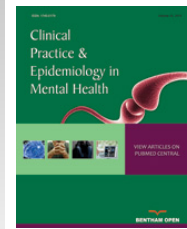




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RESEARCH ARTICLE

Relationship Among Body Image, Anthropometric Parameters and Mental Health in Physical Education Students

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Abstract:

Background

The prevalence of body image dissatisfaction (BID) is currently high. Given that psychological well-being is associated with the body measurements imposed by esthetic standards, BID is an important risk factor for mental disorders.

Objective

Identify the prevalence of BID, and compare anthropometric and mental health parameters between individuals satisfied and dissatisfied with their body image.

Method

A total of 140 university students completed the silhouette scale to screen for BID. Anthropometric measures, body mass index

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(BMI), waist circumference (WC) and body fat percentage (BFP) were used. To investigate mental health, The State-Trait Anxiety Inventories (STAI-S and STAI-T), Profile of Mood States (POMS) scale and Quality of Life (QOL-36) questionnaire were used to investigate mental health. The Student's t-test was applied to compare anthropometric and mental health parameters.

Results

67.1% of university students exhibited BID. There was a significant difference ($p = 0.041$) in BF and WC ($p = 0.048$) between dissatisfied and satisfied individuals. With respect to mood states, significant differences were observed for anger ($p = 0.014$), depression ($p = 0.011$), hostility ($p = 0.006$), fatigue ($p = 0.013$), mental confusion ($p = 0.021$) and total mood disturbance (TMD) ($p = 0.001$). The mental aspect of QOL was significantly higher ($p = 0.001$) in satisfied university students compared to their dissatisfied counterparts.

Conclusion

BID was high and it seems to be influenced by anthropometric measures related to the amount and distribution of body fat. This dissatisfaction may have a negative effect on the quality of life and mood state of young adults.

Keywords: Body image dissatisfaction, Mental health, Anthropometric parameters, Anxiety, Quality of life, Mood state.

INTRODUCTION

Body image is the mental image formed from the size and shape of one's own body [1]. It is a multidimensional construct that encompasses feelings, thoughts and behavior concerning physical attributes [2, 3]. It can also be considered as the relationship between the body of an individual and body-related cognitive processes (beliefs, values and attitudes) [4, 5].

The growing urbanization and technological development of the modern world has imposed important changes in people's lifestyle [6]. Sedentary behavior, which decreases physical activity levels, in conjunction with poor eating habits and increased intake of industrialized and hypercaloric food have contributed to the rise in problems related to excess body weight [7]. A number of studies suggest that a significant increase in body mass index (BMI), waist circumference (WC) and body fat percentage (BFP) are strong indicators of body image dissatisfaction (BID) [8 - 10].

Although there are anthropometric values suggested by the World Health Organization [11] to maintain physical fitness related to health, the ideal physical type is determined by culture [12]. In this respect, the current esthetic beauty standards accepted by society and constantly promoted by the media [13], are thin women and muscular men [14 - 16], which generates excessive concern with body image [17] and influences the growing dissatisfaction of people with their appearance [18, 19]. Thus, people compulsively strive for the perfect body and the esthetic ideal of beauty in order to follow these standards and be socially accepted [20 - 22]. This imposition aims to meet the demands of the beauty industry [23, 24], triggering increased consumption in medications, clothes, gym services, and weight loss clinics [21, 22], among other stakeholders in this expanding market. Moreover, these factors may contribute directly to the incidence of eating disorders [25, 26].

The body stereotype proposed is not always attainable due to different physical structures of the population [27], causing an increase in BID, which can be understood as a negative assessment of one's body [28]. This is normally diagnosed using questionnaires and silhouette scales, which emphasize concerns with weight, shape and BFP [29]. However, when the perception domain is investigated, silhouette figures are more frequently used [30]. Dissatisfaction with body image, resulting from not meeting the esthetic-cultural standards of contemporary society [31] is highly prevalent in both genders and in different age groups [28]. It is more common in young people, who are more vulnerable to behavioral changes, as well as in health professionals who value physical appearance [32, 33].

Depending on its severity, this dissatisfaction may hinder some aspects of life related to eating behavior, self-esteem as well as psychosocial, physical and cognitive performance [19, 34 - 37]. Given that psychological well-being in current society is significantly associated with body measurements [8], a negative self-concept of body image can decrease quality of life [45 - 47] and is a risk factor for psychiatric symptoms such as depression or mood changes [37 - 40], anxiety [41, 42] and stress [43, 44]. There is wide evidence showing that impaired body image perception may contribute to an increase in suicide attempts [48, 49].

Thus, is BID related to anthropometric profile? Moreover, does BID influence mental health measures, irrespective of anthropometric profile? The present study aimed to identify the prevalence of BID in university students, as well as to compare the mean values obtained in anthropometric tests and instruments related to mental health between

individuals satisfied and dissatisfied with body image.

METHODS

Sample

This is a cross-sectional study with a convenience sample composed of 140 physical education students (75 men and 65 women) from the Veiga de Almeida University in Rio de Janeiro state (UVA-RJ). Undergraduates were excluded from the sample who were absent from the class on data collection days; did not complete all the anthropometric assessment tests; refused to participate; did not correctly fill out the questionnaires. Individuals were instructed regarding the study procedures and gave their informed consent in accordance to the 196/96 Resolution of the National Health Council and the Declaration of Helsinki [50]. The project was approved by the human research ethics committee from the *Universidade Veiga de Almeida (UVA – RJ)* (no. CAEE 06784012.6.0000.5291).

Data Collection Procedures

The researchers held a meeting with possible volunteers at the institution. They were explained the goals and ethical procedures and gave their informed consent. Trained evaluators performed data collection at two different moments. On the first day, the individuals responded to the instruments (STAI, POMS, SF-36 and the Silhouette Scale) and on the second day, anthropometric variables were collected (Body Composition - BIA, Weight, Height and Waist Circumference). All study individuals received the same verbal instructions and doubts were clarified before the questionnaires were filled out. The instruments also contained written instructions on how to complete them. During the application of the instruments, there was no communication between individuals and there was no time limit imposed.

Anthropometric Variables

The following anthropometric and body composition variables were collected: a) height (cm) using a stadiometer with a 0.1 cm accuracy (Sanny[®] ES 2020, Brazil); b) weight using a digital scale with a 0.01 Kg accuracy (Filizola[®] PL 180, Brazil); c) waist circumference (WC) was measured using a steel anthropometric tape (Cescorf[®], Brazil), with a 2 m extension and 0.01 m intervals, at the narrowest point between the external surface of the last rib and the anterior superior iliac spine; d) BFP using a bipolar bioelectrical impedance analysis (BIA) device (Omron[®] HBF-306, USA). To complete the BIA analysis, participants completed the following procedures: (1) did not use diuretic drugs in the previous 7 days; (2) fasting for at least 4 h; (3) did not consume alcoholic beverages in the previous 48 h; (4) did not engage in intense physical activity in the last 24 h; (5) urinated at least 30 min before the measurement; (6) removed body adornments such as earrings, bracelets, necklaces and piercings; and (7) remained at absolute rest for at least 8-10 min in the supine position before the measurement [51]. All anthropometric measurements were made in accordance to the recommendations of the International Society for the Advancement of Kinanthropometry [52]. Body mass index (BMI) was computed using height and weight measures ($\text{weight}/\text{height}^2$). BMI was classified as normal ($< 25 \text{ kg}/\text{m}^2$) and overweight ($\geq 25 \text{ kg}/\text{m}^2$) according to the criteria established by the WHO [11]. The cutoff points used for WC were based on the degree of risk for cardiovascular diseases, namely moderate risk for women ($\text{WC} > 80 \text{ cm}$) and men ($\text{WC} > 94 \text{ cm}$), and high risk for women ($\text{WC} > 88 \text{ cm}$) and men ($\text{WC} > 102 \text{ cm}$). With respect to BFP, the cut off points for obesity or excess fat were $\geq 25\%$ for men and $\geq 35\%$ for women.

Body Image

The silhouette scale was used to estimate body image satisfaction. This consisted of male and female figures representing different body shapes numbered from 1 to 9 [53]. The individuals marked the silhouette that was most similar to their current body image and which one they would like to have. The difference between current and ideal silhouette was used to measure BID. If the difference was zero, the individuals were classified as satisfied, and if different from zero then they were classified as dissatisfied.

Mood State

Mood state was assessed using the Profile of Mood States Scale [54]. The 42 items on the short form are divided into six subscales: tension (T), depression (D), hostility (H), vigor (V), fatigue (F) and mental confusion (C). Each subscale contains four items rated using a Likert-type scale (not at all - 0; a little - 1; moderately - 2; quite a bit - 3; extremely - 4), with sub-scores ranging from 0 to 16. Subscales T, D, H, F and C are considered negative factors of mood, and V a positive factor. Total mood disturbance (TMD) is calculated by the sum of negative factors, subtracting

the positive factor score. The number 100 was added to the final TMD score to avoid negative results.

State-Trait Anxiety

Anxiety was measured by the self-rated STAI scales (State and Trait Anxiety Inventory). The state scale (STAI – S) requires individuals to express how they feel “at the moment” in relation to the 20 items contained on a 4-point Likert scale (not at all - 1; somewhat - 2; moderately so - 3; very much so - 4). The trait scale (STAI – T) also has 20 items, but individuals are instructed to respond how they “generally feel” on a different 4-point Likert scale (almost never - 1; sometimes - 2; often - 3; almost always - 4). The total score of each scale can vary from 20 to 80 points, with scores below 30 indicating a low degree of anxiety, 31-49 a medium level and 50 or more a high degree [55, 56].

Quality of Life

The SF-36 questionnaire (Medical Outcomes Study 36 – Item Short-Form Health Survey) was used to assess quality of life. This instrument contains 36 items, 35 of which encompass eight domains, grouped into two large components: physical (domains: functional capacity, physical aspects, pain and general health status) and mental (domains: mental health, vitality, social aspects and emotional aspects). A last item assesses change in health over time. Each of these domains received scores between 0 and 100, where zero corresponds to the lowest score and 100 to the highest [57, 58].

Statistical Analysis

The gathered data was analyzed using the SPSS 20.0 statistical package. The sample was characterized using descriptive statistics, namely central tendency (mean) and dispersion (standard deviation) measures. The Shapiro-Wilk and Levene tests were used to verify the sample’s normality and homogeneity of variances, respectively. The student’s t-test was applied to compare means from the anthropometric measures and mental health scores. A p-value < 0.05 was considered significant.

For purposes of the present study, the *d* score was defined as the difference in scores between groups (i.e., Body Satisfied and Body Dissatisfied) expressed in standard deviation units ($M_{\text{group1}} - M_{\text{group2}} / SD_{\text{pooled}}$ across groups). The most commonly used Cohen’s *d* formula has a slight bias as it overestimates the sample estimate effect size in small samples. Thereby, we completed the Hedges correction [59] which removes this bias using a simple correction, yielding an unbiased estimate of the effect size. Effect sizes were computed using an online calculator (http://www.psychometrica.de/effect_size.html) developed by [60]. Effect sizes were classified as minimal to small ($d < 0.2$), small to moderate ($d = 0.2 - 0.5$), moderate to large ($d = 0.5 - 0.8$) and large ($d > 0.8$) [61].

RESULTS

A summary of the sample characteristics is presented in Table 1. A total of 140 physical education undergraduate students, aged 23.6 ± 3.7 years, were participated in the study. The mean height, body weight, body fat percentage (BFP), BMI and WC were 70.7 ± 14.3 kg, 169.4 ± 1.1 cm, $19.5 \pm 7.1\%$, 24.5 ± 3.5 kg/m² and 76.7 ± 9.7 cm, respectively. The prevalence of BID in the students was 67.1%, with 80.4% of women and 64.2% of men aiming to reduce their body measures.

Table 1. Sample characterization (n = 140).

Variables	Mean ± SD
Age (years)	23.6 ± 3.7
Weight (kg)	70.7 ± 14.3
Height (cm)	169.4 ± 1.1
BFP (%)	19.5 ± 7.1
BMI (kg/m ²)	24.5 ± 3.5
WC (cm)	76.7 ± 9.7

SD = Standard Deviation; BMI: Body Mass Index; BFP: Body Fat Percentage; WC: Waist Circumference.

Table 2 shows the between-group differences regarding anthropometric variables. There was no difference in BMI ($p = 0.067$) between satisfied (23.7 ± 2.9 kg/m²) and dissatisfied individuals (24.9 ± 3.7 kg/m²). A significant difference ($t = -2.061$; $p = 0.041$) in BF was observed between the satisfied and dissatisfied individuals ($20.3 \pm 7.7\%$ vs. $17.9 \pm 5.4\%$). Mean WC was significantly higher ($t = -1.993$; $p = 0.048$) in dissatisfied students than in their satisfied counterparts (77.9 ± 10.0 cm vs. 74.4 ± 8.7 cm). Although there were no significant differences in BMI between groups,

the reported effect size was small to moderate ($d = 0.330$), just as for WC ($d = 0.357$) and BFP ($d = 0.328$).

Table 2. Analysis of the mean anthropometric variables and mental health between physical education undergraduates satisfied and dissatisfied with body image (Cabo Frio, RJ – 2015).

Variables	Body Satisfaction	Body Dissatisfaction	<i>t</i> value	<i>p</i> value	<i>d</i> value
BMI (kg/m ²)	23.7 ±2.9	24.9 ±3.7	-1.847	0.067	0.330
BFP (%)	17.9 ±5.4	20.3 ±7.7	-2.061	0.041*	0.328
WC (cm)	74.4 ±8.7	77.9 ±10.0	-1.993	0.048*	0.357
S-STAI	43.8 ±5.3	44.1 ±5.2	-0.352	0.725	0,063
T-STAI	44.5 ±5.4	44.9 ±5.5	-0,377	0.707	0,067
POMS anger	8.4 ±4.0	10.2 ±3.9	-2.490	0.014*	0,445
POMS depression	2.6 ±3.8	5.0 ±5.6	-2.582	0.011*	0,462
POMS hostility	3.1 ±3.6	5.0 ±3.9	-2.815	0.006*	0,504
POMS vigor	16.6 ±4.4	15.3 ±4.9	-1.536	0.127	0,275
POMS fatigue	5.4 ±4.0	7.4 ±4.6	-2.526	0.013*	0.542
POMS confusion	7.1 ±2.5	8.2 ±2.7	-2.331	0.021*	0.417
POMS TMD	110.1 ±14.5	120.5 ±18.0	-3.422	0.001*	0.612
QOL mental score	75.1 ±12.1	66.8 ±15.9	3.444	0.001*	0.491

BMI: Body Mass Index; BFP: Body Fat Percentage; WC: Waist Circumference; STAI-S: State Anxiety; STAI-T: Trait Anxiety; POMS: Profile of Mood States Scale; TMD: total mood disturbance; QOL: short form-36 Quality of Life.* $p < 0.05$.

No significant differences between groups were found regarding any of the anxiety scores investigated.

The POMS compared satisfied and dissatisfied individuals, respectively, finding significant differences between anger (8.4 ± 4.0 vs. 10.2 ± 3.9 ; $t = -2.490$; $p = 0.014$), depression (2.6 ± 3.8 vs. 5.0 ± 5.6 ; $t = -2.582$; $p = 0.011$), hostility (3.1 ± 3.6 vs. 5.0 ± 3.9 ; $t = -2.815$; $p = 0.006$), fatigue (5.4 ± 4.0 vs. 7.4 ± 4.6 ; $t = -2.526$; $p = 0.013$) and mental confusion (7.1 ± 2.5 vs. 8.2 ± 2.7 ; $t = -2.331$; $p = 0.021$). In relation to TMD, the dissatisfied obtained a significantly higher score (120.5 ± 18.0 vs. 110.1 ± 14.5 ; $t = -3.422$; $p = 0.001$). All the domains from POMS had small to moderate or moderate to large effect sizes, with the TMD score having the largest ($d = 0.612$).

The mental aspect score of quality of life (QOL) was significantly higher ($t = 3.444$; $p = 0.001$) in satisfied students (75.1 ± 12.1) when compared to the dissatisfied (66.8 ± 15.9), with a small to moderate difference between-groups ($d = 0.491$).

DISCUSSION

The aim of the present study was to assess BID of university students, and to compare anthropometric measures and mental health scores between satisfied and unsatisfied students.

The results of this study revealed that 67.1% were dissatisfied with their body image. It is important to underline that this value is significantly high, since approximately two out of three students expressed the desire to have a body shape different from the one currently perceived. Similar results were found in studies with physical education students or participants from other study domains. Miranda *et al.* [33] found that 76.6% of university students recruited from several study domains were dissatisfied with their body image (20.82 ± 3.03 years). In addition, Gonçalves *et al.* [27] identified BID in 75.8% and 78.2% of nutrition and physical education undergraduates, respectively. A research project conducted by Claumann *et al.* [62] found that 79.2% of physical education freshmen expressed BID. In another study [63] carried out with 236 undergraduates of both genders, the prevalence of BID was 69.5%. Similarly, an investigation [34] performed with 294 physical education students from the State University of Ponta Grossa (UEPG) found that 61.2% of individuals were dissatisfied with perceived body image.

Due to their high prevalence of BID, physical education undergraduates are highly susceptible to developing mental disorders, including eating disorders [21]. The physical and esthetic demands inherent to the course and profession they chose to pursue may be a possible explanation for the high percentage of dissatisfaction observed [62]. Thereby, these future professionals face pressure to follow socially accepted esthetic standards, generating exaggerated concerns with body appearance that can influence body image satisfaction levels [41, 64]. A number of authors agree that cultural pressures ultimately define idealized values, leading men to demonstrate a consensual desire to reduce body fat,

increase muscle mass, develop broad shoulders, strong arms, a thin waist and hips, as well as a flat stomach. By contrast, women crave a thin and tall stereotype, with slim thighs, buttocks, and waist, in addition to a flat stomach [12, 65].

Cross-sectional studies have been conducted in order to establish the relationship between BID and anthropometric measures. However, these studies have mainly assessed BMI and the results have been inconsistent [66]. The findings of the present study showed no difference in BMI ($p = 0.067$) between undergraduates satisfied and dissatisfied with their body image, differing from those that reported an increase in BID with the rise in BMI [10, 22, 33, 34, 63, 66 - 74]. Some studies also found no significant association between these variables [12, 69, 75].

The results presented here suggest significant differences in the anthropometric variables BFP ($p = 0.041$) and WC ($p = 0.048$) between the two groups analyzed. Corseuil *et al.* [74] observed an association between BID and BFP in a study conducted on 180 females aged between 10 and 17 years. Fermino *et al.* [72] studied individuals that engaged in activities at the Pontifical University of Parana (PUC-PR) sports center and using multiple linear regression they observed that higher BFP values represented greater body image dissatisfaction. There is also an evidence associating BID with sum of skinfolds, an alternative anthropometric measure to assess body adiposity [10, 66]. In a sample of 220 undergraduates, no association was found between WC and BID, a measure that can be used to estimate central adiposity [76].

These findings suggest that BFP and WC, just like BMI, may be reliable anthropometric indicators of BID in university students. It is also important to notice that several researchers highlight the limitations related to the use of BMI, which does not differentiate between adipose tissue and lean mass [10, 33]. Thereby, it seems that BID is more interrelated to the amount of subcutaneous adipose tissue than total body weight [66].

The current esthetic standard of beauty accepted by society and constantly promoted by the media may exert some influence on body image satisfaction and the mental health of individuals. Men express BID after viewing images of other “muscular” men, but not of average men [77]. These results corroborate those obtained for women in a study by Birkeland *et al.* [78], where 138 female undergraduates demonstrated BID and a negative mood in the presence of a model. Negative feelings about their bodies contribute to the increased prevalence of depression symptoms and decreased self-esteem in adolescent women [79]. Excessive media exposure of “ideal” bodies (thin models) in our society may trigger a more negative mood and lower food intake in women [80], contributing to the onset of eating disorders such as anorexia and bulimia.

This low self-esteem in female adolescents may be attributed to overweight and obesity, which generates BID, negatively affecting mental health [81]. El Ansari *et al.* analyzed body image differences in 1,384 university undergraduates in two European countries and found that students who perceived themselves as being overweight reported lower quality of life [82]. Better body image was also related to an increase in self-esteem, optimism and social support among women, which are mental health related components of quality of life [83]. Quality of life seems to have a positive influence on how individuals perceive their body image, but the opposite is equally likely [82].

There is a need to acknowledge and increase our understanding of BID as a public health problem. A total of 5,255 Australian women, aged between 18 and 42 years, filled out specific questionnaires on body image and mental health. The results demonstrate that most individuals (86.9%) reported some level of dissatisfaction with their weight, and more than one-third (39.4%) relate moderate dissatisfaction. Higher levels of BID were associated with poor quality of life, primarily with the mental health and psychosocial dimensions [47]. Individuals with third-degree obesity exhibit concerns with body image and high frequency of binge eating episodes, as well as severe depression symptoms and anxiety. Depression symptoms were detected in 100% of these individuals, and severe symptomatology in 84%. The frequency of anxiety as a trait was 70%, as a state 54%, and 76% of all patients reported discomfort regarding their body image [84].

LIMITATIONS

It is important to highlight that the study reported here has some limitations. First, it has a cross-sectional design, which does not allow establishing a causal relationship between the assessed variables. Furthermore, body silhouette scales are two-dimensional and do not allow to fully represent the individual, their body fat distribution and other anthropometric measures important to body image. Future studies should make efforts to include new variables to analyze the interaction between the biological, physiological, emotional and social aspects that encompass body image understanding.

CONCLUSION

The results show a high prevalence of BID in physical education undergraduates. Furthermore, individuals with greater fat accumulation in the visceral region and a higher percentage of body fat were more likely to exhibit BID. Finally, BID was related with poorer quality of life and mood state in these university students.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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REFERENCES

- [1] Slade PD. What is body image? *Behav Res Ther* 1994; 32(5): 497-502. [[http://dx.doi.org/10.1016/0005-7967\(94\)90136-8](http://dx.doi.org/10.1016/0005-7967(94)90136-8)] [PMID: 8042960]
- [2] Pinheiro AP, Giugliani ER. Body dissatisfaction in Brazilian schoolchildren: prevalence and associated factors. *Rev Saude Publica* 2006; 40(3): 489-96. [<http://dx.doi.org/10.1590/S0034-89102006000300018>] [PMID: 16810374]
- [3] Muth JL, Cash TF. Body-image attitudes: what difference does gender make? *J Appl Soc Psychol* 1997; 27(16): 1438-52. [<http://dx.doi.org/10.1111/j.1559-1816.1997.tb01607.x>]
- [4] Petroski EL, Pelegrini A, Glaner MF. Motivos e prevalência de insatisfação com a imagem corporal em adolescentes. *Cien Saude Colet* 2012; 17(4): 1071-7. [<http://dx.doi.org/10.1590/S1413-81232012000400028>] [PMID: 22534860]
- [5] Santos JEd, Pasian SR, Loureiro SR. Percepção de tamanho e forma corporal de mulheres: estudo exploratório. *Psicol Estud* 2005; 10(1): 27-35. [<http://dx.doi.org/10.1590/S1413-73722005000100005>]
- [6] Matsudo SM, Matsudo VR, Araújo T, Andrade D, Andrade E, Braggion G. Nível de atividade física da população do Estado de São Paulo: análise de acordo com o gênero, idade, nível socioeconômico, distribuição geográfica e de conhecimento. *Rev bras cienc mov* 2002; 10(4): 41-50.
- [7] Petroski EL, Pelegrini A, Glaner MF. Insatisfação corporal em adolescentes rurais e urbanos. *Motricidade* 2009; 5(4): 13-25. [[http://dx.doi.org/10.6063/motricidade.5\(4\).167](http://dx.doi.org/10.6063/motricidade.5(4).167)]
- [8] Anderson LA, Eyler AA, Galuska DA, Brown DR, Brownson RC. Relationship of satisfaction with body size and trying to lose weight in a national survey of overweight and obese women aged 40 and older, United States. *Prev Med* 2002; 35(4): 390-6. [<http://dx.doi.org/10.1006/pmed.2002.1079>] [PMID: 12453717]
- [9] Appolinário JC, Claudino AM. Transtornos alimentares. *Rev Bras Psiquiatr* 2000; 22: 28-31. [<http://dx.doi.org/10.1590/S1516-44462000000600008>]
- [10] Glaner MF, Pelegrini A, Cordoba CO, Pozzobon ME. Associação entre insatisfação com a imagem corporal e indicadores antropométricos em adolescentes. *Revista Brasileira de Educação Física e Esporte* 2013; 27(1): 129-36. [<http://dx.doi.org/10.1590/S1807-55092013000100013>]
- [11] WHO J, Consultation FE. Diet, nutrition and the prevention of chronic diseases. *World Health Organ Tech Rep Ser* 2003; 916: i-viii, 1-149, backcover. [PMID: 12768890]
- [12] Damasceno VO, Lima JRP, Vianna JM, Vianna VRA, Novaes JS. Tipo físico ideal e satisfação com a imagem corporal de praticantes de caminhada. *Rev bras med esporte* 2005; 11(3): 181-6. [<http://dx.doi.org/10.1590/S1517-86922005000300006>]
- [13] Bedford JL, Johnson CS. Societal influences on body image dissatisfaction in younger and older women. *J Women Aging* 2006; 18(1): 41-55. [http://dx.doi.org/10.1300/J074v18n01_04] [PMID: 16635949]
- [14] Bergström E, Stenlund H, Svedjehäll B. Assessment of body perception among Swedish adolescents and young adults. *J Adolesc Health* 2000; 26(1): 70-5. [[http://dx.doi.org/10.1016/S1054-139X\(99\)00058-0](http://dx.doi.org/10.1016/S1054-139X(99)00058-0)] [PMID: 10638721]
- [15] Vilela J, Lamounier J, Oliveira R, Ribeiro R, Gomes E, Barros Neto J. Avaliação do comportamento alimentar em crianças e adolescentes de Belo Horizonte. *Psiquiatria biológica* 2001; 9(3): 121-30.

- [16] Cafri G, Thompson JK. Measuring male body image: a review of the current methodology. *Psychol Men Masc* 2004; 5(1): 18. [<http://dx.doi.org/10.1037/1524-9220.5.1.18>]
- [17] Alves D, Pinto M, Alves S, Mota A, Leirós V. Cultura e imagem corporal. *Motricidade* 2009; 5(1): 1-20. [[http://dx.doi.org/10.6063/motricidade.5\(1\).184](http://dx.doi.org/10.6063/motricidade.5(1).184)]
- [18] Thompson JK, Stice E. Thin-ideal internalization: Mounting evidence for a new risk factor for body-image disturbance and eating pathology. *Curr Dir Psychol Sci* 2001; 10(5): 181-3. [<http://dx.doi.org/10.1111/1467-8721.00144>]
- [19] Smolak L. Body image in children and adolescents: where do we go from here? *Body Image* 2004; 1(1): 15-28. [[http://dx.doi.org/10.1016/S1740-1445\(03\)00008-1](http://dx.doi.org/10.1016/S1740-1445(03)00008-1)] [PMID: 18089138]
- [20] Tavares MdCGC. Imagem corporal: conceito e desenvolvimento. *Imagem corporal: conceito e desenvolvimento: Manole* 2003.
- [21] Russo R. Imagem corporal: construção através da cultura do belo. *Movimento & Percepção* 2005; 5(6): 80-90.
- [22] Saur AM, Pasian SR. Satisfação com a imagem corporal em adultos de diferentes pesos corporais. *Avaliação Psicológica* 2008; 7(2): 199-209.
- [23] Labre MP. Adolescent boys and the muscular male body ideal. *J Adolesc Health* 2002; 30(4): 233-42. [[http://dx.doi.org/10.1016/S1054-139X\(01\)00413-X](http://dx.doi.org/10.1016/S1054-139X(01)00413-X)] [PMID: 11927235]
- [24] Dohnt H, Tiggemann M. The contribution of peer and media influences to the development of body satisfaction and self-esteem in young girls: a prospective study. *Dev Psychol* 2006; 42(5): 929-36. [<http://dx.doi.org/10.1037/0012-1649.42.5.929>] [PMID: 16953697]
- [25] Morgan CM, Vecchiatti IR, Negrão AB. Etiologia dos transtornos alimentares: aspectos biológicos, psicológicos e sócio-culturais. *Rev Bras Psiquiatr* 2002; 24(Suppl. 3): 18-23. [<http://dx.doi.org/10.1590/S1516-44462002000700005>]
- [26] Bosi MLM, Vigário PdS, Vieira RdS. Comportamento alimentar e imagem corporal em atletas. *Revista Brasileira de Medicina do Esporte* 2003; 9(6): 348-56. [<http://dx.doi.org/10.1590/S1517-86922003000600002>]
- [27] Gonçalves TD, Barbosa MP, Rodrigues AM. Comportamento anoréxico e percepção corporal em universitários. *J Bras Psiquiatr* 2008; 57(3): 166-70. [<http://dx.doi.org/10.1590/S0047-20852008000300002>]
- [28] Adami F, Frainer DE, Santos JS, Fernandes TC, De-Oliveira FR. Insatisfação corporal e atividade física em adolescentes da região continental de Florianópolis. *Psicologia. Teoria e Pesquisa* 2008; 24(2): 143-9. [<http://dx.doi.org/10.1590/S0102-37722008000200003>]
- [29] Smolak L, Levine MP. Body image in children. *Body image, eating disorders, and obesity in youth: Assessment, prevention, and treatment* 2001; 41-66. [<http://dx.doi.org/10.1037/10404-002>]
- [30] Almeida SS, Zanatta DP, Rezende FF. Body image, anxiety and depression in obese patients submitted to bariatric surgery. *Estudos de Psicologia (Natal)* 2012; 17(1): 153-60. [<http://dx.doi.org/10.1590/S1413-294X2012000100019>]
- [31] Cattarin JA, Thompson JK, Thomas C, Williams R. Body image, mood, and televised images of attractiveness: The role of social comparison. *J Soc Clin Psychol* 2000; 19(2): 220. [<http://dx.doi.org/10.1521/jscp.2000.19.2.220>]
- [32] Melin P, Araújo AM. Transtornos alimentares em homens: Um desafio diagnóstico. *Rev Bras Psiquiatr* 2002. [<http://dx.doi.org/10.1590/S1516-44462002000700016>]
- [33] Miranda VPN, Filgueiras JF, Neves CM, Teixeira PC, Ferreira MEC. Insatisfação corporal em universitários de diferentes áreas de conhecimento 2012.
- [34] Rech CR, Vanat J. Auto percepção da imagem corporal em estudantes do curso de educação física. *Revista Brasileira de Educação Física e Esporte* 2010; 24(2): 285-92. [<http://dx.doi.org/10.1590/S1807-55092010000200011>]
- [35] Killen JD, Taylor CB, Hayward C, *et al.* Pursuit of thinness and onset of eating disorder symptoms in a community sample of adolescent girls: a three-year prospective analysis. *Int J Eat Disord* 1994; 16(3): 227-38. [[http://dx.doi.org/10.1002/1098-108X\(199411\)16:3<227::AID-EAT2260160303>3.0.CO;2-L](http://dx.doi.org/10.1002/1098-108X(199411)16:3<227::AID-EAT2260160303>3.0.CO;2-L)] [PMID: 7833956]
- [36] Mendelson BK, White DR, Mendelson MJ. Childrens global self-esteem predicted by body-esteem but not by weight. *Percept Mot Skills* 1995; 80(1): 97-8. [<http://dx.doi.org/10.2466/pms.1995.80.1.97>] [PMID: 7624225]
- [37] Stice E, Hayward C, Cameron RP, Killen JD, Taylor CB. Body-image and eating disturbances predict onset of depression among female adolescents: a longitudinal study. *J Abnorm Psychol* 2000; 109(3): 438-44. [<http://dx.doi.org/10.1037/0021-843X.109.3.438>] [PMID: 11016113]
- [38] Ricciardelli LA, McCabe MP. A biopsychosocial model of disordered eating and the pursuit of muscularity in adolescent boys. *Psychol Bull* 2004; 130(2): 179-205.

- [http://dx.doi.org/10.1037/0033-2909.130.2.179] [PMID: 14979769]
- [39] Johnson F, Wardle J. Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis. *J Abnorm Psychol* 2005; 114(1): 119-25.
[http://dx.doi.org/10.1037/0021-843X.114.1.119] [PMID: 15709818]
- [40] Sujoldzić A, De Lucia A. A cross-cultural study of adolescents BMI, body image and psychological well-being. *Coll Antropol* 2007; 31(1): 123-30.
[PMID: 17598390]
- [41] Mookerjee S, Singh J, Cashi T. Anthropometric profiles and social physique anxiety of physical education professionals from India. *Percept Mot Skills* 2002; 94(1): 47-54.
[http://dx.doi.org/10.2466/pms.2002.94.1.47] [PMID: 11883588]
- [42] Dixon AF, Dixon JB, O'Brien PE. Cardiovascular benefit of light to moderate alcohol consumption. *Aust Fam Physician* 2003; 32(8): 649-52.
[PMID: 12973877]
- [43] Anton SD, Perri MG, Riley JR III. Discrepancy between actual and ideal body images; Impact on eating and exercise behaviors. *Eat Behav* 2000; 1(2): 153-60.
[http://dx.doi.org/10.1016/S1471-0153(00)00015-5] [PMID: 15001058]
- [44] Markey CN, Markey PM. Relations between body image and dieting behaviors: An examination of gender differences. *Sex Roles* 2005; 53(7-8): 519-30.
[http://dx.doi.org/10.1007/s11199-005-7139-3]
- [45] Song AY, Rubin JP, Thomas V, Dudas JR, Marra KG, Fernstrom MH. Body image and quality of life in post massive weight loss body contouring patients. *Obesity (Silver Spring)* 2006; 14(9): 1626-36.
[http://dx.doi.org/10.1038/oby.2006.187] [PMID: 17030974]
- [46] Meland E, Haugland S, Breidablik HJ. Body image and perceived health in adolescence. *Health Educ Res* 2007; 22(3): 342-50.
[http://dx.doi.org/10.1093/her/cyl085] [PMID: 16957015]
- [47] Mond J, Mitchison D, Latner J, Hay P, Owen C, Rodgers B. Quality of life impairment associated with body dissatisfaction in a general population sample of women. *BMC Public Health* 2013; 13: 920.
[http://dx.doi.org/10.1186/1471-2458-13-920] [PMID: 24088248]
- [48] Eaton DK, Lowry R, Brener ND, Galuska DA, Crosby AE. Associations of body mass index and perceived weight with suicide ideation and suicide attempts among US high school students. *Arch Pediatr Adolesc Med* 2005; 159(6): 513-9.
[http://dx.doi.org/10.1001/archpedi.159.6.513] [PMID: 15939848]
- [49] Kim DS. Body image dissatisfaction as an important contributor to suicidal ideation in Korean adolescents: gender difference and mediation of parent and peer relationships. *J Psychosom Res* 2009; 66(4): 297-303.
[http://dx.doi.org/10.1016/j.jpsychores.2008.08.005] [PMID: 19302886]
- [50] Association WM. Declaration of Helsinki (2008) Ethical principles for medical research involving human subjects. South Korea.: The 59th WMA General Assembly 2007.
- [51] Guanabara Koogan, Ed. *Medicine ACoS. Manual do ACSM para avaliação da aptidão física relacionada à saúde*. Rio de Janeiro.: Primeira edição, 2006.
- [52] Marfell-Jones M, Olds T, Stewart A, Carter L. *Potchefstroom. International standards for anthropometric assessment: ISAK.*; South Africa.. 2006.
- [53] Stunkard AJ, Sørensen T, Schulsinger F. Use of the Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis* 1983; 60: 115-20.
[PMID: 6823524]
- [54] Viana MF, Almeida P, Santos RC. Adaptação portuguesa da versão reduzida do Perfil de Estados de Humor-POMS. *Anal Psicol* 2012; 19(1): 77-92.
- [55] Spielberger CD. *STAI manual for the state-trait anxiety inventory. Self-Evaluation Questionnaire* 1970; 1-24.
- [56] Biaggio A, Natalício L. *Manual para o inventário de ansiedade Traço-Estado (IDATE)*. Rio de Janeiro: CEPA 1979; p. 15.
- [57] Ciconelli RM. Tradução para o português e validação do questionário genérico de avaliação de qualidade de vida Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). São Paulo: Federal University of São Paulo (UNIFESP) 1997.
- [58] Ware JE Jr. Conceptualization and measurement of health-related quality of life: comments on an evolving field. *Arch Phys Med Rehabil* 2003; 84(4)(Suppl. 2): S43-51.
[http://dx.doi.org/10.1053/apmr.2003.50246] [PMID: 12692771]
- [59] Hedges LV. Distribution theory for Glass's estimator of effect size and related estimators. *J Educ Behav Stat* 1981; 6(2): 107-28.
[http://dx.doi.org/10.3102/10769986006002107]
- [60] Lenhard W, Lenhard A. Calculation of Effect Sizes. Bibergau (Germany): Psychometrica; 2016, Available from: http://www.psychometrica.de/effect_size.html
- [61] Lipsey MW, Wilson DB. *Practical meta-analysis.*. Thousand Oaks, CA, USA: Sage publications 2001.

- [62] Claumann GS, Pereira ÉF, Inácio S, Santos MC, Martins AC, Pelegrini A. Body image satisfaction in freshmen college students in physical education courses. *Revista da Educação Física/UEM* 2014; 25(4): 575-83.
- [63] Ferrari EP, Petroski EL, Silva DAS. Prevalence of body image dissatisfaction and associated factors among physical education students. *Trends Psychiatr Psychother* 2013; 35(2): 119-27. [http://dx.doi.org/10.1590/S2237-60892013000200005]
- [64] Garcia L, Milagres OG, Mourão L, Assis M, Palma A. Auto-percepção da imagem corporal em estudantes de Educação Física e Medicina. *Revista Brasileira de Atividade Física & Saúde* 2011; 16(1): 25-30.
- [65] Nowak M. The weight-conscious adolescent: body image, food intake, and weight-related behavior. *J Adolesc Health* 1998; 23(6): 389-98. [http://dx.doi.org/10.1016/S1054-139X(97)00263-2] [PMID: 9870333]
- [66] Petroski EL, Pelegrini A, Barbosa AR. Insatisfação com a imagem corporal: avaliação comparativa da associação com estado nutricional em universitários. *Rev Psiquiatr Rio Gd Sul* 2008; 30(1): 31-8.
- [67] McCabe MP, Ricciardelli LA. Parent, peer, and media influences on body image and strategies to both increase and decrease body size among adolescent boys and girls. *Adolescence* 2001; 36(142): 225-40. [PMID: 11572302]
- [68] Kakeshita IS, de Sousa Almeida S. Relação entre índice de massa corporal e a percepção da auto-imagem em universitários. *Rev Saude Publica* 2006; 40(3): 497-504. [http://dx.doi.org/10.1590/S0034-89102006000300019] [PMID: 16810375]
- [69] Bosi ML, Luiz RR. Autopercepção da imagem corporal entre estudantes de nutrição: um estudo no município do Rio de Janeiro. *J Bras Psiquiatr* 2006; 55(2): 108-13. [http://dx.doi.org/10.1590/S0047-20852006000200003]
- [70] Pinheiro AP, Giugliani ER. Body dissatisfaction in Brazilian schoolchildren: prevalence and associated factors. *Rev Saude Publica* 2006; 40(3): 489-96. [http://dx.doi.org/10.1590/S0034-89102006000300018] [PMID: 16810374]
- [71] Robinson TN, Chang JY, Haydel KF, Killen JD. Overweight concerns and body dissatisfaction among third-grade children: the impacts of ethnicity and socioeconomic status. *J Pediatr* 2001; 138(2): 181-7. [http://dx.doi.org/10.1067/mpd.2001.110526] [PMID: 11174614]
- [72] Fermino RC, Pezzini MR, Reis RS. Motivos para prática de atividade física e imagem corporal em frequentadores de academia. *Rev bras med esporte* 2010; 16(1): 18-23. [http://dx.doi.org/10.1590/S1517-86922010000100003]
- [73] Secchi K, Camargo BV, Bertoldo RB. Body image perception and body's social representations/Percepcao da imagem corporal e representacoes sociais do corpo. *Psicologia. Teoria e Pesquisa* 2009; 25(2): 229-37.
- [74] Corseuil MW, Pelegrini A, Beck C, Petroski EL. Prevalência de insatisfação com a imagem corporal e sua associação com a inadequação nutricional em adolescentes-DOI *Revista da Educação Física/UEM* 2009;20(1):25-31 2009; 20(1): 25-31. [http://dx.doi.org/10.4025/reveducfis.v20i1.3496]
- [75] Bosi ML, Luiz RR, Uchimura KY. Comportamento alimentar e imagem corporal entre estudantes de educação física. *J Bras Psiquiatr* 2008; 57(1): 28-33. [http://dx.doi.org/10.1590/S0047-20852008000100006]
- [76] Vasconcelos FdAGd. Influência de fatores socioeconômicos, comportamentais e nutricionais na insatisfação com a imagem corporal de universitárias em Florianópolis, SC. *Rev Bras Epidemiol* 2010; 13(4): 665-76. [http://dx.doi.org/10.1590/S1415-790X2010000400011] [PMID: 21180855]
- [77] Lorenzen LA, Grieve FG, Thomas A. Brief report: Exposure to muscular male models decreases men's body satisfaction. *Sex Roles* 2004; 51(11): 743-8. [http://dx.doi.org/10.1007/s11199-004-0723-0]
- [78] Birkeland R, Thompson JK, Herbozo S, Roehrig M, Cafri G, van den Berg P. Media exposure, mood, and body image dissatisfaction: an experimental test of person versus product priming. *Body Image* 2005; 2(1): 53-61. [http://dx.doi.org/10.1016/j.bodyim.2004.11.002] [PMID: 18089174]
- [79] Siegel JM, Yancey AK, Aneshensel CS, Schuler R. Body image, perceived pubertal timing, and adolescent mental health. *The J Adolesc Health* 1999; 25(2): 155-65. Aug [http://dx.doi.org/10.1016/S1054-139X(98)00160-8]
- [80] Anschutz DJ, Engels RC, Becker ES, Van Strien T. The effects of TV commercials using less thin models on young womens mood, body image and actual food intake. *Body Image* 2009; 6(4): 270-6. [http://dx.doi.org/10.1016/j.bodyim.2009.07.007] [PMID: 19699160]
- [81] Pesa JA, Syre TR, Jones E. Psychosocial differences associated with body weight among female adolescents: the importance of body image. *The J Adolesc Health* 2000; 26(5): 330-7. [http://dx.doi.org/10.1016/S1054-139X(99)00118-4]
- [82] El Ansari W, Clausen SV, Mabhala A, Stock C. How do I look? Body image perceptions among university students from England and Denmark. *Int J Environ Res Public Health* 2010; 7(2): 583-95.

[<http://dx.doi.org/10.3390/ijerph7020583>] [PMID: 20616992]

[83] Cash TF, Pruzinsky T. *Body image: A handbook of theory, research, and clinical practice*. The Guilford Press 2004.

[84] Matos MI, Aranha LS, Faria AN, Ferreira SR, Bacaltchuck J, Zanella MT. Binge eating disorder, anxiety, depression and body image in grade III obesity patients. *Rev Bras Psiquiatr* 2002; 24(4): 165-9.
[<http://dx.doi.org/10.1590/S1516-44462002000400004>]

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