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Self-perception of body size in schoolchildren: a cross-sectional study

Autopercepção do tamanho corporal em escolares: um estudo transversal

Abstract

Introduction: Early identification of inaccuracies in body size estimations can be fundamental to plan and accomplish more effective prevention and treatment actions related to body image perception and disorders. ***Objective***: To assess the prevalence of overestimation and underestimation of body size in thin, normal-weight, and obese schoolchildren and the factors associated. ***Methods***: Cross-sectional and school-based study conducted in Florianópolis, Santa Catarina, Brazil. The study was conducted with a sample of 1,530 schoolchildren from seven to ten years old enrolled at public and private schools in Florianópolis-SC, Brazil. Sociodemographic and anthropometric data, as well as their perceptions on body image, were analyzed. Perceptions of body size were evaluated using the Figure Rating Scales for Brazilian Children. Logistic regression was used to analyze associations. ***Results***: The prevalence of thinness or normal-weight schoolchildren who considered themselves with obesity was 10%. None of the schoolchildren with obesity considered themselves thin or normal-weighted. Considering thin and normal-weight schoolchildren, a desired body image equivalent to obesity was associated with an overestimation of their own obesity (odds ratio = 2.64, P < 0.05). Overweight in female schoolchildren was associated with an underestimation of self-thinness (odds ratio = 3.07, P < 0.05). ***Conclusions***: Self-overestimation and underestimation of body sizes were observed among 7-10 year-old schoolchildren, particularly females. Further studies using different variables and methodological approaches are needed to know in depth the causes of distorted body image.

Keywords: Body image. Self-concept. Child. Obesity. Cross-sectional studies.

Resumo

Introdução: A identificação precoce de imprecisões nas estimativas do tamanho corporal pode ser fundamental para planejar e realizar ações de prevenção e tratamento mais eficazes relacionadas à percepção e distúrbios da imagem corporal. ***Objetivo***: Estimar a prevalência de superestimação e subestimação do tamanho corporal em escolares com magreza, peso normal e obesidade e os fatores associados. ***Métodos***: Estudo transversal e de base escolar realizado em Florianópolis, Santa Catarina, Brasil. O estudo foi realizado com uma amostra de 1.530 escolares de sete a dez anos matriculados em escolas públicas e privadas de Florianópolis. Foram analisados dados sociodemográficos e antropométricos, bem como suas percepções sobre a imagem corporal. As percepções do tamanho corporal foram avaliadas utilizando-se as Escalas de Silhuetas para Crianças Brasileiras. Foi utilizada regressão logística para análise das associações. ***Resultados***: A prevalência de magreza ou de peso normal em escolares que se consideravam com obesidade foi de 10%. Nenhum

dos escolares com obesidade se consideraram magros ou com peso normal. Nos escolares magros, a imagem corporal desejada referente à obesidade manteve-se associada à percepção de considerar-se obeso (*odds ratio* = 2,64, p < 0,05). O sobrepeso, no sexo feminino, se manteve associado à condição de considerar-se magro (*odds ratio* = 3,07, p < 0,05). ***Conclusões***: A superestimação e subestimação do tamanho corporal foram observadas entre crianças de 7 a 10 anos, particularmente do sexo feminino. Outros estudos utilizando diferentes variáveis e abordagens metodológicas são necessários para identificar, em profundidade, as causas da distorção da imagem corporal.

Palavras-chave: Imagem corporal. Autoconceito. Criança. Obesidade. Estudos transversais.

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INTRODUCTION

Body image refers to the mental image we have of the size of our bodies, shape, and outlines, as well as our feelings towards them. Body image is considered an important construction related to the psychosocial and behavioral health of people.[1,2]

Body image develops throughout childhood and, by the age of six, children begin to worry about their weight and body shapes. Body size inaccuracy, which is a vague judgment of one's own body size, is considered a symptom and a strong predictor in the development of eating disorders. It can also be associated with other disorders, such as depression.[3-11]

Underestimation of body size relates to the perception of one's body size being smaller than it really is; overestimation, on the other hand, describes the perception of one's body size being larger than its real size. Children and adolescents who have distorted body perceptions appear to be more prone to suffer from body image dissatisfaction, thus leading to higher levels of psychological stress.[12-18]

Literature review studies showed that there has been a rapid growth in research on body image perception in children and adolescents, led by the concern of short and long-term consequences of body image on health at all ages. These studies show that there is few research on body image perception with children. Mostly, such studies make use of non-valid instruments of body image assessment, thus limiting inferences. Furthermore, few studies have been conducted to assess inaccuracy of body size estimation among children.[3, 5,18-23]

Understanding the relationships and influences of socio-environmental contexts and biological characteristics related to body image in children and adolescents, it is fundamental to plan and accomplish prevention and treatment actions related to body image perception and disorders in the field of Public Health.[8, 17, 21, 24-28] Therefore, early identification of accentuated inaccuracies in body size estimations, as well as the factors associated with them in schoolchildren, can be crucial to reduce the negative impacts of such misjudgments on the health of children. This paper aimed to investigate the prevalence of body size overestimation (thin and normal-weight schoolchildren) and underestimation (schoolchildren with obesity), as well as to identify the factors associated with such perceptions.

METHODS

This is a cross-sectional, school-based study. The broader research project was conducted in the years 2012/2013, in Florianópolis-SC, Brazil. The research protocol was approved by a local public university human research ethics committee, hearing number 120341/October, 8th 2012.

The methodological procedures involved in sample size calculation, sampling, and data collection and analysis have been described in detail elsewhere.[29,30]

Participants

The calculation of the sample size considered the school census of the National Institute of Education and Research (available at http://portal.inep.gov.br/web/guest/inep-data) in year 2011, which indicated 19,172 schoolchildren aged 7 to 10 years enrolled in 84 schools in the city of Florianópolis. Prevalence of overweight/obesity of 38%, margin of error of 3.5 percentage points, 95% confidence interval and a study design effect (Deff) of 1.8 were considered. Additional 10% were considered for possible refusals. The final sample size was found in 1,440 schoolchildren aged 7 to 10 years. The estimate of the prevalence of overweight/obesity was based on previous studies carried out in Florianópolis.[31,32]

For the present study, the cluster sampling procedure was carried out, in which the schools were allocated in 10 strata, according to the administrative regions of the city of Florianópolis (Central, Continent, North, East and South) and type of school (public or private). Schools within each stratum were randomly selected to be included in the study. In total, the final sample consisted of 30 schools (19 public and 11 private). In each school, the classrooms were drawn and all students were invited to participate in the research. The parents or guardians authorized the participation of these students in the research.

Measures

Data were obtained using the Figure Rating Scale for Brazilian children developed by Kakeshita et al.[33] The Figure Rating Scale consists of 11 figures printed on individual cards for each sex, measuring 12.5 × 6.5 centimeters, numbered on the back. Each silhouette corresponds to a real body mass index (BMI) interval, for classification purposes, and an average BMI for calculation purposes (12 kg/m^2 to 29 kg/m^2 BMI, 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.[33]

Students were asked to identify the figure presenting the body which was most similar to their own (actual BMI), and, after that, to indicate the figure showing the body they would actually like to have (desired BMI). The mean BMI of each figure selected followed the World Health Organization (WHO) classification.[34]

Body mass and height were measured in order to enable the calculation of the schoolchildren's body mass index (real BMI). Such diagnoses were defined using BMI curves for age and sex published by the WHO: undernutrition or thinness (BMI < Z-score −2), normal (BMI ≥ Z-score −2 and ≤ Z-score +1), overweight (BMI > Z-score +1 and ≤ Z-score +2); and obesity (BMI > Z-score +2).[34]

For corporal mass measurement, students had to be barefoot, wear light clothes, and remain in orthostatic position (standing and erect body) – in which weight is divided between both lower limbs; their arms must be loose laterally to the body and their shoulders relaxed. Students were also asked to keep their heads on Frankfurt plane. Stature assessment followed a standardized procedure, with the student in the orthostatic position (standing, barefoot and together, keeping contact with the tape, heels and occipital region, head in the Frankfurt plane, relaxed shoulders and arms loose laterally). Anthropometric measurements were taken according to the procedures recommended by Lohman et al.[35]

The quality of anthropometric measurements was evaluated by the absolute and relative Technical Error of Measurement (TEM) and by the Reliability Coefficient (R), according to parameters established by Habitcht and by Ulijaszek & Kerr.[36, 37]

The body mass measurement was obtained using an electronic scale (Marte, São Paulo, Brazil) with a maximum capacity of 200 kilograms and accurate to 50 grams. Height was measured using a stadiometer (Alturexata, Belo Horizonte, Brazil) with a 0.5 centimeters scale.

Body dissatisfaction was estimated by subtracting the desired BMI from the actual BMI. When the result was zero, students were considered satisfied with their body image. When the result was negative, they were considered to desire a smaller body size; when it was positive, they were considered to desire a larger body size. This classification was used in other studies.[38,39]

Statistical analyses

A database was created with Epi Data version 3.2 and a team of typists who had been trained in advance, using a double-entry system, processed data. Statistical analysis was performed using STATA version 11.0. Analyses were adjusted for the effects of the design and study sample using the STATA survey (SVY) command.

Descriptive statistics were calculated and bivariate analysis was used to identify independent variables associated with outcomes. Crude and adjusted logistic regression analyses were used to estimate odds ratios (OR) and 95% confidence intervals (CI). A binary logistic regression model was constructed for each schoolchildren category (thin/normal-weight children who considered themselves with obesity and overweight children who considered themselves thin/normal-weight). Variables with P values ≤ 0.20 in bivariate analyses were selected for the adjusted logistic regression model. The significance cutoff was set at 5%.

RESULTS

A total of 1,530 schoolchildren aged 7 to 10 years took part in this study. They were enrolled in the second to fifth years of primary education at schools in Florianópolis, State of Santa Catarina, Brazil. The general characteristics of the sample are listed in Table 1..

Table 1. Descriptive characteristics of the sample and anthropometric and body image results (n = 1,530) of schoolchildren aged 7-10 years in Florianópolis, State of Santa Catarina, Brazil, 2012-2013.

Variables	N	%
Sex		
Boys	725	44.9
Girls	805	55.1
Age (years)		
7	403	30.3
8	380	26.3
9	362	24.1
10	385	19.3
Type of school		
Public	1001	61.0
Private	529	39.0
Mother's education		
Did not attend school/incomplete primary education	232	15.7
Complete primary education	218	14.8
Complete secondary education	572	38.7
Complete higher education	454	30.8
Body mass index categories (real BMI)		
Thin	9	0.6
Normal weight	965	62.7
Overweight	337	23.4
Obese	210	13.3

Table 1. Descriptive characteristics of the sample and anthropometric and body image results (n = 1,530) of schoolchildren aged 7-10 years in Florianópolis, State of Santa Catarina, Brazil, 2012-2013. (Continues)

Variables	N	%
Perceived body image (actual BMI)		
Thin	68	4.0
Normal weight	756	52.2
Overweight	405	27.7
Obese	264	16.1
Desired body image (desired BMI)		
Thin	155	9.9
Normal	906	62.0
Overweight	318	21.3
Obese	117	6.8
Dissatisfaction body image		
Satisfied	254	17.1
Desire smaller body	872	59.9
Desire larger body	377	23.0

Most schoolchildren were 7-year-old (30.3%) girls (55.1 %), enrolled at public schools (61.0%), with mothers who had completed Secondary Education (38.7%). Regarding body mass index categories and body image, most of them were normal-weight (62.7%), and perceived themselves as normal-weight (52.2%); however, most schoolchildren desired to have a smaller body (59.9%) (Table 1).

Out of this sample, 155 (10.1%) schoolchildren, who were thin or normal-weight, considered themselves with obesity; 37 (2.4%) children were overweight and considered themselves thin or normal-weight. There was no evidence of schoolchildren with obesity who considered themselves thin or normal-weight (data not shown in the tables).

Table 2 shows that the thin/normal weight schoolchildren who considered themselves with obesity were predominantly 7-year-old (46.1%) boys (55%), enrolled at public schools (67.2%), with mothers who had completed secondary education (35.3%). The silhouettes that they selected to represent their desired body sizes were equivalent to overweight. Most of them were dissatisfied with their body image and desired a smaller silhouette (86.6%). However, there was no significant association between these variables.

In the crude analysis, the association between the variables “age” and “desired body image” had a P value < 0.20, and was, therefore, included in the multivariate analysis. In the adjusted analysis, thin/normal-weight schoolchildren – whose desired body image was obese – were almost three times more likely to consider themselves with obesity (OR = 2.64; 95% CI = 1.06-6.58; P = 0.022) (table 2).

Table 2. Logistic regression of thin/normal-weight schoolchildren perceived as obese (N = 155), aged 7-10 years old in Florianópolis, State of Santa Catarina, Brazil, 2012-2013.

Variables	N (%)	Crude OR	95% CI	P	Adjusted OR*	95% CI	P
Sex				0.834			
Boys	90 (55.0)	1					
Girls	65 (45.0)	1.09	0.32- 3.74				
Age (years)				0.087			0.134
7	57 (46.1)	1			1		
8	35 (23.1)	0.51	0.09-2.73		0.58	0.08-3.98	
9	29 (16.6)	0.54	0.22-1.33		0.58	0.19-1.84	
10	34 (14.2)	0.59	0.34-.02		0.65	0.30-1.39	
Type of School				0.389			
Public	111 (67.2)	1					
Private	44 (32.8)	1.90	0.25-14.58				
Mother's Education				0.567			
Did not attend school/ incomplete primary education	32 (21.1)	1					
Complete primary education	31 (22.5)	1.78	0.57-5.59				
Complete secondary education	53 (35.3)	1.28	0.54-3.03				
Complete higher education	30 (21.2)	1.75	0.26-12.01				
Desired body image				0.017			0.022
Normal	52 (37.9)	1			1		
Thin	10 (5.2)	0.52	0.18-1.47		0.49	0.17-1.39	
Overweight	67 (39.4)	1.60	0.54-4.71		1.51	0.37-6.16	
Obese	26 (18.1)	3.03	1.06-8.63		2.64	1.06-6.58	
Dissatisfaction body image				0.345			
Satisfied	6 (2.6)	1					
Desire smaller body	136 (86.6)	0.40	0.14-1.13				
Desire larger body	13 (10.8)	1.52	0.12-20.07				

CI = confidence interval; OR = odds ratio. *Adjusted for age and desired body image.

Table 3 shows that overweight schoolchildren who considered themselves thin or normal-weight individuals were predominantly girls (70.5%), aged 7 years (52.2%), enrolled at public schools (52.5%), with mothers who had completed higher education (34.4%). Most of them selected silhouettes that are equivalent to normal weight for their desired body image and were not satisfied with body image; they wanted to have a smaller silhouette than the one perceived by themselves (68.2%).

Table 3 lists the results of the logistic regression analyses for schoolchildren who were overweight and considered themselves thin or normal-weight. Based on the results of the crude analysis, the variables "age" and "sex" were included in the multivariate analysis. Only "sex" remained associated with the condition of being

overweight while the child considered himself/herself to be thin – female schoolchildren were three times more likely to be overweight, even though they perceived themselves as thin (OR = 3.07; 95% CI = 2.19-4.29; P = 0.002).

Table 3. Logistic regression of overweight schoolchildren perceived as thin (N = 37), aged 7-10 years in Florianópolis, State of Santa Catarina, Brazil, 2012-2013.

Variables	N (%)	Crude OR	95% CI	P	Adjusted OR*	95% CI	P
Sex				0.001			**0.002**
Boys	14 (29.5)	1			1		
Girls	23 (70.5)	3.41	2.64-4.42		3.07	2.19-4.29	
Age (years)				0.018			0.029
7	15 (52.2)	1			1		
8	12 (25.2)	0.50	0.24-1.02		0.57	0.22-1.50	
9	6 (13.4)	0.35	0.02-6.53		0.41	0.02-10.06	
10	4 (9.2)	0.29	0.06-1.54		0.36	0.06-2.21	
Type of School				0.548			
Public	24 (52.5)	1					
Private	13 (47.5)	1.45	0.25-8.29				
Mother's Education				0.501			
Did not study/ incomplete primary education	5 (10.2)	1					
Complete primary education	10 (22.0)	4.08	0.82-20.26				
Complete secondary education	15 (33.4)	2.16	0.52-8.99				
Complete higher education	7 (34.4)	2.33	0.43-12.48				
Desired body image				0.246			
Normal	20 (55.0)	1					
Underweight	10 (31.9)	3.36	1.56-7.21				
Overweight	5 (9.6)	0.36	0.06-2.15				
Obese	2 (3.5)	0.77	0.13-4.63				
Dissatisfaction towards body image				0.998			
Satisfied	3 (16.1)	1					
Desire smaller body	26 (68.2)	0.15	0.06-0.36				
Desire larger body	8 (15.7)	1.10	0.17-7.17				

IC = Intervado de confiança; *OR = odds ratio*. *Ajustado para sexo e idade.

DISCUSSION

The results drawn from this study showed that the prevalence of thin/normal-weight schoolchildren who considered themselves with obesity (10%) is within the range reported in other similar studies.[12,40] Such results were more frequent in boys, sons of mothers with high school education. Zhang et al.[27], in a study conducted in China with schoolchildren, reported that 12.7% of boys and 16.7% of girls with normal or low weight perceived themselves to be overweight. In contrast, the 2% prevalence of overweight schoolchildren who considered themselves thin/normal weight could be considered low as compared to other studies with schoolchildren, in which prevalence rates range from 7% to 70%.[12,41] In relation to overweight schoolchildren who considered themselves thin/normal weight, most were girls, daughters of mothers with complete higher education. These results were observed in schoolchildren enrolled in public school, at the age of seven. Another frequent result, for both sexes, was that schoolchildren wished to have smaller silhouettes. However, it should be emphasized that comparisons between prevalence rates from other studies are of limited utility because of differences in the age groups studied, methodologies used, and cutoff points adopted. The logistic regression analysis showed that only the variable "sex" remained associated with girls who were overweight and considered themselves thin or normal weight.

It is important to highlight the high percentage of schoolchildren whose desired body image was equivalent to obesity (41%) within the subset of children who were actually thin or normal weight and considered themselves with obesity. Moreover, the high percentage (82%) of schoolchildren whose desired body image was equivalent to normal or thin, within the subset of overweight schoolchildren who considered themselves thin and had an average female body size. Only 3.8% showed a bias towards overestimation. The study by Schuck et al.[11] reveals that 88.1% of the girls investigated showed an underestimate bias of body size. For the subset of thin schoolchildren, their desired body image possibly had an influence on their perception of being obese, and it was confirmed by the multivariate analysis, which identified this association (OR = 2.64; 95% CI = 1.06-6.58; P = 0.022).

Self-image is the way each person perceives him/herself and it is considered a multidimensional and multifaceted structure, which consists of emotional, cognitive, perceptive, and behavioral dimensions. The body image is an ambiguous, mental representation of the shape and size of a body, which is influenced by the interaction of biological, psychological, environmental, social, economic, political, historical and others. Therefore, it comprises the inter-relationship between one's idealized image, and the image of the body he/she wishes to have, the image conveyed by the impressions of other people and the objective image the person sees.[1-3,11,16,22] For children, having an ideal as a parameter and being capable of making comparisons are necessary conditions that support the ability to evaluate their own bodies.[3] A study by Min et al.[42] in China found that overweight children had the least consistency between body self-image compared to their real weight status (boys: 14,0%, girls: 4,9%), but underweight children showed the highest consistency (boys: 72.1%, girls: 75.7%). However, boys do not seem to have the ability to compare themselves with designs commonly used in the assessment of self-perception related to body image.[5]

Body size overestimation can damage the health of schoolchildren. Studies have found associations between body size overestimation and body size dissatisfaction, unhealthy weight control practices, such as restrictive diets, laxatives and diuretics, or excessive physical activity, as well as stress, low academic achievement, emotional problems, depression, and even suicidal thoughts.[5,8,11, 25,43]

Another finding worthy of note is the association between sex and the condition of being overweight and considering oneself to be thin, in which overweight female schoolchildren were three times more likely to consider themselves thin. A study published by Costa et al.,[44] which reports results from the same research project, found that girls who were overweight or with obesity were more likely to underestimate their own body size. Another study ,published by Hussin et al.,[45] found that girls with obesity had greater tendency to body size underestimation when compared with obese boys .

Recent studies have reported a greater tendency towards body size overestimation among girls.[11,12,40,46,47] It has been shown that girls are more vulnerable to developing eating disorders and problems related to body image due to intense social pressure towards the ideal (thin) body starting in childhood.[5,11,48-51] Therefore, underestimation of body image within this subset should not be ignored, since it could place a barrier to seeking health care.[41]

There is evidence in literature that body size estimation is influenced by several factors, including biological, psychological and social aspects, such as age, race and ethnicity, sex, anthropometric variables, mass communication, self-esteem, depression, personality traits, mood, as well as parental and peer pressure.[8,17,21,24,52,53]

It is worth emphasizing that the factors associated with body image perception in children and adolescents are complex and multidisciplinary, thus requiring the construction of complex predictive models, extrapolating the analysis model carried out in the this study. In view of this, further studies should be conducted, to investigate different variables or employ other methodological approaches in order to expand the understanding of the factors involved in erroneous estimation of body size among schoolchildren.

The most significant limitations of this study are due to its cross-sectional design, which precludes the establishment of causality inferences between the variables. There is also a limitation related to the instrument employed to evaluate body image, which, given its two-dimensional scale, does not offer a complete representation of an individual and may affect the body image perception. On the other hand, strong points of this research include the methods adopted for sample calculation and selection, methodological rigor, standardization of anthropometric measurements, and the use of a scale of body silhouettes validated for Brazilian children.

CONCLUSION

Therefore, it is possible to conclude that both self-overestimation and underestimation of body size were observed among seven to ten-year-old schoolchildren from Florianópolis, State of Santa Catarina, Brazil, particularly girls. Considering thin schoolchildren, desired body image was associated with considering themselves with obesity; when it comes to overweight schoolchildren, girls were more likely to consider themselves thin in relation to boys.

The results presented can be used to support intervention policies based on the adoption of healthy habits and construction of appropriate body perception in schools.

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