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**ORIGINAL ARTICLE /** *ARTIGO ORIGINAL*

# Nutritional status, body image, and their association with extreme weight control behaviors among Brazilian adolescents, National Adolescent Student Health Survey 2015

## *Estado nutricional, imagem corporal e associação com comportamentos extremos para controle de peso em adolescentes brasileiros, Pesquisa Nacional de Saúde do Escolar de 2015*

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**ABSTRACT:** ***Introduction:*** This study aimed to analyze the association between nutritional status, body image perception, and extreme weight control behaviors among adolescents. ***Methods:*** This is an analytical cross-sectional study conducted in Brazil based on the National Adolescent Student Health Survey (*Pesquisa Nacional de Saúde do Escolar* - PeNSE) of 2015, with adolescents aged 13 to 17 years. Nutritional status and body image perception were the independent variables. The two dependent variables were vomiting or laxative use and use of medicines and other formulas for weight control in the 30 days prior to data collection. We used Poisson regression models for association, with demographic variables for control. ***Results:*** 7.4% of adolescents (95%CI 6.7 – 8.2) reported vomiting or using laxatives, with no difference between genders. The prevalence of use of medicines and formulas was higher among boys (7.8%; 95%CI 6.6 – 8.9). The association between nutritional status and extreme behaviors was not significant. However, the prevalence of vomiting or laxative use for adolescents who considered themselves very fat was 2.3 (95%CI 1.1 – 4.7) times higher for boys and 5.3 (95%CI 3.3 – 8.6) times higher for girls, while the use of medicines and formulas was 4.0 (95%CI 2.3 – 7.1) times higher for girls who considered themselves very fat. ***Conclusion:*** Body image perception seems to have a greater influence on extreme behaviors than nutritional status. Strategies involving health services and schools have great potential to impact the self-esteem and health of students positively.

***Keywords:*** Body image. Nutritional status. Adolescent. Vomiting. Weight perception. Weight loss.

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**RESUMO:** ***Introdução:*** Este estudo objetivou analisar a associação entre estado nutricional, percepção da imagem corporal e comportamentos extremos para controle de peso nos adolescentes. ***Metodologia:*** Estudo transversal analítico, realizado no Brasil a partir da Pesquisa Nacional de Saúde do Escolar (PeNSE) de 2015, com adolescentes de 13 a 17 anos. Estado nutricional e percepção da imagem corporal foram as variáveis independentes. As dependentes foram vômito ou uso de laxantes e uso de remédios e outras fórmulas para controle de peso nos últimos 30 dias. Modelos de regressão de Poisson foram empregados para associação, com uso de variáveis demográficas para controle. ***Resultados:*** 7,4% dos adolescentes (IC95% 6,7 – 8,2) relataram vômito ou uso de laxantes, sem diferença entre os sexos. A prevalência de uso de remédio e fórmulas foi maior entre meninos (7,8%; IC95% 6,6 – 8,9). A associação entre estado nutricional e comportamentos extremos não foi significativa; entretanto, a prevalência de vômito ou uso de laxantes foi 2,3 (IC95% 1,1 – 4,7) vezes maior em meninos e 5,3 (IC95% 3,3 – 8,6) vezes maior em meninas que se sentiam muito gordos(as), ao passo que uso de remédios e fórmulas foi 4,0 vezes (IC95% 2,3 – 7,1) maior em meninas que sentiam muito gordas. ***Conclusão:*** A percepção da imagem corporal parece ter maior influência na prática dos comportamentos extremos do que o estado nutricional. Estratégias envolvendo serviços de saúde e escolas têm grande potencialidade para ações que impactem positivamente na autoestima e na saúde dos estudantes.

***Palavras-chave:*** Imagem corporal. Estado nutricional. Adolescente. Vômito. Percepção de peso. Perda de peso.

## INTRODUCTION

Body image can be defined as the perception individuals have of their own body, that is, the way they see themselves[1]. This image is built during all stages of life and is strongly influenced by cultural and social issues, such as media, family, and friends[2,3].

Adolescence is a period of identity construction and biological, cognitive, and emotional transformations, which stimulate adolescents to feel insecure about their body, constituting a critical phase for body image building[4-6].

The use of laxatives and medicines, as well as induced vomiting, are strategies that adolescents have been using for weight control, as they strive to have a socially acceptable body standard[7]. The factors related to this kind of conduct need to be better elucidated, since such practices are considered risk behaviors for the development of eating disorders, such as anorexia and bulimia.

Body image perception seems to be one of the determining factors for the emergence of abnormal eating behaviors and inadequate weight control practices[8]. Previous studies conducted with 9th-grade adolescents in Brazilian state capitals[9,10] revealed a relationship between extreme weight control behaviors and body image perception. However, we still do not know the strength of this association in a representative Brazilian sample, with an expanded age group, and measured anthropometric data that allow the assessment of nutritional status.

Considering this context and the need to deepen the knowledge about the topic in the country, this study aimed to analyze the association between nutritional status, body image perception, and extreme weight control behaviors in a representative Brazilian sample of adolescent students aged 13 to 17 years, who participated in the National Adolescent Student Health Survey (*Pesquisa Nacional de Saúde do Escolar* - PeNSE) in 2015.

## METHODS

This is an analytical cross-sectional study carried out with PeNSE 2015 data. PeNSE is a health survey aimed at the adolescent population and conducted triennially since 2009, through a partnership between the Ministry of Health and the National Institute of Geography and Statistics (*Instituto Nacional de Geografia e Estatística* - IBGE), with the support of the Ministry of Education[11].

In 2015, PeNSE data collection was based on two distinct sampling plans: Sample 1, which included 9th-grade students from elementary school, representing state capitals, Brazil, regions, and federative units; and Sample 2, which consisted of adolescents aged 13 to 17 years, representing Brazil and its regions[11]. This study used Sample 2 of PeNSE 2015, as it contains anthropometric measurements (weight and height) that allowed the assessment of the nutritional status of these students.

The population comprises students who, in 2015, attended from 6th to 9th grade of elementary school and 1st to 3rd grade of high school, both public and private, in the national territory. Further details regarding PeNSE design and sampling can be found in specific publication[11]. In summary, Sample 2 comprised 653 selected classes of the mentioned population, distributed in 380 schools in 179 cities. Schools were selected from the School Census 2013, considering only those who had at least 15 students enrolled in the set of classes chosen.

In these schools, all students from the classes selected who were present on the day of the questionnaire application were invited to participate in the survey. However, we only kept students aged 13 to 17 years in the sample.

Students recorded their answers directly on an electronic questionnaire accessed on smartphones, without interference from the interviewer.

After filling out the questionnaire, the students went to an environment different from the classroom, so a trained interviewer could measure their anthropometric data (weight and height). Students with impairments that could hamper the anthropometric measurements or who refused to participate in the procedure were excluded from this stage of the study. A portable electronic scale measured the weight, and a portable stadiometer fixed on a smooth wall, with the help of adhesive tape, measured the height. The technicians were instructed to measure weight and height twice and repeat it a third time if the previous results were different. However, only one information for each variable was recorded on the student's smartphone.

Among the information available on PeNSE 2015, the ones of particular interest for the present study are nutritional status, body image perception, and extreme weight control behaviors of adolescents.

Nutritional status was assessed through body mass index (BMI), calculated from the ratio between weight (kg) and height squared ($m^2$). We adopted the BMI classification for age in z-scores, with cut-offs proposed by the World Health Organization (WHO)[12]: z-score < -2: thinness; z-score > -2 and < +1: normal weight; z-score > +1: overweight; and z-score > +2: obesity. The indicator of body image perception was based on the question "Regarding your body, do you consider yourself": with answers categorized into "thin/very thin, normal, fat, or very fat."

Two indicators represented extreme weight control behaviors:

- vomiting or laxative use for weight control in the 30 days prior to data collection (estimated based on the question "In the past 30 days, did you vomit or took laxatives to lose or avoid gaining weight?": yes or no);
- use of medicines, formulas, or other products for weight control in the 30 days prior to data collection (estimated based on the question "In the past 30 days, did you take any medicine, formula, or other product to lose weight without medical supervision?": yes or no).

Some control variables identified in the literature complemented the analyses:

- region (North, Northeast, Southeast, South or Midwest);
- gender: male or female;
- age (13, 14, 15, 16, or 17 years);
- school administrative dependence (public or private), used in this study as indicative of socioeconomic condition.

We estimated the frequencies (and confidence interval of 95% – 95%CI) of the studied variables, stratified by gender, and the indicators of extreme weight control behaviors, categorized by gender, region, age, and school administrative dependence. The estimate of prevalence ratios (PRs) and the association between dependent and independent variables were calculated by Poisson regression models, stratified by gender. We used a model for the association between nutritional status and extreme weight control behaviors, adjusted for body image perception, region, age, and administrative dependence; and another to estimate the association between body image perception and extreme behaviors, adjusted for nutritional status, and the same demographic variables of the previous model. We used the Stata S/E 14.2 software to analyze the data, considering the complex design of the PeNSE 2015 sample, and adopting a significance level of 5%.

The National Committee for Ethics in Research of the National Health Council approved this research. Participation in the survey was voluntary and with minimal risk to the adolescents. Students consented to participate in the study digitally using the data collection instrument. Parents or guardians were not required to sign the

informed consent form due to the autonomy of adolescents, guaranteed by the Child and Adolescent Statute[13].

## RESULTS

Sample 2 of PeNSE 2015 consists of data collected from 16,608 adolescents from elementary and high school. After excluding adolescents out of the age group selected and questionnaires without gender and age variables, 10,926 students remained in the sample and were analyzed in the present study. Among them, 50.3% were male, 61.9% were 13- to 15-year-olds, and 87.1% attended public schools (Table 1).

Assessment of nutritional status showed that 73.2% of the students had normal weight. Thinness prevalence was higher among male adolescents (3.8%), and there were no differences between genders regarding overweight and obesity. In relation to body image, 52.5% of adolescents reported considering themselves normal, with lower prevalence among boys. We underline that 27.6% of adolescents saw themselves as thin or very thin, and the prevalence of those who considered themselves fat or very fat was higher among girls (21.5 and 3.2%, respectively) (Table 1).

Out of the total number of adolescents, 7.4% reported vomiting or using laxatives for weight control in the 30 days prior to data collection, with no differences between genders. The prevalence of use of medicines, formulas, or other products with the same purpose was greater among male adolescents (7.8%) (Table 1).

For them, the prevalence of both extreme weight control behaviors decreased with age, with vomiting and laxative use having a more pronounced reduction. The prevalence of both extreme behaviors was higher for boys attending public schools. These phenomena did not happen with girls (Table 2).

The analysis by region showed no differences in the prevalence of extreme behaviors, except for the Northeast region, where male adolescents had a higher prevalence of vomiting or using laxatives, compared with the North and Midwest regions (Table 2).

The descriptive analysis also emphasizes that, among girls and the total number of adolescents, the prevalence of extreme behaviors tends to increase with the rise in BMI. It is noteworthy, however, the significant prevalence of vomiting or laxative use (8.2%; 95%CI 4.3 – 15.2) and use of medicines, formulas, or other products (10.3%; 95%CI 6.1 – 16.8) among thin boys (Table 2).

Similarly to nutritional status, the prevalence of extreme behaviors was higher among boys who considered themselves thin / very thin (9.8%; 95%CI 7.6 – 12.5 for vomiting or laxative use and 9.6%; 95%CI% 7.3 – 12.7 for use of medicines, formulas, or other products). For both genders, the prevalence of extreme behaviors increased significantly in adolescents who saw themselves as fat or very fat, when compared to those who considered themselves normal (Table 2).

The results of the multiple model showed that, except for overweight girls, the effect of nutritional status on the prevalence of extreme behaviors was not significant.

Table 1. Sample distribution by demographic variables, nutritional status, body image perception, and weight control behaviors, according to gender, in Brazil and its regions. National Adolescent Student Health Survey 2015.

| | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | % | 95%CI | % | 95%CI | % | 95%CI |
| Age group (years) | | | | | | |
| 13 to 15 | 62.8 | 59.0 – 66.4 | 61.1 | 56.6 – 65.5 | 61.9 | 58.1 – 65.6 |
| 14 to 17 | 37.2 | 33.6 – 41.0 | 38.9 | 34.5 – 43.4 | 38.1 | 34.3 – 41.9 |
| Administrative dependence | | | | | | |
| Public | 87.5 | 85.5 – 89.5 | 86.6 | 84.2 – 88.7 | 87.1 | 84.9 – 89.0 |
| Private | 12.5 | 10.5 – 14.8 | 13.4 | 11.3 – 15.8 | 12.9 | 11.0 – 15.1 |
| Region | | | | | | |
| North | 9.6 | 7.9 – 11.4 | 8.8 | 7.4 – 10.5 | 9.2 | 7.7 – 10.9 |
| Northeast | 29.0 | 26.1 – 32.1 | 28.1 | 25.1 – 31.3 | 28.6 | 26.0 – 31.3 |
| Southeast | 40.3 | 36.9 – 43.9 | 41.7 | 38.1 – 45.4 | 41.0 | 38.0 – 44.2 |
| South | 13.6 | 12.2 – 15.2 | 13.6 | 11.8 – 15.5 | 13.6 | 12.2 – 15.1 |
| Midwest | 7.5 | 6.6 – 8.4 | 7.8 | 6.7 – 8.9 | 7.6 | 6.8 – 8.6 |
| Nutritional status | | | | | | |
| Thin | 3.8 | 3.2 – 4.5 | 2.4 | 1.9 – 3.2 | 3.1 | 2.7 – 3.6 |
| Normal weight | 72.5 | 70.8 – 74.2 | 73.8 | 72.1 – 75.3 | 73.2 | 72.0 – 74.3 |
| Overweight | 15.4 | 14.1 – 16.7 | 16.5 | 15.2 – 17.8 | 15.9 | 15.1 – 16.8 |
| Obesity | 8.3 | 7.3 – 9.4 | 7.3 | 6.3 – 8.3 | 7.8 | 7.0 – 8.6 |
| Body image perception | | | | | | |
| Thin/very thin | 28.6 | 26.8 – 30.5 | 26.7 | 25.1 – 28.2 | 27.6 | 26.4 – 28.8 |
| Normal | 56.3 | 54.4 – 58.2 | 48.6 | 46.7 – 50.6 | 52.5 | 51.1 – 53.8 |
| Fat | 13.5 | 12.1 – 15.1 | 21.5 | 20.0 – 23.1 | 17.5 | 16.4 – 18.7 |
| Very fat | 1.6 | 1.1 – 2.1 | 3.2 | 2.6 – 3.8 | 2.4 | 2.0 – 2.7 |
| Extreme weight control behaviors | | | | | | |
| Vomiting or laxative use | 7.6 | 6.6 – 8.9 | 7.1 | 6.3 – 8.0 | 7.4 | 6.6 – 8.2 |
| Medicines, formulas, or other products | 7.8 | 6.6 – 9.3 | 5.5 | 4.7 – 6.5 | 6.7 | 5.9 – 7.6 |

95%CI: confidence interval of 95%.

Table 2. Prevalence of extreme weight control behaviors for males, females, and the total number of adolescents, according to nutritional status, body image perception, age, administrative dependence, and region, with a confidence interval of 95%. National Adolescent Student Health Survey 2015.

| | Prevalence of vomiting or laxative use for weight control in the 30 days prior to data collection | | | | | | Prevalence of use of medicines, formulas, or other products for weight control in the 30 days prior to data collection | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| | % | 95%CI | % | 95%CI | % | 95%CI | % | 95%CI | % | 95%CI | % | 95%CI |
| Age (in years) | | | | | | | | | | | | |
| 13 | 11.1 | 8.5 – 14.3 | 6.9 | 5.0 – 9.3 | 9.0 | 7.4 – 10.9 | 10.8 | 8.6 – 13.5 | 5.4 | 4.1 – 7.1 | 8.2 | 6.9 – 9.7 |
| 14 | 9.5 | 7.3 – 12.3 | 7.1 | 5.1 – 9.9 | 8.3 | 6.7 – 9.5 | 8.9 | 6.5 – 12.2 | 4.9 | 3.5 – 6.9 | 7.0 | 5.4 – 8.9 |
| 15 | 7.6 | 5.6 – 10.1 | 8.1 | 6.2 – 10.6 | 7.9 | 6.4 – 9.5 | 8.1 | 6.0 – 10.7 | 6.5 | 4.6 – 9.0 | 7.3 | 5.8 – 9.1 |
| 16 | 6.5 | 4.8 – 8.8 | 6.6 | 5.2 – 8.5 | 6.6 | 5.4 – 8.0 | 6.2 | 4.3 – 8.8 | 5.3 | 3.8 – 7.3 | 5.7 | 4.4 – 7.4 |
| 17 | 3.0 | 1.8 – 4.8 | 6.6 | 4.9 – 6.8 | 4.8 | 3.7 – 6.1 | 4.8 | 3.2 – 7.2 | 5.5 | 3.8 – 7.9 | 5.1 | 3.8 – 6.9 |
| Administrative dependence | | | | | | | | | | | | |
| Public | 8.2 | 7.0 – 9.6 | 7.0 | 6.1 – 8.1 | 7.6 | 6.8 – 8.5 | 8.3 | 7.0 – 9.9 | 5.5 | 4.6 – 6.6 | 6.9 | 6.0 – 8.0 |
| Private | 3.7 | 2.2 – 6.3 | 7.4 | 5.7 – 9.6 | 5.6 | 4.3 – 7.3 | 4.4 | 3.1 – 6.2 | 5.5 | 3.7 – 8.0 | 5.0 | 4.0 – 6.2 |
| Region | | | | | | | | | | | | |
| North | 5.9 | 4.2 – 8.1 | 7.8 | 5.7 – 10.4 | 6.8 | 5.2 – 8.8 | 6.3 | 4.4 – 9.0 | 5.5 | 4.1 – 7.3 | 5.9 | 4.6 – 7.5 |
| Northeast | 10.5 | 8.2 – 13.4 | 7.1 | 5.7 – 8.9 | 8.8 | 7.4 – 10.4 | 8.3 | 6.4 – 10.8 | 4.4 | 3.2 – 6.1 | 6.4 | 5.1 – 8.0 |
| Southeast | 6.6 | 4.9 – 8.7 | 6.7 | 5.3 – 8.4 | 6.6 | 5.4 – 8.1 | 8.2 | 6.0 – 11.3 | 5.9 | 4.3 – 8.0 | 7.1 | 5.5 – 9.0 |
| South | 7.5 | 5.6 – 9.9 | 7.0 | 5.4 – 8.9 | 7.2 | 6.0 – 8.6 | 7.4 | 5.3 – 8.7 | 6.7 | 5.0 – 8.8 | 7.0 | 5.7 – 8.6 |
| Midwest | 4.9 | 3.6 – 6.8 | 8.8 | 7.2 – 10.7 | 6.9 | 5.9 – 8.0 | 6.8 | 5.3 – 8.7 | 5.6 | 4.1 – 7.5 | 6.2 | 5.1 – 7.5 |
| Nutritional status | | | | | | | | | | | | |
| Thin | 8.2 | 4.3 – 15.2 | 0.9 | 0.1 – 6.4 | 5.4 | 2.9 – 9.8 | 10.3 | 6.1 – 16.8 | 1.0 | 0.1 – 7.0 | 6.7 | 4.0 – 11.0 |
| Normal weight | 7.0 | 5.9 – 8.3 | 5.8 | 4.9 – 6.8 | 6.4 | 5.6 – 7.2 | 7.3 | 6.0 – 8.9 | 4.0 | 3.0 – 5.3 | 5.7 | 4.7 – 6.7 |
| Overweight | 8.6 | 6.1 – 12.0 | 11.0 | 8.8 – 13.7 | 9.8 | 8.3 – 11.7 | 8.5 | 6.3 – 11.5 | 10.1 | 7.8 – 13.0 | 9.3 | 7.6 – 11.4 |
| Obesity | 11.2 | 7.2 – 16.9 | 13.4 | 9.1 – 19.4 | 12.2 | 9.2 – 16.1 | 9.8 | 6.9 – 13.8 | 12.4 | 8.9 – 17.1 | 11.0 | 8.5 – 14.1 |
| Body image perception | | | | | | | | | | | | |
| Thin/very thin | 9.8 | 7.6 – 12.5 | 5.0 | 3.7 – 6.7 | 7.5 | 6.1 – 9.1 | 9.6 | 7.3 – 12.7 | 3.5 | 2.3 – 5.5 | 6.7 | 5.2 – 8.6 |
| Normal | 5.8 | 4.7 – 7.1 | 4.3 | 3.5 – 5.3 | 5.1 | 4.4 – 5.9 | 6.5 | 5.3 – 8.0 | 3.6 | 2.8 – 4.7 | 5.2 | 4.4 – 6.1 |
| Fat | 9.3 | 6.3 – 13.4 | 13.6 | 11.1 – 16.4 | 11.9 | 10.1 – 14.0 | 8.2 | 6.3 – 10.8 | 10.3 | 8.3 – 12.8 | 9.5 | 8.1 – 11.2 |
| Very fat | 18.5 | 10.3 – 31.1 | 23.4 | 16.4 – 32.3 | 21.8 | 16.0 – 29.1 | 10.4 | 5.1 – 20.0 | 19.4 | 12.9 – 28.0 | 16.5 | 11.6 – 22.9 |

95%CI: confidence interval of 95%.

For male adolescents, the prevalence of vomiting or laxative use was 2.32 (95%CI 1.15 – 4.69) times higher among those who saw themselves as very fat, in relation to those who considered themselves normal (Table 3). The prevalence of both behaviors was significantly higher for boys who considered themselves thin/very thin (Tables 3 and 4).

Vomiting or laxative use was 5.32 (95%CI 3.30 – 8.57) times higher for girls who thought of themselves as very fat when compared to those who saw themselves as normal (Table 3). The prevalence of use of medicines, formulas, or other products, in turn, was 4.0 (95%CI 2.26 – 7.07) times higher among girls who saw themselves as very fat, in comparison with those who considered themselves normal (Table 4).

## DISCUSSION

In 2015, the prevalence of vomiting and laxative use for weight control did not differ between genders. However, the use of medicines, formulas, or other products was higher

Table 3. Prevalence ratio of vomiting or laxative use for weight control in the 30 days prior to data collection, in relation to nutritional status and body image among Brazilian adolescents. National Adolescent Student Health Survey 2015.

| Vomiting or laxative use in the 30 days prior to data collection | Simple model | | | | Multiple model | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | PR | 95%CI | PR | 95%CI | PR | 95%CI | PR | 95%CI |
| Nutritional status** | | | | | | | | |
| Normal weight | * | * | * | * | * | * | * | * |
| Thin | 1.17 | 0.61 – 2.21 | 0.16 | 0.02 – 1.14 | 0.88 | 0.44 – 1.76 | 0.17 | 0.02 – 1.13 |
| Overweight | 1.23 | 0.84 – 1.79 | 1.90 | 1.43 – 2.52 | 1.38 | 0.91 – 2.08 | 1.15 | 0.81 – 1.64 |
| Obesity | 1.59 | 1.02 – 2.48 | 2.32 | 1.57 – 3.43 | 1.52 | 0.94 – 2.47 | 1.06 | 0.66 – 1.70 |
| Body image perception*** | | | | | | | | |
| Normal | * | * | * | * | * | * | * | * |
| Thin/very thin | 1.69 | 1.25 – 2.30 | 1.17 | 0.80 – 1.69 | 1.88 | 1.35 – 2.61 | 1.27 | 0.88 – 1.84 |
| Fat | 1.61 | 1.07 – 2.42 | 3.16 | 2.37 – 4.21 | 1.35 | 0.90 – 2.02 | 3.06 | 2.17 – 4.31 |
| Very fat | 3.20 | 1.73 – 5.90 | 5.45 | 3.63 – 8.17 | 2.32 | 1.15 – 4.69 | 5.32 | 3.30 – 8.57 |

PR: prevalence ratio; 95%CI: confidence interval of 95%.
*Reference values; **Poisson regression adjusted for body image perception, age, administrative dependence, and geographical region; ***Poisson regression adjusted for nutritional status, age, administrative dependence, and geographic region.

among male students. These results were similar to those found in a 2009 study with 9th-grade students from elementary school in Brazilian state capitals and the Federal District[10]. Also in Brazil, a school-based study conducted in a city of Santa Catarina revealed that the use of medicines and formulas presented similar prevalence between genders. On the other hand, the practice of inducing vomiting or using laxatives was higher among girls[14]. We also found divergent results, in which the estimated prevalence for these behaviors was higher among female adolescents[15,16].

The high prevalence of extreme behaviors among thin boys or those who saw themselves as thin or very thin should receive special attention. It is unclear whether adolescents who are or see themselves as thin displayed an extreme behavior motivated by weight control or to stay thin. We emphasize, however, that such conduct had already been observed in a similar 2009 study carried out with 9th-grade students from elementary school in Brazilian state capitals and the Federal District[10]. The prevalence of extreme behaviors among boys who considered themselves thin or very thin, compared to those who saw themselves as normal, was also higher in studies conducted in the state of Massachusetts, United States[15],

Table 4. Prevalence ratio of use of medicines, formulas, or other products for weight control in the 30 days prior to data collection, in relation to nutritional status and body image among Brazilian adolescents. National Adolescent Student Health Survey 2015.

| Medicines or formulas in the 30 days prior to data collection | Simple model | | | | Multiple model | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | PR | 95%CI | PR | 95%CI | PR | 95%CI | PR | 95%CI |
| Nutritional status** | | | | | | | | |
| Normal weight | * | * | * | * | * | * | * | * |
| Thin | 1.40 | 0.82 – 2.39 | 0.26 | 0.04 – 1.81 | 1.16 | 0.65 – 2.08 | 0.27 | 0.04 – 1.97 |
| Overweight | 1.16 | 0.84 – 1.60 | 2.52 | 1.69 – 3.76 | 1.30 | 0.91 – 1.83 | 1.72 | 1.10 – 2.68 |
| Obesity | 1.33 | 0.91 – 1.94 | 3.10 | 2.02 – 4.75 | 1.39 | 0.78 – 2.46 | 1.60 | 0.98 – 2.64 |
| Body image perception*** | | | | | | | | |
| Normal | * | * | * | * | * | * | * | * |
| Thin/very thin | 1.48 | 1.09 – 2.00 | 0.98 | 0.61 – 1.57 | 1.58 | 1.15 – 2.16 | 1.12 | 0.70 – 1.79 |
| Fat | 1.27 | 0.91 – 1.77 | 2.84 | 2.17 – 3.72 | 1.11 | 0.69 – 1.78 | 2.21 | 1.62 – 3.00 |
| Very fat | 1.60 | 0.76 – 3.36 | 5.34 | 3.25 – 8.78 | 1.32 | 0.57 – 3.01 | 4.0 | 2.26 – 7.07 |

PR: prevalence ratio; 95%CI: confidence interval of 95%.
*Reference values; **Poisson regression adjusted for body image perception, age, administrative dependence, and geographical region; ***Poisson regression adjusted for nutritional status, age, administrative dependence, and geographic region.

and Palestine[17], a characteristic not observed among girls. Another highlight is that boys underestimate their body image, seeing themselves as thin/very thin and adopting practices to gain muscle mass[18].

The prevalence of vomiting and laxative use, as well as the use of medicines, formulas, or other products decreased with age for boys and the total population. A study carried out in Palestine found similar results. In it, adolescents of both genders in their final years of study showed a lower chance of displaying extreme weight control behaviors[17]. In the United States, an investigation revealed this same behavior, but only among female adolescents[15].

Among boys, the prevalence of both extreme behaviors was higher for those attending public schools, and the prevalence of vomiting and laxative use was higher in the Northeast region. Such findings could be related to the socioeconomic conditions of these students, similar to results found in a North American study in which male adolescents from schools located in poor areas had a greater chance of displaying extreme weight control behaviors[19]. Despite the evidence of a possible relationship between extreme behaviors and socioeconomic conditions, further studies, including qualitative ones, are necessary to understand the peculiarities of this phenomenon among boys. A hypothesis to be tested is whether boys from lower social classes are more vulnerable to pressures to fit their body image into a socially established standard.

There was an association between body image perception and extreme weight control behaviors – stronger for girls who thought of themselves as very fat –, a relationship not found between extreme behaviors and nutritional status. These results allow us to infer that body image perception might have a greater influence on the adoption of extreme behaviors than nutritional status.

The literature has evidence of the direct association between nutritional status and extreme weight control behaviors[15,20]. However, the hypothesis that body image perception could have a more significant impact on extreme behaviors is reinforced when considering the relationship between body image distortion and such practices. For example, normal weight adolescents who overestimate or underestimate their nutritional status have higher chances of fasting, vomiting, or using laxatives and medicines without a medical prescription, when compared to those who consider their weight adequate[21,22].

It is important to emphasize that unhealthy weight control behaviors are associated with body image perception in adolescents. Pressure from the media to conform to aesthetic standards of thinness can influence such habits, especially among girls[23]. The media disseminates standards of perfect bodies for men and women, which can affect the adolescent's self-image, and result in suffering and discrimination for those who do not feel they fit this ideal[24].

To circumvent this problem, schools, together with health services, become important spaces for discussion and construction of healthy and real frames of reference for adolescents, decreasing the negative influence of the media on behaviors related to nutrition and health[25]. In this scenario, the Health at School Program, an intersectoral initiative, represents a strategy to implement actions that positively impact the self-esteem, body image perception, and

health of students, with interventions ranging from the promotion of healthy eating habits to the encouragement of body practices, and physical and leisure activities in schools[26].

As a limitation of the present study, we underline that since PeNSE is a cross-sectional survey, reverse causality bias can occur, as it is not possible to determine if body image perception among adolescents stimulates extreme weight control behaviors or if these practices cause a body image perception that justifies these actions. Furthermore, the results cannot be generalized to adolescents who do not attend schools. Also, the study did not include variables of mental health, which can be correlated with the outcome.

We suggest dividing the question about vomiting or laxative use for weight control in the 30 days prior to data collection into two to allow the identification of behaviors specifically attributed to bulimia due to the proliferation of sites and social media groups that encourage the adoption of bulimic behaviors during adolescence.

## CONCLUSION

The results of this study allow us to infer that body image perception seems to have a more significant influence on the practice of extreme behaviors than nutritional status, especially among female adolescents.

To deal with this problem, intersectoral strategies involving health services and schools have great potential in developing actions that result in a positive body image perception and improve the self-esteem and health of students.

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