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Association between body image dissatisfaction and obesity among schoolchildren aged 7–10 years☆

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HIGHLIGHTS

- There was a normative discontent in schoolchildren.
- Significant differences between the sexes in the prevalence of body dissatisfaction.
- In boys, there was association between IMC, WC and desire for a smaller body size.
- In girls, there was association between IMC, %BF and desire for a smaller body size.

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ABSTRACT

Objective: The aim of this study is to evaluate the association between body image dissatisfaction and measurements of obesity - body mass index, waist circumference and body fat percentage - in students aged 7 to 10 years in Florianopolis, Santa Catarina.
Methods: Body image dissatisfaction was assessed by the Figure Rating Scale for Brazilian children. Association analyses were performed using multinomial logistic regression.
Results: Body dissatisfaction was prevalent in 82.9% of the students, of whom 59.9% desired a smaller body size and 23.0% desired a larger body size, with a significant difference between the sexes. In boys, overweight, obesity and central obesity remained associated with the desire for a smaller body size, whereas for girls overweight and excess body fat were associated with the desire for a smaller body size.
Conclusions: The results point to a normative discontent and indicate the need to include the topic of body image in the school curriculum.

1. Introduction

Body image can be defined as the mental image that a person has about the size, shape and form of his/her body, as well as the feelings about these characteristics and constituent body parts [1]. Body dissatisfaction (BD) refers to the discrepancy between the real and the idealized body image of the individual [1,2], and has often been associated with obesity in children and adolescents [3–5].

This evidence needs to be explored further, as body dissatisfaction is associated with symptoms of depression, unhealthy weight control behaviors such as restrictive diets, compensatory behavior, binge-eating and eating disorders [4,6,7].

Obesity is defined as the abnormal or excessive accumulation of body fat which can cause health damage [8]. It can be assessed in various ways, however anthropometry is generally considered the most useful method, as it is inexpensive, non-invasive, universally applicable and easily accepted by the population [9]. Among anthropometric measurements, body mass index (BMI) is one of the indicators most commonly used to diagnose the nutritional status of the population, for it is easy to calculate and interpret, and extreme values are associated with health risks. However, it does have important limitations, such as

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not distinguishing between the amount and the distribution of body fat [9,10].

In population and clinical studies involving children and adolescents, other estimative measurements of body fat are required, such as skin folds or waist circumference [9,10]. Skinfolds thickness are predictors of total body fat and body fat percentage (%BF) [9], and waist circumference (WC) is considered an effective anthropometric marker for the diagnosis of central obesity (CO) in children and adolescents [11].

Despite the existence of studies that have investigated the association between dissatisfaction with body image and overweight/obesity by BMI [4,5,12–14], little is known about the relationship with central obesity, measured by waist circumference and excess body fat obtained by skin folds, especially among children.

School age is typically when habits and behaviors are formed which can last throughout adulthood [15], therefore knowing how body dissatisfaction relates to measurements of obesity could help in the planning of educational strategies and the prevention body image issues and eating disorders in schools.

This study aims to evaluate the association between body image dissatisfaction and measurements of obesity (body mass index, waist circumference and body fat percentage) in Brazilian schoolchildren aged 7–10 years.

2. Method

2.1. Participants

This is a cross-sectional school-based study and part of a broader research project, funded by the National Council for Scientific and Technological Development (CNPq, project no. 402 322/2005-3), conducted in the years 2012/2013, in Florianópolis, Santa Catarina, Brazil. In this study we analyzed data of a random sample of 1530 school children aged 7 to 10 years.

The sampling procedure was carried out by conglomerates. The schools were divided into 10 strata, according to the administrative regions of the city of Florianópolis (Centre, Mainland, North, East and South) and type of school (public or private). From each group schools were selected at random for inclusion in the study. The sample included 30 schools (19 public and 11 private). After that the students to be evaluated in each school were selected using the student list available at each educational institution.

According to the 2011 school census by the National Institute of Studies and Research (available at http://portal.inep.gov.br/basica-censo), there was a total of 19,172 schoolchildren aged 7 to 10 years. The calculation of sample size was performed based on an expected prevalence of outcome (excess body weight) of 38%, a margin of error of 3.5 percentage points and a 95% significance level. Allowing for the design effect (Deff) of 1.8, and an additional 10% for possible refusals, the sample size was 1440 students aged 7 to 10 years.

Since the present study sought to test the variables associated with body dissatisfaction, subsequent calculations were performed to estimate the minimum detectable differences. Based on the total number of students, the prevalence of different exposure and outcome variables, as well as adjustments made for interference, the study had an 80% success rate in detecting as statistically significant ($p < 0.05$) an odds ratio (OR) of between 0.87 and 0.28 as a protective factor, and of between 1.13 and 1.72 as a risk factor.

2.2. Measures

The dependent variable in this study was body image dissatisfaction. The data were obtained by the Figure Rating Scale for Brazilian children developed by Kakeshita et al. [16]. The Figure Rating Scale consists of 11 figures printed on individual cards for each sex, measuring 12.5 cm × 6.5 cm, numbered on the back. Each silhouette corresponds to a real interval body mass index (BMI) for the purpose of classifying the subject, and an average BMI for the purposes of calculation (varying BMI from 12 kg/m^2 to 29 kg/m^2, with a constant increment of 1.7 kg/m^2 for each figure). The validity of the scale was demonstrated by the high correlation with the real BMI [16].

The interviewers asked the students to identify the figure with the body most similar to their own (actual BMI), and after that to indicate the figure showing the body they would like to have (desired BMI). Body dissatisfaction was estimated by subtracting the desired BMI from the actual BMI ("desired" minus "actual"). When the result was zero, the students were considered to be satisfied with their body image. When the result was negative, they were considered to desire a smaller body size, and when it was positive they were considered to desire a larger body size. For comparison, body dissatisfaction was classified not only from the difference between one or more figures, as suggested by the authors of the Silhouette Scale [16], but also the difference between two or more figures, with both the classifications consisting of three categories: satisfied; desire for smaller body size; desire for larger body size.

The independent variables were: overweight/obesity (BMI); central obesity (WC) and body fat percentage (%BF). Anthropometric measurements were taken by a group of researchers trained by a physical education professional certified by ISAK (International Society for the Advancement of Kinanthropometry), considered the benchmark for the anthropometric measurements used in this study. The quality of the anthropometric measurements was evaluated by the absolute and relative technical error of measurement (TEM) and the reliability coefficient (R), according to parameters established by Habitcht [17], and by Ulijaszek and Kerr [18].

Anthropometric measurements were taken according to the procedures of Lohman et al. [19]. The body mass measurement was obtained using an electronic scale (Marte®, São Paulo, Brazil) with a maximum capacity of 200 kg and accurate to 50 g. Height was measured using a stadiometer (Alturexata®, Belo Horizonte, Brazil) with a 0.5 cm scale. Waist circumference was measured using non-elastic anthropometric tape with a scale of 0.1 cm (Lange®, Cambridge, USA). Skinfold thickness (ST) was measured with calipers with a 1 mm scale (Lange®, Cambridge, USA). The measurements were made on the right side of the body, with three measurements taken of the same fold in sequence, the average of which was recorded as the final measurement.

The students' nutritional status was established based on BMI curves for age and sex according to the WHO reference data [20]. For purposes of analysis, BMI was categorized as: not overweight/obese (BMI ≤ z-score + 1); overweight (BMI > z-score + 1 and ≤ z-score + 2); and obese (BMI > z-score + 2).

The diagnosis of CO was made based on the classification proposed by Taylor [11], according to sex and age. Boys were considered to have CO if they had a WC above: 62.9 cm for 7 years; 65.3 cm for 8 years; 67.7 cm for 9 years; 70.1 cm to 10 years of age. And girls were considered to have CO with a WC above: 62 cm for 7 years; 64.7 cm for 8 years; 67.3 cm for 9 years; 69.6 cm for 10 years.

To calculate the %BF, the triceps and subscapular skinfolds were measured. From these values the %BF was estimated using Lohman's predictive equations [21]. The students were classified as having excess body fat if they had %BF values above 20 for boys and 25 for girls [22].

The variables of age, type of school and mother's educational level were included in the model as control variables. This information was obtained directly at the schools, from the students' enrollment forms and from a questionnaire for the students' parents or guardians, sent with the informed consent form. Age was categorized as 7–8 years and 9–10 years; type of school as public or private; and the mother's education as: did not study or incomplete primary education; completed primary education; completed secondary education; university degree.

2.3. Data analysis

The database was developed with the program Epi Data version 3.2., and the analysis was conducted using the software STATA version 11.0.