

## ORIGINAL ARTICLE

# Body image is associated with leisure-time physical activity and sedentary behavior in adolescents: data from the Brazilian National School-based Health Survey (PeNSE 2015)

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**Objective:** To evaluate the association of leisure-time physical activity and sedentary behavior with body image concern and satisfaction in Brazilian adolescents.

**Methods:** Data were extracted from the 2015 Brazilian National Adolescent School-based Health Survey (Pesquisa Nacional de Saúde do Escolar [PeNSE]). Information regarding body image concern and satisfaction, as well as exposures (physical activity and sedentary behavior) and covariates (maternal education, age, smoking, and alcohol intake), were assessed through a questionnaire.

**Results:** Logistic regression analysis revealed that engagement in recommended levels of physical activity ( $\geq 300$  min/week) was associated with a decreased concern with body image and a high satisfaction in boys. Four or more hours spent in sedentary activities were associated with increased concern with body image and dissatisfaction among boys and girls.

**Conclusion:** These findings support the relevance of programs aiming to promote physical activity and reduce sedentary behavior in the adolescent population. Such programs play a protective role against body dissatisfaction and are important for the development of a healthy body image in adolescence.

**Keywords:** Body dissatisfaction; body image; physical activity; sedentary lifestyle; adolescents

## Introduction

Adolescence is characterized by psychological and physical transitions, as well as behavioral changes, which can affect general health, wellbeing, body image, and other characteristics in adulthood.<sup>1</sup> Also, it stands out as a period in which boys and girls are more prone to social pressures as they try to adapt to imposed environmental standards, which impacts their body image.<sup>2</sup>

Body image reflects how individuals think, feel, see, and act in relation to their bodies.<sup>3</sup> It is a multidimensional construct supported by attitudinal and perceptual dimensions. The body image attitudinal dimension assesses cognitive, emotional, and behavioral aspects, in addition to dissatisfaction with the body itself.<sup>1,3</sup>

Body dissatisfaction refers to a subjective assessment of a person's negative perception of their own body. Exposure to sociocultural factors; opinions of family, friends, and peers; and ideals of leanness and muscle definition promoted by the media can lead to negative body perception in adolescents. In addition, such perception is influenced by cognitive, psychological, and physical factors.<sup>4,5</sup>

Although the relationship between the aforementioned factors and body image has been extensively investigated, little is known about the relationship between body image and behavioral factors, namely, physical activity and sedentary behavior. Moreover, it is worrisome that while physical activity levels tend to decrease in adolescence, time spent on sedentary behavior increases considerably.<sup>6,7</sup> A scoping review showed that engaging in physical activities and sports is related to a less negative body image. This relationship might support the hypothesis that physical changes brought by engaging in physical activities can promote a more positive body image.<sup>8</sup>

With the progressive increase in technologies and the rise of social networks, adolescents are highly exposed to unattainable and idealized physical forms, and have thus become more prone to the demands of imposed beauty standards.<sup>9,10</sup> A recent study with Brazilian adolescents showed that 45% were dissatisfied with their bodies, and that physical inactivity was associated with this condition.<sup>11</sup> However, this study did not assess whether sedentary behavior is associated with body dissatisfaction, nor whether these behaviors are related to body image concerns by adolescents.

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In this context, it is relevant to provide evidence to understand whether physical activity and sedentary behavior are associated with adolescents' body image. It should be noted that cultural and economic factors play an important role in body image perception,<sup>7</sup> which limits extrapolation from previous studies conducted in high-income countries. This is especially relevant in national representative samples of upper-middle-income countries such as Brazil, where inequalities are evident. Thus, we sought to elucidate the following question: what is the relationship between body image, leisure-time physical activity, and sedentary behavior in adolescents?

The initial hypothesis was that active adolescents who spent less time in sedentary activities would show less dissatisfaction, as well as a greater concern with their bodies. Thus, the aim of this study was to evaluate the relationship of leisure-time physical activity and sedentary behavior with body image concern and satisfaction in adolescents who participated in the 2015 Brazilian National Adolescent School-based Health Survey (Pesquisa Nacional de Saúde do Escolar [PeNSE]).

## Methods

### *Study design and sample*

We used data from the 2015 PeNSE. This nationwide survey was conducted in partnership with the World Health Organization (WHO), the Pan American Health Organization (PAHO), and the United States Centers for Disease Control and Prevention (CDC/USA), allowing comparability with international research. PeNSE aims to fill gaps in knowledge about the health situation of Brazilian adolescents and comply with current recommendations.

The survey had four waves (2004, 2009, 2012, and 2015). In the first three waves, the sample consisted of ninth-grade students only. The 2015 edition included two samples, the first consisting of ninth-grade students ( $n=102,301$ ) and the second of fifth- to ninth-grade students, as well as secondary students aged 13 or older ( $n=10,926$ ). In the present study, data from the second sample of the 2015 wave were evaluated. Those participants who did not provide information on maternal educational attainment ( $n=2,374$ ), as well as those whose mothers had no formal schooling ( $n=454$ ), were excluded. Thus, our final sample was composed of 8,098 participants.

The target population of the study was composed of students from public and private schools located in urban and rural areas. The sample size was estimated considering the 26 state capitals of Brazil and the Federal District, distributed across the five macro-regions of the country. A cluster sampling process was used to select the sample. Schools in each macro-region of Brazil (North, Northeast, Southeast, South, and Midwest) were considered. In these schools, students of selected classes were asked to participate in the survey. Sample size dimensions in each stratum were considered with an approximate maximum sampling error of 3%, in absolute values, to estimate a 50% proportion with a 95%

confidence level. The final stratification included 53 geographic strata, 27 representing each of the state capitals and the Federal District and 26 representing other municipalities in each Brazilian state, excluding capitals. Sample selection units were carried out in two stages: 1) schools stratified by school system (public and private); 2) by sizes; and 3) by grade. Additional information can be found elsewhere.<sup>12,13</sup>

### *Data collection*

The same questionnaire was administered to all students in samples 1 and 2. Smartphones were used to administer the questionnaire while students were in the classroom. The survey was developed based on standardized questionnaires that were previously adapted for Brazilian adolescents. Interviewer training courses were conducted in each state and the Federal District to ensure the quality and standardization of data collection procedures.

### *Outcome assessment*

Two main outcomes were used in the present study: body image concern and body satisfaction. Body image concern was assessed through the following question: Do you consider your body image as being something: 1) very important; 2) important; 3) not very important; or 4) not important. To assess body satisfaction participants were asked: How do you feel about your body? 1) very satisfied, 2) satisfied, 3) indifferent, 4) dissatisfied, or 5) very dissatisfied. For purposes of analysis, answer categories were pooled as follows to yield a dichotomous positive/negative classification: very important/important and not very important/not important; very satisfied/satisfied and indifferent/dissatisfied/very dissatisfied, respectively.<sup>14</sup>

### *Physical activity and sedentary behavior*

Physical activity in the 7 days prior to the interview was assessed. This study was specifically designed to address physical activities performed during leisure time. Participants who engaged in  $\geq 300$  min per week were considered active, whereas those who performed  $< 300$  min per week were considered physically inactive.<sup>15</sup>

Sedentary behavior was assessed through the following question: On a typical weekday, how long are you sitting, watching television, on a computer, playing video games, talking to friends, or doing other activities while sitting? For purposes of analysis, this variable was dichotomized as  $\leq 4$  h/day and  $> 4$  h/day.

### *Assessment of covariates*

The following covariates were assessed: maternal education, age, smoking, and alcohol intake. Maternal education was used as a socioeconomic proxy variable and was categorized as some primary education, graduated elementary school, graduated high school, and graduated college. The sample age was divided into two groups:

13 to 15 years and 16 to 17 years. Smoking and alcohol intake were assessed as yes-or-no questions.

#### Ethics statement

The project was approved by the Brazilian National Research Ethics Commission (Comissão Nacional de Ética em Pesquisa [CONEP]; protocol no. 1.006.467/2015) in accordance with National Health Council (Conselho Nacional de Saúde [CNS]) Resolution no. 196 of October 10, 1996. Participation was voluntary and participants were allowed to skip any questions or refuse to answer the whole questionnaire. All individual information was kept confidential, and schools were also not identified.<sup>12</sup>

#### Statistical analysis

Data were analyzed using the STATA statistical package, version 14.0. Descriptive statistics (absolute and relative frequencies) were used to characterize the sample according to the studied outcomes and covariates. Crude and adjusted logistic regression analyses were performed, with their values expressed as odds ratios (OR) and their respective 95% confidence intervals (95%CI). The analysis was adjusted for sex, age, maternal education, and skin color. Only variables with  $p < 0.20$  in crude analysis remained in the adjusted model. An alpha of 5% was considered for statistical significance.

#### Results

Most of the participants were aged 13 to 15 years (65.2%), male (50.5%), and nonwhite (60.6%). Regarding maternal education, graduated high school (32.1%) was the most reported level. The sociodemographic characteristics of the study sample, stratified by sex, are shown in Table S1, available as online-only supplementary

material. No associations were observed between sex, skin color, and age. Graduated high school was the highest maternal educational level reported by both boys and girls (34.1 and 33.8%, respectively;  $p < 0.001$ ).

The majority of participants did not meet the physical activity recommendation (67.6%), and 41.5% reported engaging in sedentary activities for 4 to 8 h/day. Male participants were more likely to meet physical activity recommendations (41.2%) than females (23.4%;  $p < 0.001$ ). In addition, the prevalence of sedentary behavior lasting 4 to 8 h/day was higher among girls than boys: 44.5 and 41.6%, respectively ( $p = 0.007$ ).

Regarding body image concerns, most participants reported that body image was very important/important (83.4%) and most were satisfied with their bodies (68.2%). Girls were more concerned with their body image compared to boys (86 vs. 82.3%, respectively;  $p < 0.001$ ). On the other hand, male participants (72.2%) were more satisfied with their body image when compared to female ones (59.3%;  $p < 0.001$ ).

Table 1 shows the crude and adjusted analyses between body image concern and body satisfaction, physical activity, and sedentary behavior for the overall sample. Participants who met physical activity recommendations were less likely to be dissatisfied with their bodies (OR 0.60; 95%CI 0.53-0.68). Regarding sedentary behavior, those who reported more time per day sitting ( $\geq 4$  h/day) were more likely to consider their body image less important (OR 1.18; 95%CI 1.04-1.33) and report greater dissatisfaction with their bodies (OR 1.41; 95%CI 1.28-1.55).

Tables 2 and 3 present crude and adjusted analyses between body image concern/body satisfaction and physical activity/sedentary behavior, stratified by sex. Male participants who met physical activity recommendations were less likely to be dissatisfied with their bodies (OR 0.55; 95%CI 0.47-0.65) and to report that their body image was not important (OR 0.64; 95%CI 0.53-0.78).

**Table 1** Crude and adjusted analyses for the relationship of body image concern and body image satisfaction with leisure-time physical activity and sedentary behavior (PeNSE 2015, n=8,049)

	Crude OR (95%CI)	p-value	Adjusted* OR (95%CI)	p-value
<b>Body image concern</b>				
Sedentary behavior (n=8,053), h/day				
< 4	1.0	< 0.001	1.0	0.007
$\geq 4$	1.16 (1.03-1.31)		1.18 (1.04-1.33)	
Leisure-time physical activity (n=8,053), min/week				
< 300	1.0	0.106	1.0	0.136
$\geq 300$	0.91 (0.79-1.03)		0.91 (0.80-1.03)	
<b>Body satisfaction</b>				
Sedentary behavior (n=8,041), h/day				
< 4	1.0	< 0.001	1.0	< 0.001
$\geq 4$	1.47 (1.34-1.61)		1.41 (1.28-1.55)	
Leisure-time physical activity (n=8,041), min/week				
< 300	1.0	< 0.001	1.0	< 0.001
$\geq 300$	0.68 (0.61-0.75)		0.60 (0.53-0.68)	

95%CI = 95% confidence interval; OR = odds ratio; PeNSE = Pesquisa Nacional de Saúde do Escolar (Brazilian National Adolescent School-based Health Survey).

\*Adjusted for age, maternal education, smoking, and alcohol intake.

**Table 2** Crude and adjusted analyses for the relationship of body image concern with leisure-time physical activity and sedentary behavior in male and female adolescents (PeNSE 2015)

	Crude OR (95%CI)	p-value	Adjusted* OR (95%CI)	p-value
<b>Male (n=3,966)</b>				
Sedentary behavior, h/day		0.001		0.001
< 4	1.0		1.0	
≥ 4	1.33 (1.13-1.56)		1.32 (1.12-1.55)	
Leisure-time physical activity, min/week		< 0.001		< 0.001
< 300	1.0		1.0	
≥ 300	0.74 (0.62-0.85)		0.64 (0.53-0.78)	
<b>Female (n=4,085)</b>				
Sedentary behavior, h/day		0.829		0.678
< 4	1.0		1.0	
≥ 4	1.02 (0.85-1.21)		1.04 (0.87-1.24)	
Leisure-time physical activity, min/week		0.615		0.434
< 300	1.0		1.0	
≥ 300	1.05 (0.85-1.30)		1.11 (0.86-1.44)	

95%CI = 95% confidence interval; OR = odds ratio; PeNSE = Pesquisa Nacional de Saúde do Escolar (Brazilian National Adolescent School-based Health Survey).

\* Adjusted for age, maternal education, smoking, and alcohol intake.

**Table 3** Crude and adjusted analyses for the relationship of body satisfaction with leisure-time physical activity and sedentary behavior in male and female adolescents (PeNSE 2015)

	Crude OR (95%CI)	p-value	Adjusted* OR (95%CI)	p-value
<b>Male (n=3,956)</b>				
Sedentary behavior, h/day		< 0.001		< 0.001
< 4	1.0		1.0	
≥ 4	1.42 (1.22-1.62)		1.37 (1.18-1.58)	
Leisure-time physical activity, min/week		< 0.001		< 0.001
< 300	1.0		1.0	
≥ 300	0.63 (0.54-0.73)		0.55 (0.47-0.65)	
<b>Female (n=4,085)</b>				
Sedentary behavior, h/day		< 0.001		< 0.001
< 4	1.0		1.0	
≥ 4	1.44 (1.31-1.69)		1.39 (1.22-1.58)	
Leisure-time physical activity, min/week		0.219		0.291
< 300	1.0		1.0	
≥ 300	0.91 (0.79-1.06)		0.90 (0.74-1.09)	

95%CI = 95% confidence interval; OR = odds ratio; PeNSE = Pesquisa Nacional de Saúde do Escolar (Brazilian National Adolescent School-based Health Survey).

\* Adjusted for age, maternal education, smoking, and alcohol intake.

There was no association between leisure-time physical activity and body image concern or satisfaction in female participants.

Male participants who spent 4 to 8 h/day on sedentary behaviors were more likely to consider their body image important (OR 1.32; 95%CI 1.12-1.55). However, no significant association was observed for female participants. When the relationship between sedentary behavior and body image satisfaction was analyzed, a significant association was observed in both sexes. Those who engaged in sedentary activities for 4 to 8 h/day were more likely to be dissatisfied with their bodies (males: OR 1.37; 95%CI 1.18-1.58; females: OR 1.39; 95%CI 1.22-1.58).

## Discussion

The findings of this nationally representative study indicate that, in general, adolescents who engage in recommended levels of physical activity are less likely to be dissatisfied with their body image. On the other hand, engaging in 4 or more hours of sedentary activities per day showed an opposite effect. Nevertheless, stratified analysis showed that, for body image concern and body satisfaction, this relationship was only significant for boys; among girls, only sedentary behavior was associated with body dissatisfaction.

Our findings are in line with previous studies, corroborating the evidence that different factors influence body

satisfaction between girls and boys.<sup>2,4,7,9,16-18</sup> The physical changes inherent to adolescence seem to affect females' body satisfaction more intensely.<sup>17</sup> A longitudinal study showed a 4% reduction in body satisfaction among girls after 2 years of follow-up, while satisfaction levels remained stable among boys.<sup>19</sup> Another study followed adolescent girls from the seventh to the eleventh grade and found that they had early and growing dissatisfaction as they grew older.<sup>20</sup> It is plausible that older adolescents are more concerned with these factors than younger adolescents, who transitioned from childhood less recently.

Because women are more exposed to the media, in which there is a discrepancy between the ideal presented and real bodies, this might translate into excessive self-demands with respect to female aesthetic standards.<sup>2,18</sup> At the same time, an increase in muscle mass has been observed in male adolescents in this population, which brings their actual body image to the male figure idealized by the media and can thus contribute to greater body-image satisfaction among boys.<sup>2</sup> In this context, girls perform physical activities in order to lose weight/body fat, while for boys, the goal is to increase muscle mass.<sup>21</sup>

The findings of our study reveal that active adolescents attached greater importance to body image and were less likely to be dissatisfied with their bodies, which is in line with previous studies in this population.<sup>7,10,21,22</sup> Stratified analysis showed that, among active boys, less dissatisfaction and a greater concern with body image were observed; however, the same was not observed in girls. Indeed, previous evidence had already shown that engagement in sports activities has a positive effect on body satisfaction but with a significant moderation of sex, with the association holding true only in boys.<sup>16</sup>

The greater aesthetic demands placed on girls may help to explain the lack of an association in females. The sociocultural concept of an idealized body for the female sex is characterized by elegance and fragility, which makes girls less likely to desire a sportswoman's body. Two other reasons should be considered: aesthetic standards contribute to girls disliking sportswear; and menstrual periods can cause discomfort during practice.<sup>23</sup> Due to these factors, girls can be physically inactive despite placing high importance on self-image.

A study carried out with female adolescents (aged 14 and 19) from a public school demonstrated that body dissatisfaction was associated with less physical activity and increased time spent in sedentary activities.<sup>1</sup> The findings of our study also demonstrated an association of sedentary behavior with dissatisfaction and body image concern. The stratified analysis confirmed that adolescents of both sexes who remain more than 4 hours in sedentary behaviors presented a higher risk of dissatisfaction, while a greater importance attributed to body image was only confirmed for males.

Prolonged screen time may be a surrogate marker of greater exposure to unreal and idealized body shapes, and social networks have expanded the spread of these beauty standards.<sup>9,10</sup> In this sense, a study with Spanish adolescents showed that body dissatisfaction was associated with higher levels of exposure to TV shows and magazines that addressed topics such as diet, fitness,

and beauty.<sup>4</sup> Computer time at leisure was associated with greater body dissatisfaction among girls, but not among boys. Conversely, computer time for schoolwork was associated with a more positive body image, which may indicate that, in this case, girls are less exposed to beauty ideals and, therefore, to a lesser influence on their self-perception.<sup>10</sup>

Sociocultural influence is the main driver of body dissatisfaction, with lesser effects from biological and psychological variables.<sup>24</sup> Although body size – generally assessed by the body mass index (BMI) – can contribute to body image, perceptions related to social pressures, comparisons, and internalization may also play a central role in the way adolescents evaluate their bodies.<sup>25</sup>

Evidence points to an association between the importance attributed to body image and body perception, indicating that body self-evaluation in adolescents is closely related to the centrality that body appearance has in their values. This can consequently reflect on their efforts to maintain or adapt to aesthetic standards, seeking to lose body weight or gain muscle mass.<sup>26</sup> This is in line with the findings of the present study, in which active boys attributed greater importance to body image, while those who spent more time in sedentary behaviors rated it as less important.

Some limitations of the present study are worth noting. The exposures of physical activity and sedentary behavior were investigated through a questionnaire, and are thus susceptible to information bias. We cannot rule out residual confusion due to unmeasured variables, such as maturation stage and BMI. Data regarding weight and height were not properly assessed in the PeNSE 2015 survey, which prevented us from looking for a possible relationship between BMI and body image. Also, due to the cross-sectional design of our study, we cannot rule out the possibility of reverse causality. Future prospective or experimental studies are needed to elucidate causal links between body image and health behaviors in adolescents.

The sample size and selection representative of the Brazilian adolescent population is the main strength of this study. Besides, our study brings new evidence regarding the relationship between body image and health behaviors in adolescence. Physical activity and sedentary behavior are often overlooked in studies that analyze associations with body image.

Our findings suggest that engaging in physical activity can contribute to reduce body image dissatisfaction. This result is important, considering that studies have shown an association of body satisfaction in adolescents with higher levels of well-being,<sup>18</sup> higher self-esteem and lower stress levels,<sup>26</sup> and lower levels of depressive symptoms<sup>16</sup> and emotional and behavioral problems.<sup>9</sup> Thus, the importance of developing a healthy body image in adolescence must be emphasized due to the consequences associated with health.

In conclusion, the present study observed that, in a representative sample of Brazilian adolescents, physical activity was associated with greater body image satisfaction and concern, while a longer time spent in sedentary behavior was inversely associated with these aspects.

It also demonstrated that a worrying proportion of Brazilian adolescents are inactive, spend a long time in sedentary behaviors, and express some degree of dissatisfaction with their body image. This study can substantiate the importance of programs and projects that promote physical activity and aim to reduce sedentary behavior in the adolescent population, given the protective role that physical activity presents against body dissatisfaction.

These findings can also be useful to encourage the design of future interventions. They may be incorporated into the school environment to raise awareness among schoolchildren at an early age. Such interventions should promote discussions on internalization of beauty ideals, social comparisons, body awareness, and self-acceptance. The sex differences raised in the present study are also important to be considered, as girls seem more prone than boys to experience dissatisfaction with their bodies.

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### Disclosure

The authors report no conflicts of interest.

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