

# Effects of psychological, morphological and sociodemographic variables on adolescents' eating behavior

*Efeitos de variáveis psicológicas, morfológicas e sociodemográficas sobre o comportamento alimentar de adolescentes*

*Efectos de variables psicológicas, morfológicas y sociodemográficas sobre el comportamiento alimentar de adolescentes*

Leonardo de Sousa Fortes<sup>1</sup>, Ana Carolina S. Amaral<sup>2</sup>, Sebastião de Sousa Almeida<sup>3</sup>, Maria Elisa C. Ferreira<sup>4</sup>

## ABSTRACT

**Objective:** To investigate the association of body dissatisfaction (BD), degree of psychological commitment to exercise (DPCE), usual level of physical activity (LPA), body mass index (BMI), fat percentage (%F) and ethnicity with inappropriate eating behavior (IEB) in adolescents.

**Methods:** Cross sectional study with 362 adolescents aged between ten and 19 years old, of both genders, selected by stratified sampling. The *Eating Attitudes Test* (EAT-26) was used to assess the IEB. In addition, *Body Shape Questionnaire*, *Commitment Exercise Scale* and the *International Physical Activity Questionnaire* were applied in order to assess BD, DPCE and LPA, respectively. Statistical treatment included multivariate analysis and multiple regression.

**Results:** BD, DPCE, BMI and %F were significantly associated with EAT-26 subscales scores for both genders. The statistical values were different between genders.

**Conclusions:** body dissatisfaction and BMI seemed to be strongly associated with the different constructs of eating behavior in both sexes.

**Key-words:** feeding behavior; body image; motor activity.

## RESUMO

**Objetivo:** Averiguar a associação da insatisfação corporal (IC), do grau de comprometimento psicológico ao exercício (GCPE), do nível habitual de atividade física (NAF), do índice de massa corpórea (IMC), do percentual de gordura (%G) e da etnia com o comportamento alimentar inadequado (CAI) de adolescentes.

**Métodos:** Investigação transversal, da qual participaram 362 jovens de ambos os sexos, com idades entre dez e 19 anos, selecionados por amostragem estratificada. O *Eating Attitudes Test* (EAT-26) foi utilizado para avaliar o CAI. Ademais, utilizou-se o *Body Shape Questionnaire*, a *Commitment Exercise Scale* e o *International Physical Activity Questionnaire* para avaliar IC, GCPE e NAF, respectivamente. Conduziu-se análise multivariada e regressão múltipla para se analisarem os dados.

**Resultados:** Os resultados evidenciaram que a IC, o GCPE, o IMC e o %G associaram-se significativamente ( $p < 0,05$ ) com os escores das subescalas do EAT-26, tanto no sexo feminino, quanto no masculino. Os valores indicativos dessas associações foram diferentes entre os sexos.

**Conclusões:** a insatisfação corporal e o IMC parecem ser os fatores mais fortemente associados aos distintos construtos do comportamento alimentar em ambos os sexos.

**Palavras-chave:** comportamento alimentar; imagem corporal; atividade motora.

Instituição: Faculdade de Educação Física e Desportos da Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brasil

<sup>1</sup>Mestre em Educação Física pela UFJF; Professor Titular do Centro Universitário Fafibe, Bebedouro, SP, Brasil

<sup>2</sup>Mestre em Educação Física pela UFJF; Professora do Instituto Federal de Educação, Ciência e Tecnologia do Sudeste de Minas Gerais – Campus Barbacena, Barbacena, MG, Brasil

<sup>3</sup>Doutor em Farmacologia pela Universidade de São Paulo (USP); Professor Titular do Departamento de Psicologia da Faculdade de Filosofia, Ciências e Letras da USP, São Paulo, SP, Brasil

<sup>4</sup>Pós-Doutora em Educação pela USP; Professora Titular do Departamento de Fundamentos da Educação Física da UFJF, Juiz de Fora, MG, Brasil

Endereço para correspondência:

Leonardo de Sousa Fortes

Rua Arnaud Capuzzo, 355/12 – Nova Aliança

CEP 14026-594 – Ribeirão Preto/SP

E-mail: leodesousafortes@hotmail.com

Conflito de interesse: nada a declarar

Recebido em: 29/6/2012

Aprovado em: 17/12/2012

## RESUMEN

**Objetivo:** Averiguar la asociación de la insatisfacción corporal (IC), del grado de comprometimiento psicológico al ejercicio (GCPE), del nivel habitual de actividad física (NAF), del índice de masa corporal (IMC), del porcentaje de grasa y de la etnia con el comportamiento alimentar inadecuado (CAI) de adolescentes.

**Métodos:** Investigación transversal, en la que participaron 362 jóvenes de ambos sexos, con edades entre 10 y 19 años, seleccionados por muestra estratificada. Se utilizó el *Eating Attitudes Test* (EAT-26) para evaluar los CAI. Además, se utilizó el *Body Shape Questionnaire*, la *Commitment Exercise Scale* y el *International Physical Activity Questionnaire* para evaluar IC, GCPE y NAF, respectivamente. Se condujo análisis multivariado y regresión múltiple para analizar los datos.

**Resultados:** Los resultados evidenciaron que la IC, el GCPE, el IMC y el porcentaje de grasa se asociaron significativamente ( $p < 0,05$ ) con los escores de las subescalas del EAT-26, tanto en el sexo femenino como en el masculino. Los valores indicativos de estas asociaciones fueron distintos entre los sexos.

**Conclusiones:** El IC y el IMC parecen ser los factores más fuertemente asociados a los distintos constructos del comportamiento alimentar de ambos sexos.

**Palabras clave:** comportamiento alimentar; imagen corporal; actividad motora.

## Introduction

In recent years, researchers have developed growing interest in studying the components of body image among many groups, especially in adolescents<sup>(1-3)</sup>. Body image involves both accuracy of perceptions of body size and attitudes, feelings, behaviors, and cognitions related to the body<sup>(1,4,5)</sup>. In this sense, body dissatisfaction is part of a subcomponent of the attitudinal dimension of body image with respect to deprecation/concern with weight and physical appearance<sup>(3,6)</sup>.

Some authors suggest a high prevalence of body dissatisfaction among adolescents<sup>(2,7)</sup>. Moreover, studies show that body dissatisfaction may be a first-order symptom in the development of inappropriate eating behaviors<sup>(8-11)</sup>, possibly contributing for the development of eating disorders.

According to Ferreira and Veiga<sup>(12)</sup>, dietary restriction, binge eating, self-induced vomiting and use of medications with the purpose of weight loss are considered abnormal

behavior, often related to the clinical diagnosis of eating disorders<sup>(13,14)</sup>. While in Brazil there are no population-based data on the prevalence of these disorders, studies in various regions of the country have demonstrated that, among young women, it can reach 15%<sup>(15,16)</sup>. Among young men, however, data are controversial, but it is believed that the prevalence approaches 1%<sup>(17)</sup>.

Other factors besides body dissatisfaction are associated with inappropriate eating behaviors. Modolo *et al*<sup>(18)</sup> point out that overcommitment to physical exercise may be related to eating disorders. However, there is still no consensus on the influence of physical activity upon eating behaviors. Some authors emphasize its importance<sup>(19)</sup>, while others argue that regular physical activity does not necessarily promote deleterious effects on health habits<sup>(20)</sup>.

Surveys also show the effects and influence of morphological factors, such as body mass index (BMI) and percentage of fat, on food intake/refusal behaviors<sup>(3,21)</sup>. Subjects with overweight/obesity or with a high body fat percentage generally have higher risks of developing eating disorders<sup>(11,22)</sup>. In addition, ethnicity may be another aspect that carries effects on eating habits. On the one hand, it seems that white individuals may be at greater risk for inadequate dietary behaviors when compared to other ethnic groups<sup>(7,23)</sup>. On the other, Sampei *et al*<sup>(24)</sup> found no difference in these behaviors between white and yellow girls.

Despite many discussions in this respect, so far we have no knowledge of studies in Brazil with the purpose of investigating the effects of various factors on the different constructs related to inappropriate eating behavior. Therefore, some hypotheses were formulated based on foundations by Laus, Costa and Almeida<sup>(2)</sup> about the possible effects of habitual physical activity, body dissatisfaction, and morphological factors on the eating behavior of adolescents. This study aimed to verify whether there is an association between body dissatisfaction (BD), the degree of psychological commitment to exercise (DPCE), the usual level of physical activity (LPA), body mass index (BMI), percentage of fat, and ethnicity, and inappropriate eating behaviors (IEB) of adolescents.

## Method

This is a cross-sectional school-based study, conducted in 2011 in the municipality of Juiz de Fora, state of Minas Gerais, with adolescents from 10 to 15 years of both sexes.

According to information from the Department of Education of Juiz de Fora, the population aged between 10

and 15 years enrolled in the schools of the municipality in 2010 was approximately 60,000 students. Thus, sample size calculation was performed, following recommendations of Alves *et al*<sup>(16)</sup> and using the following criteria: prevalence of 30% for inappropriate eating behavior, according to findings by Scherer *et al*<sup>(21)</sup> and Martins *et al*<sup>(22)</sup>, 95% confidence and 5% sampling error, totaling 321 students who should be evaluated to obtain a sample that would be representative of the population.

The sample selection occurred randomly, by a simple draw performed in two steps: first, the draw of the schools in each region and then, the draw of teenagers in these units. Schools were selected taking advantage of the relationship provided by the Statistics Division of the Department of Education of Juiz de Fora. The final sample of the survey was distributed in 12 different collection points (schools) and consisted of adolescents of both sexes aged 10 to 15 years who attended school on the days of collection and whose parents consented to their participation in the research. The study included only students who presented the Informed Consent Form (ICF) signed by their parents and who were enrolled in elementary or high school in the municipality of Juiz de Fora in 2011. Moreover, teenagers who refused to undergo the assessment activities were excluded from the investigation.

Thus, 403 subjects participated in the study, and 41 were excluded because they did not answer the questionnaire fully or did not participate in anthropometric assessments, totaling a final sample of 362 adolescents: 199 females and 163 males.

The instruments used were the Eating Attitudes Test (EAT-26), the Body Shape Questionnaire (BSQ), the Commitment to Exercise Scale (CES), and the International Physical Activity Questionnaire (IPAQ).

The EAT-26 was used to assess IEB, as well as each of its constructs. It consists of a self-report tool containing 26 items, with Likert-type scale responses (0=Never, almost never, or seldom; 1=Sometimes, 2=Several times, 3=always), and question number 25 presents an inverted score. These questions are divided into three subscales, each representing a facet of inappropriate eating behavior, namely: 1) diet – regarding the pathological refusal to high-calorie foods and concern with physical appearance; 2) bulimia and concern with food – refers to episodes of binge eating followed by purging behaviors for weight loss/control; and 3) oral self-control – reflects self-control in relation to food and evaluates environmental and social pressure stimulating food intake. Scores  $\leq 20$  indicate risk behavior for developing eating disorders. For this study,

we used the versions of the EAT-26 validated for Brazilian female<sup>(25)</sup> and male<sup>(26)</sup> adolescents.

The BSQ is a self-report instrument consisting of 34 questions in Likert-type scale ranging from 1=Never to 6=Always, which aim to assess the frequency of concern/dissatisfaction that the adolescent has regarding weight and physical appearance, i.e., their BD. It is considered that scores above 80 indicate dissatisfaction with physical appearance, and the higher the score, the greater the depreciation that is evaluated with their body appearance. This questionnaire has been validated for the Brazilian adolescent population<sup>(1)</sup>, showing good psychometric properties.

To determine the degree of psychological commitment of an individual regarding the habit of exercising, the Commitment to Exercise Scale – CES was applied. The instrument was translated, adapted, and validated for Portuguese by Teixeira *et al*<sup>(27)</sup>, and was named *Escala de Dedicção ao Exercício* (Commitment to Exercise Scale). The scale assesses the degree to which feelings of well-being are modulated by exercise, maintenance of exercise in the face of adverse conditions, and the degree of interference that physical activity has on the individual's social commitments. It is a visual analogue scale composed of eight questions ranging from 0–155mm and, therefore, with a maximum score of 1,240mm.

The short version of the IPAQ was also used to rate the level of habitual physical activity. It is a self-report instrument, composed of eight essay questions, to assess the amount of time spent per week in different dimensions of physical activity and physical inactivity. The IPAQ was validated for the young Brazilian population<sup>(28)</sup>. According to the score obtained, the individual is classified as: Sedentary, Insufficiently active A, Insufficiently Active B, Active, and Very Active.

Body mass was measured by a Tanita portable digital scale with 100g precision and maximum capacity of 200kg. A Welmy portable stadiometer with accuracy of 0.1cm and maximum height of 2.20m was used to measure the height of teenagers. BMI was obtained using the following formula:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ <sup>(4)</sup>. The classification of BMI followed the criteria of the World Health Organization<sup>(29)</sup>, which proposes a classification in underweight, normal weight, overweight, and obese, according to percentiles (5, 85, and 95) according to chronological age.

The measurements of skinfolds (triceps and subscapular) were performed in triplicate, not consecutively. These were measured with a Lange skinfold caliper with a precision of

0.1mm. For calculation of the percentage of body fat (%F), the prediction equation specific for adolescents proposed by Slaughter *et al*<sup>(30)</sup> was used.

The research was divided in two phases. First, the students answered the instruments (EAT, BSQ, CES and IPAQ), plus a qualitative questionnaire about demographic data (age, gender, and ethnicity – white, black or yellow). This step was performed in groups by a single researcher, who standardized verbal explanations in an attempt to avoid interference among raters.

After completing the questionnaires, students were led into another room, wearing Physical Education uniforms, barefoot, and had their anthropometric data measured individually. Only one student was allowed in the room at a time.

The study design was approved by the Research Ethics Committee of Universidade Federal de Juiz de Fora (protocol n. 2282.022.2011), according to the law 196/96 of the National Health Council.

Data were described by measures of central tendency (mean), dispersion (standard deviation) and frequencies (absolute and relative). In order to compare all continuous

variables by gender, multivariate analysis (MANOVA) was conducted. The Shapiro-Wilk test was used to assess the normality of BMI and body fat percentage according to chronological age and sex. Then, the stepwise multiple linear regression was used to determine the association of all the independent variables on the subscales of the EAT-26 according to sex in a single block. All data were processed in the SPSS 17.0 software, adopting a significance level of 5%.

## Results

Regarding the stratification of adolescents based on age, the final sample (362 adolescents) had 59, 62, 65, 56, 65 and 55 adolescents with respectively 10, 11, 12, 13, 14 and 15 years. The characterization of the sample by age, sex and ethnicity is described in Table 1, besides the descriptive analysis of the variables.

The findings according to age showed the following mean values for BMI in girls and boys, respectively: 10 years – 16.9kg/m<sup>2</sup> and 16.4kg/m<sup>2</sup>; 11 years – 17.4kg/m<sup>2</sup> and 17.1kg/m<sup>2</sup>; 12 years – 18.0kg/m<sup>2</sup> and 18.3kg/m<sup>2</sup>; 13 years – 18.9kg/m<sup>2</sup> and 18.5kg/m<sup>2</sup>; 14 years – 20.1kg/m<sup>2</sup> and 19.6kg/m<sup>2</sup>, and 15 years – 20.6kg/m<sup>2</sup> and 20.8kg/m<sup>2</sup>.

Through multivariate analysis, a statistically significant difference ( $p < 0.05$ ) was identified between sexes for the “Diet” ( $F = 25.46$ ,  $p = 0.001$ ) and “Oral self-control” ( $F = 14.17$ ,  $p = 0.01$ ) subscales, for the total score of the EAT-26 ( $F = 19.55$ ,  $p < 0.001$ ), the BSQ ( $F = 36.91$ ,  $p = 0.001$ ) and for body fat percentage ( $F = 11.75$ ,  $p = 0.01$ ).

The multiple regression model with the “Diet” subscale as the dependent variable showed a significant association ( $p < 0.05$ ) with body dissatisfaction ( $r^2 = 0.59$ ), BMI ( $r^2 = 0.16$ )

**Table 1** - Descriptive values of the variables according to gender

	Female	Male	p
Diet*	8 (0-29)	5 (0-30)	0.001
Bulimia*	1 (0-16)	0 (0-9)	0.16
Self-control*	4 (0-14)	3 (0-13)	0.01
EAT-26*	16 (2-46)	10 (0-48)	0.001
BSQ*	78 (35-172)	60 (35-178)	0.001
CES**	498.2±215.5	548.7±218.5	0.37
BMI**	19.8±3.7	20.0±3.5	0.22
%F**	25.7±7.3	21.7±10.3	0.01
Age (years)**	12.7±1.6	12.7±1.7	0.46
IPQA			
Sedentary	8 (4.0%)	9 (5.5%)	
Insufficiently active A	24 (12.1%)	9 (5.5%)	
Insufficiently active B	44 (22.1%)	22 (13.5%)	
Active	76 (38.2%)	51 (31.3%)	
Very Active	47 (23.6%)	72 (44.2%)	
Ethnicity			
White	134 (67.4%)	117 (71.8%)	
Black	48 (24.1%)	35 (21.5%)	
Yellow	17 (8.5%)	11 (8.7%)	

\*Median (minimum–maximum value); \*\*Mean±Standard deviation; EAT-26: Eating Attitudes Test-26; BSQ: Body Shape Questionnaire; CES: Commitment Exercise Scale; BMI: body mass index; %F: Percentage of fat; IPAQ: International Physical Activity Questionnaire.

**Table 2** - Stepwise Multiple Regression with the “Diet” subscale as the dependent variable in adolescents according to sex

Variable	Sex			
	Female		Male	
	r	r <sup>2</sup>	r	r <sup>2</sup>
BSQ	0.77*	0.59*	0.69*	0.47*
CES	0.18*	0.04*	0.18*	0.03*
IPAQ	0.12	0.02	0.05	0.003
BMI	0.39*	0.16*	0.45*	0.21*
%F	0.32*	0.10*	0.34*	0.12*
Ethnicity	0.003	0.001	0.002	0.0001
Total	0.78*	0.61*	0.72*	0.52*

BSQ: Body Shape Questionnaire; CES: Commitment to Exercise Scale; IPAQ: International Physical Activity Questionnaire; BMI: Body Mass Index; %F: Percentage of fat; \* $p < 0.05$



**Table 3** - Stepwise Multiple Regression with "Bulimia and Food concern" as the dependable variables in adolescents according to sex

Variable	Sex			
	Female		Male	
	r	r <sup>2</sup>	r	r <sup>2</sup>
BSQ	0.63*	0.39*	0.37*	0.14*
CES	0.15*	0.02*	0.13	0.02
IPAQ	0.11	0.01	0.10	0.01
BMI	0.19*	0.04*	0.21*	0.05*
%F	0.17*	0.03*	0.005	0.0001
Ethnicity	0.003	0.001	0.004	0.001
Total	0.64*	0.41*	0.46*	0.21*

BSQ: Body Shape Questionnaire; CES: Commitment to Exercise Scale; IPAQ: International Physical Activity Questionnaire; BMI: Body Mass Index; %F: Percentage of fat; \* $p < 0.05$

and body fat percentage ( $r^2 = 0.10$ ) in females. Similarly, the multiple linear regression showed a significant association ( $p < 0.05$ ) of body dissatisfaction ( $r^2 = 0.47$ ), BMI ( $r^2 = 0.21$ ) and fat percentage ( $r^2 = 0.12$ ) with the "Diet" subscale in males. Moreover, very inexpressive values were found for the CES (4 and 3% for girls and boys, respectively) (Table 2).

Regarding this same analysis, but using the "Bulimia and Food concern" subscale as a dependent variable, the results presented in Table 3 show that body dissatisfaction and BMI explained variance in both sexes ( $p < 0.05$ ). However, the DPCE and body fat percentage influenced the scores of this subscale only in females ( $p < 0.05$ ).

Finally, for the "Oral self-control" subscale, the regression model showed significant influences ( $p < 0.05$ ) only among boys. Body dissatisfaction and BMI explained part of the variance of the EAT-26 factor. However, it is noteworthy that the independent variables together modulated only 8% of the variance of oral self-control in females ( $p < 0.05$ ).

## Discussion

The study aimed to assess the association of BD, the DPCE, the usual LPA, BMI, body fat percentage, and ethnicity with IEB of adolescents.

Regarding the comparison of variables by gender, the results showed that females had higher values for dietary restriction (Diet), social pressure to eat (oral self-control), body dissatisfaction, and body fat percentage when compared to males. These findings corroborate other studies<sup>(2-4,10,31)</sup> that also found differences in the eating behavior of boys and girls. Some authors point out that girls often

**Table 4** - Stepwise Multiple Regression with "Oral Self-control" Subscale as the dependent variable in adolescents according to sex

Variable	Sex			
	Female		Male	
	r	r <sup>2</sup>	r	r <sup>2</sup>
BSQ	0.11	0.01	0.42*	0.18*
CES	0.14	0.02	0.15	0.02
IPAQ	0.009	0.001	0.01	0.009
BMI	0.13	0.02	0.16*	0.03*
%F	0.07	0.005	0.10	0.01
Ethnicity	0.04	0.001	0.07	0.005
Total	0.28*	0.08*	0.47*	0.22*

BSQ: Body Shape Questionnaire; CES: Commitment to Exercise Scale; IPAQ: International Physical Activity Questionnaire; BMI: Body Mass Index; %F: Percentage of fat; \* $p < 0.05$

present pathological food refusal, besides reporting greater pressure from parents and friends to lose/control weight<sup>(6,13)</sup>. In addition, young women are more prone to dissatisfaction with weight and physical appearance when compared to boys<sup>(2,4,31)</sup>. Perhaps, the high profile of fat found in females during puberty may be one of the explanations for such facts, because body fat, according to Fortes *et al.*<sup>(32)</sup> and Rodgers, Cabrol and Paxton<sup>(6)</sup> is considered a derogatory aspect in Western culture. Moreover, Miranda *et al.*<sup>(4)</sup> point out that girls are easily influenced by the media regarding the internalization of the thin body ideal. Thus, girls can aspire bodies that are usually unattainable, becoming more vulnerable to BD and, therefore, more susceptible to the onset of harmful eating habits<sup>(9,11,31)</sup>.

The results of this study showed that the independent variables explained 61 and 52% of the variance of the "Diet" subscale in females and males, respectively. BD, DPCE, BMI, and body fat percentage modulated food restriction and concerns with body appearance in both sexes. However, the regression model showed body dissatisfaction as the main predictor of pathological food refusal, both among girls and among boys (59 and 47%, respectively). These results are consistent with other findings, such as Rodgers, Cabrol and Paxton<sup>(6)</sup>, which identified 36% of behaviors toward thinness as influenced by body depreciation in Australian girls. However, no similar study has been found with a male sample. Nonetheless, it seems that food refusal among boys is influenced by the same factors considered as predictors in females.

Although the DPCE modulated the "Diet" subscale scores in both sexes, it is worth noting that the exaggerated dedication to physical exercise explained pathological

food refusal only 4% among girls and 3% among boys. These results are consistent with the assumptions made by Modolo *et al*<sup>(18)</sup> and Aşçi, Tuzun and Koca<sup>(19)</sup>, that exercising in excess may predispose young people to periods of food restriction. In contrast, the magnitude of this relationship may not be high enough to trigger pathological behaviors of food restriction, as noted earlier by Fortes, Oliveira and Ferreira<sup>(20)</sup>. Therefore, this topic remains unclear and needs further investigation.

Regarding the influence of ethnicity on food restriction, some studies have found contrasting results. On one hand, Engel *et al*<sup>(23)</sup>, Johnson *et al*<sup>(8)</sup> and Pernick *et al*<sup>(7)</sup> have demonstrated that ethnicity may explain between 5 and 16% of pathological food refusal. On the other hand, in the findings of Sampei *et al*<sup>(24)</sup>, as in the present study, this effect was not identified. One possible explanation for this difference may lie in the socio-cultural aspects related to the ideal of beauty, and it is possible that ethnicity acts as a modulator of behaviors related to diet only in cultures where skin color is associated with the pattern of the ideal body<sup>(6)</sup>.

Regarding the explanations for the symptoms of bulimia and concern with food, the multiple regression model showed slightly different results between the sexes. Among girls, BD was again the factor that best explained the variance of the Bulimia subscale, followed by BMI, body fat percentage, and DPCE. According to Rodgers, Cabrol and Paxton<sup>(6)</sup>, dissatisfaction with physical appearance tends to be the main explanation for the development of behaviors of binge eating followed by feelings of guilt and use of purging methods in order to control weight. Moreover, some researchers point out that girls with bulimia usually have mild overweight, which may explain to some extent the influence of body fat percentage and BMI on symptoms of bulimia and food concern in the present study<sup>(3,9,10)</sup>.

On the other hand, in males, only BD and BMI influenced this EAT-26 subscale, and 14 and 5% of the variance in symptoms of bulimia were explained by these variables, respectively. Although there are not many investigations aimed to evaluate these aspects in young boys, it seems that the DPCE, the level of habitual physical activity and ethnicity do not influence binge eating and purging behaviors for weight control<sup>(20)</sup>.

Regarding the influence of the variables in relation to self-control and environmental pressure to eat, the results

revealed 8% of influence for females and 22% for males. However, only among boys BD (18%) and BMI (3%) explained part of the variance in this subscale. Perhaps, for females, self-control and environmental pressure from parents and friends to weight loss/control are not influenced by the variables entered into the regression model, but by cultural and sociodemographic factors<sup>(5)</sup>. Thus, it is believed that young women are more easily influenced by social agents, compared to boys<sup>(9,10)</sup>, while, for males, morphological aspects and depreciation with their own bodies seem to better explain oral self-control.

This study presented some limitations. The main one was the use of self-reported assessment tools. Researchers emphasize that people may not respond faithfully to the questionnaires, because they are dealing with subjective responses that may be circumvented<sup>(3,32)</sup>. In contrast, Miranda *et al*<sup>(4)</sup> point out that, in population-based surveys or large samples, interviews with tools of easy application, such as questionnaires, is perhaps the most viable method to be used. Another limitation was the cross-sectional design, which does not allow inference of causality. This means that there is no way to assess the degree of intensity and direction of the associations found between the outcome of the study and the independent variables. Scherer *et al*<sup>(21)</sup> point out that the sampling process stratified by sociodemographic regions within the municipality does not guarantee that the sample is representative of the study population. However, it should be emphasized that the methodological procedures used in this study were made based on another research carried out successfully<sup>(16)</sup>. Thus, as a pioneer in the assessment of the influence of some factors on inappropriate eating behaviors between girls and boys, it is believed that the present research obtained results that cover part of the gap in this area of knowledge that, therefore, deserves to be further discussed in future studies.

Finally, it was concluded that BD and BMI are the major factors that promote significant effects on distinct constructs of eating behavior in both sexes; however, more research is needed on this respect. Thus, it is suggested that further studies are conducted to examine possible effects and influences of sociocultural agents, such as media and friends, on different constructs of IEB in adolescents, along with longitudinal studies that evaluate the causal relationships between these variables.

## References

1. Conti MA, Cordas TA, Latorre MR. A study of the validity and reliability of the Brazilian version of the Body Shape Questionnaire (BSQ) among adolescents. *Rev Bras Saude Mater Infant* 2009;9:331-8.
2. Laus MF, Costa TM, Almeida SS. Body image dissatisfaction and its relationship with physical activity and body mass index in Brazilian adolescents. *J Bras Psiquiatr* 2011;60:315-20.
3. Fortes LS, Ferreira ME. Comparação da insatisfação corporal e do comportamento alimentar inadequado em atletas adolescentes de diferentes modalidades esportivas. *Rev Bras Educ Fis Esporte* 2011;25:707-16.
4. Miranda VP, Conti MA, Bastos R, Ferreira ME. Body dissatisfaction in Brazilian adolescents from small municipalities of Minas Gerais. *J Bras Psiquiatr* 2011;60:190-7.
5. Amaral AC, Cordás TA, Conti MA, Ferreira ME. Semantic equivalence and internal consistency of the Brazilian Portuguese version of the Sociocultural Attitudes Towards Appearance Questionnaire-3 (SATAQ-3). *Cad Saude Publica* 2011;27:1487-97.
6. Rodgers R, Chabrol H, Paxton SJ. An exploration of the tripartite influence model of body dissatisfaction and disordered eating among Australian and French college women. *Body Image* 2011;8:208-15.
7. Pernick Y, Nichols JF, Rauh MJ, Kern M, Ji M, Lawson MJ *et al.* Disordered eating among a multi-racial/ethnic sample of female high-school athletes. *J Adolesc Health* 2006;38:689-95.
8. Johnson C, Crosby R, Engel S, Mitchell J, Powers P, Wittrock D *et al.* Gender, ethnicity, self-esteem and disordered eating among college athletes. *Eat Behav* 2004;5:147-56.
9. Rossi A, Moreira EA, Rauhen MS. Determinants of eating behavior: a review focusing on the family. *Rev Nutr* 2008;21:739-48.
10. Dunker KL, Fernandes CP, Carreira-Filho D. Socioeconomic influence on eating disorders risk behaviors in adolescents. *J Bras Psiquiatr* 2009;58:156-61.
11. Castro IR, Levy RB, Cardoso LO, Passos MD, Sardinha LM, Tavares LF *et al.* Body image, nutritional status and practices for weight control among Brazilian adolescents. *Cienc Saude Colet* 2010;15 (Suppl 2):3099-108.
12. De Souza Ferreira JE, da Veiga GV. Eating disorder risk behavior in Brazilian adolescents from low socio-economic level. *Appetite* 2008;51:249-55.
13. Grossbard JR, Neighbors C, Larimer ME. Perceived norms for thinness and muscularity among college students: what do men and women really want? *Eat Behav* 2011;12:192-9.
14. Teixeira PC, Costa RF, Matsudo SM, Cordás TA. Physical exercises in patients with eating disorders. *Rev Psiq Clin* 2009;36:145-52.
15. Nunes MA, Barros FC, Anselmo Olinto MT, Comey S, Mari JD. Prevalence of abnormal eating behaviours and inappropriate methods of weight control in young women from Brazil: a population-based study. *Eat Weight Disord* 2003;8:100-6.
16. Alves E, Vasconcelos FA, Calvo MC, Neves J. Prevalence of symptoms of anorexia nervosa and dissatisfaction with body image among female adolescents in Florianópolis, Santa Catarina State, Brazil. *Cad Saude Publica* 2008;24:503-12.
17. American Psychiatric Association. Practice guideline for the treatment of patients with eating disorders (revision). American Psychiatric Association Work Group on Eating Disorders. *Am J Psychiatry* 2000; 157 (Suppl 1):1-39.
18. Modoio VB, Antunes HK, Gimenez PR, Santiago ML, Tufik S, Mello MT. Negative addiction to exercise: are there differences between genders? *Clinics* 2011;66:255-60.
19. Aşçi FH, Tüzün M, Koca C. An examination of eating attitudes and physical activity levels of Turkish university students with regard to self-presentational concern. *Eat Behav* 2006;7:362-7.
20. Fortes LS, Oliveira FG, Ferreira ME. Influência de fatores afetivos, antropométricos e sociodemográficos sobre o comportamento alimentar em jovens atletas. *J Bras Psiquiatr* 2012;61:148-53.
21. Scherer FC, Martins CR, Pelegrini A, Matheus SC, Petroski EL. Body image among adolescents: association with sexual maturation and symptoms of eating disorders. *J Bras Psiquiatr* 2010;59:198-202.
22. Martins CR, Pelegrini A, Matheus SC, Petroski EL. Body image dissatisfaction and its relationship with nutritional status, body fat, and anorexia and bulimia symptoms in adolescents. *Rev Psiquiatr Rio Gd Sul* 2010;32:19-23.
23. Engel SG, Johnson C, Powers PS, Crosby RD, Wonderlich SA, Wittrock DA *et al.* Predictors of disordered eating in a sample of elite Division I college athletes. *Eat Behav* 2003;4:333-43.
24. Sampei MA, Sigulem DM, Novo NF, Juliano Y, Colugnati FA. Eating attitudes and body image in ethnic Japanese and Caucasian adolescent girls in the city of São Paulo, Brazil. *J Pediatr (Rio J)* 2009;85:122-8.
25. Bighetti F, Santos CB, Santos JE, Ribeiro RP. Tradução e validação do Eating Attitudes Test em adolescentes do sexo feminino de Ribeirão Preto, São Paulo. *J Bras Psiquiatr* 2004;53:339-46.
26. Fortes LS, Amaral AC, Conti MA, Cordás TA, Ferreira ME. Qualidades psicométricas do Eating Attitudes Test (EAT-26) para a população adolescente masculina brasileira. *Psicol Refl Crit*. In Press 2012.
27. Teixeira PC, Hearst N, Matsudo SM, Cordás TA, Conti MA. Transcultural adaptation: translation and content validation of the Commitment Exercise Scale to the Brazilian language. *Rev Psiquiatr Clin* 2011;38:24-8.
28. Guedes DP, Lopes CC, Guedes JE. Reprodutibilidade e validade do Questionário Internacional de Atividade Física em adolescentes. *Rev Bras Med Esporte* 2005;11:151-8.
29. Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Org* 2007;85:660-7.
30. Slaughter MH, Lohman TG, Boileau RA, Horswill CA, Stillman RJ, Van Loan MD *et al.* Skinfold equations for estimation of body fatness in children and youth. *Hum Biol* 1988;60:709-23.
31. Duca GF, Garcia LM, Sousa TF, Oliveira ES, Nahas MV. Body weight dissatisfaction and associated factors among adolescents. *Rev Paul Pediatr* 2010;28:340-6.
32. Fortes LS, Miranda VP, Amaral AC, Ferreira ME. Body dissatisfaction of teen athletes and non-athletes. *J Bras Psiquiatr* 2011;60:309-14.