 64.2% for girls) in João Pessoa-PB.

Ceschini et al.<sup>3</sup> evaluated adolescents between the ages of 14 to 19 participating and not participating in the project to encourage physical activity named “Agita São Paulo” through a questionnaire similar to that used in this study, and the prevalence of physical inactivity found was 62.5% in the participants of this project. However, the prevalence of physical inactivity of the non-participants was higher than this study, which was 75.6%<sup>3</sup>. This evaluation was similar to another study conducted in the city of Niterói-RJ with adolescents between the ages of 14 to 15 in which 85% of the boys

and 94% of the girls were classified as sedentary, using the physical activity questionnaire for children (PAQ -C), which classified as sedentary those with a score of less than three on the scale. Physical activity at school and at play was considered in this case<sup>18</sup>. A study of school-aged children and adolescents from Aracaju, also using the PAQ-C, showed similar data with a prevalence of inactivity of 85.2% for girls and 69.8% for boys<sup>23</sup>. Another study of schoolchildren in the city of Curitiba-PR between the ages of 14 to 18 showed that 77.9% of the boys and 90.9% of the girls are insufficiently active, and the outcome was defined as not achieving five days of moderate or vigorous physical activity per week<sup>24</sup>. Despite the different evaluation methods, it can be observed that in studies that found higher prevalence of insufficient physical activity, the age range evaluated is more restricted than the present study and consists of adolescents over 14 years old, which confirms the increase of the prevalence of insufficient physical activity with increasing age<sup>16-18,23,24</sup>.

Age is a variable often related to the prevalence of physical activity, and its increase seems to present a declining trend in the daily average of energy expenditure at the expense of less physical activity<sup>3,17-19,25</sup>. The results of this study tend in this direction only in the male adolescents, in which physical activity levels appear to decrease with advancing age. Entering the job market, lack of time, and discontentment with the practices of physical education have been factors related to the decrease in the levels of physical activity with increasing age<sup>16</sup>. Therefore, extra-curricular strategies to promote health, encompassing the practice of physical activity, should be valued and encouraged since childhood by means of intersectoral actions from the sectors of education and health.

Boys are more active with a 58.9% prevalence of insufficient physical activity versus 81.9% for girls, which are data similar to other Brazilian studies even with different evaluative tools<sup>14,19,20,26,27</sup>. Because of this, programs emphasizing the female adolescent population should be encouraged.

For adolescents, the variable of not currently studying was associated with insufficient physical activity, meaning that the boys who were studying were 27% more active, and the girls 15%. Most Brazilian studies involving physical activity in adolescents were conducted in schools<sup>23-25</sup> and the population-based studies found either did not report this parameter<sup>16,19,24</sup> or the percentage found was irrelevant<sup>4</sup>. The prevalence of adolescents who reported to be working was 15.3% and of these, 58% said that they went to work by an active means of transport.

No relationship was found between physical activity level and skin color, which is in agreement with a study of schoolchildren between the ages of 14 to 19 in Pernambuco<sup>25</sup>. In contrast, a study conducted in the city of Pelotas-RS found an association of increased physical activity (recreation and transportation) and the color of non-white skin, even when adjusted by the socioeconomic variable<sup>14</sup>.

Studies have shown that adolescents from a higher socioeconomic level in Brazil have higher levels of physical activity, and poverty is a risk fac-

tor for physical inactivity<sup>4,16,17</sup>. Socioeconomic status in this study did not have a significant association with the prevalence of insufficient physical activity. This lack of differentiation may occur due to behavioral and social factors that seem to affect the socioeconomic levels equally, such as lack of security, the areas related to violence and drug trafficking, the progressive reduction of open spaces in urban centers, the difficulty of access and availability of recreational areas and activities, which all lead to less recreational opportunities and a physically active life<sup>10,24</sup>.

Sedentary behavior and insufficient physical activity are known to lead to becoming overweight and obesity. Furthermore, it seems as though sedentary activities such as watching television, playing *video games*, and using computers favor the increased prevalence of excess weight<sup>12,24</sup>. However, no association was found between insufficient physical activity, being overweight, and obesity, which is in agreement with several epidemiological studies<sup>17,18,26</sup>. One explanation for these results can be attributed to the limitation of BMI as a method of classification of nutritional status, because, although it is widely used as a valid indicator for this screening, it presents problems of specificity and sensitivity when applying it to teens<sup>28</sup>.

Regarding the types of physical activity practiced, the most common for boys was field soccer (74.5%) followed by riding bike (39.5%) and futsal (17.5%). For the girls it was walking (32.5%) followed by field soccer (31.9%) and volleyball (30.0%). In a study conducted in Rio de Janeiro with adolescents between the ages of 14 and 15, the activity most practiced among boys was soccer while with the girls it was walking and dancing<sup>18</sup>. In another study conducted in Pelotas-RS with adolescents between the ages of 10 to 12, the boys confirmed their preference for soccer (65%), while the girls practiced volleyball (47%) more often<sup>16</sup>. In adolescents between the ages of 10 and 19, once again soccer was the most frequent with the boys (63.4%) and walking with the girls (45%)<sup>19</sup>. This seems to be a standard: the boys practice team sports more frequently, especially soccer, a sport related to our country's culture, while the girls prefer activities such as walking. However, despite soccer among boys being predominant and receiving greater media visibility, more and more this sport is found as being popular among girls as well.

The use of a questionnaire to assess the level of physical activity may be a limitation of the study; however, it has a good applicability for large groups and is inexpensive, making it possible to be replicated in other locations, enabling better comparative analyses. Moreover, the variety of instruments used to assess the prevalence of insufficient physical activity in Brazil, the lack of standardization in defining this outcome and its associated variables assessed, and the comparative analysis of the level of physical activity of adolescents are all limiting factors, and therefore there seems to be a need for methodologies as those used in this study. The variables related to family physical activity could be added in future studies as well as the reasons for doing physical activity or not. Direct measurements such as weight and height could also be done, and even the use of the accelerometer.



## CONCLUSION

Despite recognizing the importance of physical activity as a factor in promoting health and preventing disease, the prevalence of insufficient physical activity showed up as being high in adolescents 10 to 19 years old in the Health Districts of Restinga and Extremo Sul of Porto Alegre-RS. Being a girl, not studying, and between the ages of 16 and 19, may be factors that increase the levels of insufficient physical activity. It is evident that interventions need to be developed that respect the differences between boys and girls for promoting physical activity in this age group.

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