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ORIGINAL RESEARCH

BODY WEIGHT PERCEPTION AND ASSOCIATED FACTORS IN STUDENTS

Fernanda Nascimento Pereira[1], Jéssica Rodrigues de Oliveira[1], Cristina Carpentieri Zöllner[2], Ana Maria Dianezi Gambardella[1]

Abstract

Objective: to analyze the association between body weight perception and related variables in Elementary School students. **Methods:** cross-sectional study performed in 2007 with schoolchildren aged 8 to 17, residents of Vitoria (ES). Anthropometric, demographic, socioeconomic and sexual maturation data were collected. Body weight perception was established by one single question as to what the children thought of their own body weight in relation to their height. Logistic regression analysis stratified by gender was used to verify the associations among body weight perception and age, body mass index, waist circumference, pubertal stage and socioeconomic status. The reference category for analysis was "adequate weight perception". **Results:** three hundred and ninety-seven students participated in the study, 52.4% were females, and the average age (standard deviation) was 12 (1.84) years. Nutritional status for boys and girls showed, respectively, 21.7% and 20.1% overweight, 76.9% and 77.8% normal weight for height, 1.4% and 2.1% underweight. There was statistic association between body weight perception and nutritional status (overweight) for both genders (boys: OR = 6.76; girls: OR = 19.58), and age (10 to 14 years) for boys (OR = 0.40). The other variables did not show any association. **Conclusion:** body weight perception was associated with nutritional status in both genders, and with age only for boys. This reinforces the need for health professionals to monitor these adolescents so that they should have a better understanding of their own bodies.

Key words: adolescents; nutritional status; body image; body weight.

INTRODUCTION

Everything that an individual notices about his/her body contributes to the shaping of their own body image, which can be defined as the figurative representation of what the individual mentally conceives in relation to the size, shape and structure of the body[1,2].

However, the image is not formed based only on what the body notices separately, but also by how each individual's personality interprets the sensations and experiences lived by the body, that is, how the individual deals with everything that is related to the physical appearance[1,3]. This phenomenon is structured according to the constant changes that occur in the external world of each individual and his/her social relationships[1,2].

The identity formation and constant body changes make the adolescent group vulnerable to social and cultural changes. They tend to present concerns regarding their body weight because they long for a slender body, and for fear of being excluded from the group to which they belong[4].

The cult of slenderness is somewhat paradoxical in our society, since we are exposed, by the media, to a high energy density food supply derived from fats and sugars. And the same media leads us to cultivate a lean body, contributing to the prejudice against obesity and unhealthy eating habits[5]. For the teens, it becomes more and more difficult to consider beauty as an individual and singular characteristic when they are facing the display of ultra thin or muscular bodies on the cover of magazines and commercial advertisements via television, *internet etc.*[6,33].

The media's influence on the individual, and on the world the adolescents belong to can be indirect or direct, in such a way that the body

1 Faculdade de Saúde Pública, Universidade de São Paulo. Avenida Doutor Arnaldo, 715, Cerqueira César, São Paulo / SP, 01246-904
2 Secretaria Estadual de Saúde do Espírito Santo. Av. Marechal Mascarenhas de Moraes, 2025 - Bento Ferreira, Vitória/ES, 29050-625
Departamento de Nutrição, Faculdade de Saúde Pública, Universidade de São Paulo
Based on the Masters Dissertation: "Body weight perception and associated factors in Elementary School students in Vitória (ES)", 2011, Faculdade de Saúde Pública da Universidade de São Paulo.
Corresponding Author: fenasper@usp.br

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standard portrayed by the media relates to an unreal standard, presented as desirable for the adolescent's comparison with him/herself[7]. Besides, the parents are no longer the source of information, a role now assigned to what their peers and the society consider "rules" to be followed[7].

When we study body image by sex, we observe that boys and girls deal with their own body transformations in different ways. Furthermore, the identity built transfer for a child's body begins to be reconstructed for a body undergoing rapid transformations, and for the girls with the arrival of menstruation and the development of secondary sexual characteristics, this becomes more pronounced[8].

For boys, their self built body image is composed of elements that ullate to the appreciation of muscular bodies as a reference for the ideal male model. While girls are stimulated to lose weight to meet the of a standard security demand, the boys are stimulated to enlarge their muscles to reinforce their masculinity. Therefore, it can be said that individuals build their body image from experiences that are representative of each gender's universe[9,10].

All these body transformations, added to the specific social and cultural ideals for each sex, may create in the adolescent a feeling of frustration with regarde to what he/she desires[11]. The effect of changes at the beginning of puberty also causes a contrast in the emotional development according to sex, that is, the girls tend to feel less self-assurance than the boys because girls are seen as more or less attractive by their peers[11].

Considering the important of know and better comprehending the factors related to body weight perception in adolescents, information on body image perception in adolescents of the city of Vitória, capital of the state of Espírito Santo (ES), will be provided in order to contribute to a better understanding of this subject. Thus, the objective of this study was to analyze the association between body weight perception and related variables in school-children aged 8 to 17 years.

METHODS

Data are taken from the cross-sectional study undertaken in 2007[12] of students from fourth to ninth grade of the Brazilian Elementary School System, enrolled in public and private schools in the city of Vitória, capital of Espírito Santo (Brazil).

The sample was planned according to the total of 14,734 students. In the first stage, 12 public and 6 private schools were randomly selected from a pool of 42 schools in the city, considering the proportionality of its distribution. Then, the schools were drawn according to the administrative regions: Continental, Maruípe and Bento Ferreira / Jucutuquara, selected by the Department of Education of Vitória, because they were at locations of carry access, in order to ensure the sample representativeness of the examples of these regions.

After the schools had been established, systematic random sampling was performed among the enrolled students for the selection of those who would be studied. The predicted initial sample was of 450 individuals, including 25 students per school. The sample size calculation considered the student population from the grades of interest in the 3 administrative regions with a 5% margin of error.

Data were collected from 404 individuals; three girls were excluded (2 reported the possibility of pregnancy and 1 was mentally disabled) along with four boys who provided incomplete dada.

Nutrition undergraduate students, trained and supervised by nutritionists, collected the data by interviewing the participants and gathering their anthropometric measurements at the students' schools. Data were registered in a previously tested questionnaire. Another questionnaire, along with a consent form were sent to the parents for collecting family data.

Body weight perception was verified by asking the students one single question about how they perceived their weight in relation to their height (extremely low, low, adequate, high, extremely high). For data analysis, we chose to rearrange the categories into "adequate" (considering the answer "adequate") as the reference point, and "inadequate" (considering the remaining answers).

Students' body mass index (BMI) was calculated (BMI = weight/height^2) from students' measurements of body weight (in kilograms) and height (in centimeters) obtained, according to the techniques described by GORDON *et al*.[13]. All measurements were performed in duplicate and the mean value was used for the analysis.

Body weight was measured on a Tanita® microelectronic portable digital scale, which has a 150 kg capacity and 0.1 kg resolution. Height was measured using an Alturaexata® vertical stadiometer with 0.1 cm resolution.

Students' nutritional status was verified according to the BMI classification proposed by COLE *et al*.[14,15]. These classifications present critical values for classifying individuals 2 to 18 years of age as underweight, at risk of obesity and as obese, according to sex, and population data used from 6 countries, including Brazil. For the regression analysis we created the category "adequate weight-for-height" which was used as reference.

Waist circumference was measured according to the techniques described by CALLAWAY *et al.*[16]. The measurements were registered in centimeters, in duplicate and the numbers were not rounded. We considered the 90th percentile of the waist circumference percentile curve proposed by MCCARTHY *et al.*[17], for the school-children aged 8 to 17 years, according to sex and age bracket, which classifies the individuals with fat accumulation around the waist area. Those classified under the 90th percentile of the waist circumference were used as reference for the regression analysis.

The assessment of sexual maturity stage was performed by a self-evaluation of the secondary sex characteristics, based on the comparison of photos of the 5 sexual maturity stages that characterize the sexual development of children and adolescents, according to criteria proposed by TANNER [18]. For males we considered the development of the genitals (G1, G2, G3, G4 and G5) and for females the development of breasts (B1, B2, B3, B4 and B5) evaluated according to size, shape and characteristics. The development of pubic hair (P1, P2, P3, P4 e P5) was evaluated for both sexes according to amount, distribution and characteristics. A brief explanation was given to the students regarding the different stages and also how the questionnaire should be filled out.

Age was obtained from the difference between the dates of the interviews and of birth of each individual, in years, and divided into categories: 8 to 10, 10 to 14 and 14 to 18 years. Such categories are related to the individual's biological development, and the age bracket 8 to 10 was used as the reference category for the regression analysis. As a social and cultural variable we used maternal education, classified in years: d" 8 years and > 8 years. Gender was classified as female and male.

We performed logistic regression analysis to determine the effect of independent variables (nutritional status, age and waist circumference) for the student's body weight perception using the category "adequate weight" as reference. Variable selection and verification of entry order in the final model were performed by univariate analysis, considering significance level of $p<0.20$. Analyses stratified by sex were held to verify possible behavior differences of variables among boys and girls. All analyzes were adjusted by maternal education and sexual maturity stage.

Statistical calculations were performed using *Stata* 10.1 (*Stata Corporation, College Station*, TX 2007), considering a significance level of 0.05.

The Ethics Research Committee of the Faculdade de Saúde Pública da Universidade de São Paulo approved this survey. Parents or legal guardians of the students signed a consent form allowing their participation in the research. Students classified as underweight or overweight (risk for obesity or obesity) were sent to the public health service of the city of Vitória (ES) for a follow up by professionals.

RESULTS

Three hundred and ninety-seven students participated in this study; age average (standard deviation) was of 12 years (1.84) and 52.4% were females. Boys and girls were assessed as overweight 21.7% and 20.1%, as normal weight for height 76.9% and 77.8%, and as underweight 1.4% e 2.1%, respectively.

For girls, weight, BMI, and WC presented statistically significant association with body perception, whose means were higher among those who perceived their body weight as inadequate (above the adequate weight). The same was observed for boys, especially for height (Table 1).

We observed in boys, a statistically significant difference between body perception and nutritional status, and in girls only in nutritional status. There was a higher prevalence among boys who perceived their weight as adequate but were overweight, than in girls with the same perception and nutritional status. About half of the students of both genders perceived their weight as inadequate (extremely high, high, extremely low or low) when the nutritional status showed normal weight. There was statistically significant association between waist circumference and body perception only among girls. The remaining variables did not present statistically significant association with body perception (Table 2).

Association between body perception and the variables nutritional status and age bracket

Table 1: Distribution of students aged 8 to 17 years, and mean (SD) height, weight, body mass index (BMI), and waist circumference (WC), by sex and body perception, Vitória (ES), Brazil, 2007

Body image perception[1]	Stature (cm)		Weight (kg)		BMI (kg/m²)		WC (cm)	
	♀	♂	♀	♂	♀	♂	♀	♂
Low	147.5 (10.83)	145.2 (13.65)	35.3 (8.37)	36.6 (10.39)	15.9 (1.85)	17.1 (2.16)	57.7 (4.63)	60.9 (5.74)
Adequate	150.9 (10.43)	152.3 (13.14)	40.9 (9.03)	43.5 (12.03)	17.7 (2.24)	18.4 (2.57)	61.2 (5.12)	64.8 (5.96)
High	153.3 (8.37)	153.2 (13.62)	52.5 (11.10)	53.9 (18.48)	22.2 (3.69)	22.4 (4.57)	70.7 (7.46)	73.1 (10.68)

Notes: [1] Body weight perception in relation to height.
$^{*}p<0.001$; $^{**}p<0.05$; $^{***}p>0.05$ (values of p in relation to the categories low, adequate, and high).

Table 2: Distribution of students of both sexes, aged 8 to 17 years, according to body perception and independent variables, Vitória (ES), Brazil, 2007

Variables	Body perception[1]								p	
	Adequate (n♂ = 135 / n♀ = 104)				Inadequate (n♂ = 73 / n♀ = 85)					
	N		%		N		%			
Nutritional status	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Normal weight[2]	119	99	88.1	95.2	41	48	56.2	56.4	**<0.000**	**<0.000**
Underweight	2	2	1.5	1.9	1	2	1.4	2.4		
Overweight	14	3	10.4	2.9	31	35	42.4	41.2		
Waist circumference										
< 90th *percentile*	35	48	26.0	46.2	19	20	26.0	23.5	0.987	**0.001**
e" 90th *percentile*	100	56	74.0	53.8	54	65	74.0	76.5		
Sexual maturity stage										
Prepubertal	78	22	57.8	21.2	44	16	60.3	18.8	0.616	0913
Pubertal	52	72	38.5	69.2	28	60	38.4	70.6		
Postpubertal	5	10	3.7	9.6	1	9	1.4	10.6		
Age bracket										
08 |— 10	19	16	14.1	15.4	19	14	26.0	16.5	0.097	0.859
10 |— 14	91	69	67.4	66.3	41	58	56.2	68.2		
14 |— 18	25	19	18.5	18.3	13	13	17.8	15.3		
Maternal education										
d" 8 years	96	70	71.1	67.3	47	57	64.4	67.1	0.318	0.971
> 8 years	39	34	28.9	32.7	26	28	35.6	32.9		

Notes:
[1] Body weight perception in relation to height
[2] Normal weight for height

was observed in boys. Overweight individuals presented a 6.76 OR in relation to perceiving their own body weight as inadequate; for those aged 10 to 14, the OR was 0.40 in relation to the same perception, when compared with the other age brackets (Table 3).

The OR was 19.58 for girls who perceived their weight as inadequate when their BMI

Table 3: Association between body perception and nutritional status, age bracket and waist circumference, in boys, Vitória (ES), Brazil, 2007

Variables	Crude OR (IC 95%)	p	Adjusted OR[1] (IC 95%)	p
Nutritional Status				
Normal weight for height	1.00	–	1.00	–
Underweight	2.90(0.40 – 21.27)	0.294	2.31(0.29 – 17.98)	0.425
Overweight	6.43(3.12 – 13.26)	**<0.001**	6,76(3.00 – 15.22)	**<0.001**
Age (years)				
08 |— 10	1.00	–	1.00	–
10 |— 14	0.45(0.22 – 0.94)	**0.034**	0.40(0.18 – 0.93)	**0.033**
14 |— 18	0.56(0.22 – 1.40)	0.213	0.58(0.19 – 1.75)	0.333
Waist circumference (cm)				
< 90th *percentile*	1.00	–	–	–
e" 90th *percentile*	0.95(0.50 – 1.80)	0.863	–	–

Note:
[1] Adjusted by the variables sexual maturity stage and maternal education
OR: *odds ratio*

showed they were overweight. The waist circumference did not show any association with body image perception when adjusted (Table 4).

Table 4: Association between body perception and nutritional status, age bracket and waist circumference, in girls, Vitória (ES), Brazil, 2007.

Variables	Crude OR (IC 95%)	*p*	Adjusted OR[1] (IC 95%)	*p*
Nutritional Status				
Normal weight for height	1.00	–	1.00	–
Underweight	2.06(0.28 – 15.09)	0.476	2.10(0.27 – 16.26)	0.476
Overweight	24.06(7.04 – 82.19)	<0.001	19,58(5.39 – 71.12)	<0.001
Age (years)				
08 |— 10	1.00	–	–	–
10 |— 14	0.96(0.43 – 2.13)	0.921	–	–
14 |— 18	0.78(0.29 – 2.14)	0.632	–	–
Waist circumference (cm)				
< 90th percentile	1.00	–	1.00	–
< 90th percentile	2.79(1.48 – 5.24))	0.001	1.36(0.61 – 3.06)	0.452

Note:
1 Adjusted by the variables sexual maturity stage and maternal education
OR: odds ratio

DISCUSSION

The choice of the most coherent instrument for studying body perception depends on what you want to investigate, since via this instrument you can verify both how well the individual regards the size of his/her body, and also the cognitive and behavioral aspects the individual presents, while providing better understanding of the given results[19]. The instruments most used in epidemiological research, and in clinical practice, are questionnaires, group or single interviews, and forms with body silhouette scales, that aim to identify discrepancies between the real and the desired body, and the feelings, emotions, behaviors and attitudes related[20,32]. The instrument used in the present study allowed us to verify body weight perception in a simple, practical and cheap way, when compared with instruments used in other studies that can be used in population studies and in clinical practices with adolescents.

The prevalence of overweight in both sexes was similar to that of other studies on body weight perception with students of the same age group[21,22]. In the present study, we verified that the nutritional status classified by the BMI as overweight, is associated with the inadequate body weight perception (extremely high, high, extremely low or low) in boys and girls. However, individuals with normal weight for height can also perceive themselves as over or underweight, and this can vary according to the gender[22,23,24], with a tendency to boys perceiving a lower body weight and girls a higher body weight. This reflects the slender body stereotype for girls and the muscular body for boys, valued nowadays by the western society, in addition to the pressure exerted by their social relations, in order for the adolescents to be accepted by their peers and parents[24].

The high BMI value can reflect changes in body composition that are features of puberty and of each gender related, for example, to the increase of lean body mass or fat tissue. Many studies on body awareness observed that the prevalence of distortions in body perception was high even among those with adequate nutritional status, what suggests that the weight perceived can be a beauty or a health related concern. It is important to emphasize that the body weight perception as "high" or "low" when related to height, consisted of one category (inadequate), and did not allow a more detailed analysis.

It was expected that the variable waist circumference, a sensitive and specific measure of abdominal body fat in children and adolescents of different ages, would present association with body weight perception, because the body can also be perceived from specific areas such as thighs, waist, buttocks, hips *etc.*[25-26]. It is important to consider that the classification criteria used as reference contemplates a population of British individuals, whose body shape patterns differ from Brazilian individuals. Studies relating to body perception and other variables that indicate nutritional status are scarce in the scientific literature.

The classification of sexual maturity, through self-evaluation of the secondary characteristics consists of a practical, cheap method, easy to fill out, and that does not depend on the researcher. However, it may result in errors on the part of the individuals examined, and that, in many studies, it is not practical verify. Aiming to minimize errors, the students received explanations on the differences between the stages, in addition to instructions on how to fill out the form.

Although we did not observe any association between body perception and sex maturity stage, this latter as may influence body weight perception differently between the genders, due to the physiological changes that occur. Along with the beginning of pubertal development, girls tend to have an increase in fat tissue (without necessarily putting on weight), and considering beauty, social and cultural reasons, they may perceive themselves, in the post pubertal phase, to have a body that goes against what is expected by the current beauty standards. The same pattern does not occur in boys, because as they mature sexually their bodies become more like what the male ideal is, due to the increase of muscle mass. Therefore, boys may perceive themselves as "thin" and girls as "fat", even when their weight is normal for their height[27,28]. ABBOTT *et al*.[29], in an Australian survey with adolescents of the same age groups, found adequate body weight perception in boys that matured before their mates, reinforcing the ideal of manhood, while overweight girls reported some type of concern related to body mass during adolescence.

Maybe the sexual maturity stage might explain the results found for the variable age, associated with body perception only in boys aged 10 to 14 years. This age group corresponds to the pubertal stage of sexual maturation where the adolescents show an increase in muscular mass due to physiological development and as already discussed, may not realize they are overweight or underweight. Unlike girls, whose concerns with beauty start at an early age usually influenced by family members. With time, influenced by the media and their own group, girls tend to be under more pressure to have a slim body. JONES[30] highlights the importance given to appearance during adolescence, and that aging may lead to changes in body weight perception.

The studies that relate body weight perception and social and economic levels are inconclusive. TRICHES *et al.*[31] observed that children of mothers with low educational levels were more susceptible to perceive their body weight as inadequate. The hypothesis presented by those authors was that these adolescents are more vulnerable to social and cultural influences, in addition to expressing greater need to be accepted by the social environment they live in. According to the authors, having a body that meets the pre-established stereotype may represent the false idea of better social status and possible social mobility. Such an argument may be questioned, because if we consider our society as globalized, it would be improbable that poor adolescents would not be influenced in their choices, attitudes, behaviors and thoughts in the same way as the rich ones.

The main results of the present study indicate that body weight is perceived in different ways between genders. Overweight school-children presented inadequate perception, and only in boys of 10 to 14 years we did observe association between body weight an perception and age group. It is important to emphasize that more studies for the purpose of evaluating body weight perception and associated factors, especially in adolescents, are necessary in Brazil. Most studies are cross-sectional and are therefore are of interest to better understand how the body is perceived, and what the influences in this process are during growth and development. This would be achieved using qualitative and quantitative approaches helping health professionals to better understand the topic and provide better quality of life for the adolescents.

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