

# Aspects Related to Body Image and Eating Behaviors in Healthy Brazilian Undergraduate Students

Armando Afonso Jr (Correspondence Author)

Fluminense Federal University

Rua Recife, Jardim Bela Vista, Rio das Ostras – RJ, Brazil

E-mail: armandosajunior@outlook.com

Thales Ferro

PUC-Rio

Rua Marquês de São Vicente, 225, Gávea, Rio de Janeiro – RJ, Brazil

E-mail: thalesferro@gmail.com

Luis Anunciação

PUC-Rio

Rua Marquês de São Vicente, 225, Gávea, Rio de Janeiro – RJ, Brazil

E-mail: luisfca@gmail.com

J. Landeira-Fernandez

PUC-Rio

Rua Marquês de São Vicente, 225, Gávea, Rio de Janeiro – RJ, Brazil

E-mail: landeira@puc-rio.br

Received: January 25, 2018

Accepted: March 3, 2018

Published: March 15, 2018

doi:10.5296/gjes.v4i1.12541

URL: <https://doi.org/10.5296/gjes.v4i1.12541>

## Abstract

The discrepancy between one's actual body and the ideal body, especially among young

adults, can lead to body dissatisfaction in both men and women, which is commonly accepted to be central to eating disorders. We explored aspects of body image and eating disorders in healthy Brazilian students ( $n = 219$ ) using two standardized measures (Body Shape Questionnaire [BSQ-34] and Eating Attitudes Test [EAT-26]) and assessing height, weight, Body Mass Index (BMI), and the history of physical activity. We also analyzed the ability of one measure to predict another. Linear multiple regression was used to verify which variables best predicted the scale outcomes. The Least Absolute Shrinkage and Selection Operator (LASSO) was used for variable selection. The results suggested that women have a greater risk of body dissatisfaction and eating disorders. Both instruments had variables that significantly predicted each other's results, whereas BMI was only associated with BSQ-34 scores. These findings broaden our understanding of eating disorders and body image.

**Keywords:** Eating disorders, Body image, Body dissatisfaction, Undergraduate students, Brazil

## 1. Introduction

Body image is a multifaceted construct that is responsible for the mental representation of individuals' own bodies, including perceptions of their size, shape, and facial features (Laus et al., 2014; Medeiros, Caputo, & Domingues, 2017). It comprises cognitive, perceptual, and affective aspects of the ways in which individuals think, feel, and behave with regard to their physical attributes (Cash & Pruzinsky, 1990; Muth & Cash, 1997). This subjective representation is extremely important. It influences relationships with others and builds a distinct identity of the self (Medeiros et al., 2017).

In our society, body aesthetics are highly valued, particularly body shape and weight (Pereira Junior, Campor Junior, & Silveira, 2013; Tiggemann, 2004). Both men and women are under constant pressure to achieve the ideal body that is perpetuated by the media (Rodgers, McLean, & Paxton, 2015; Spitzer, Henderson, & Marylin, 1999). However, the discrepancy between the unrealistic ideal body and the actual body can affect the way in which people perceive themselves, making dissatisfaction a frequent issue (Tiggemann, 2004). Body dissatisfaction can generally arise from distortions of internal representations of the body through negative self-evaluation processes (Tiggemann, 2004).

Body dissatisfaction is also extremely relevant because it is a clinical symptom and a risk factor for eating disorders, such as anorexia nervosa and bulimia nervosa (American Psychiatric Association, 2013; Smolak & Thompson, 2011). Eating disorders are severe psychiatric disorders that are characterized by compulsive behaviors that result in psychological, behavioral, and physical complications (Kumar, Singh, Manpreet, & Ankush, 2016). Special attention should be given to eating behaviors of undergraduate students. Evidence indicates that this population is inclined to present symptoms of eating disorders that are both prevalent and persistent (Eisenberg, Nicklett, Roeder, & Kirz, 2011).

The Brazilian cultural context presents critical differences from other populations with regard to body dissatisfaction and eating disorders. The Brazilian population appears to be especially prone to body-related disturbances because of the historical relationship the country has with body image. The body has acquired a distinguished place in Brazilian society, associated with social achievement and successful relationships (Laus et al., 2014). Brazilians had the highest prevalence of stating that beauty increases opportunities in life. Brazil also has the most people who have considered having cosmetic surgery (Etcoff, Orbach, Scott, & D'Agostinho, 2004). University students in Brazil have a high prevalence of eating disorders and body dissatisfaction (dos Santos Alvarenga, Philippi, Lourenço, de Moraes Sato, & Scagliusi, 2010; Nunes, Santos, & Souza, 2017). Therefore, it is important to investigate the factors that are involved in body satisfaction and related disorders within this vulnerable population.

Despite the current importance of body dissatisfaction and eating disorders, there is little consensus about the factors that are associated with both concepts. Some findings suggest that individuals with a higher body mass index (BMI) present greater body dissatisfaction and more eating disorder symptoms (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Kumar et al., 2016), but other studies have refuted these results (Lopes et al., 2017; Nunes, Olinto, Barros, & Camey, 2001). Discrepant findings have also

been reported with regard to engaging in physical activities. Some authors found that physical activity helped improve body content and consequently eating habits (Añez et al., 2016), but other authors did not (Medeiros et al., 2017). This controversy indicates that more rigorous studies are needed to clarify this issue.

The present study further explored the factors that are involved in eating disorders and body dissatisfaction. The first goal was to explore aspects of body image and eating behaviors in healthy Brazilian undergraduate students using two standardized self-report measures. The second goal was to analyze and discuss the ability of one measure to be predictive of another.

## **2. Methods**

### *2.1 Participants*

The participants were 126 female and 93 male Brazilian undergraduate students (mean age = 21.5 years; SD = 4.37 years) from the city of Rio de Janeiro. On average, the students were enrolled in the second year of college. No significant differences in age or year of enrollment were found between participants.

### *2.2 Measures*

The Body Shape Questionnaire (BSQ-34) is a self-report measure that assesses one's body shape, size, and weight specifically in the 4 weeks prior to its administration. It was developed by Cooper, Taylor, Cooper, and Fairbum (1987) to address individuals' concerns about body image. The BSQ-34 includes questions that tap into other important body image symptoms, such as the following: "Have you not gone out to social occasions (e.g., parties) because you have felt bad about your shape?" "Has eating even a small amount of food made you feel fat?" "Has worry about your shape made you diet?" (Rosen, Jones, Ramirez, & Waxman, 1996). The response options are on a 6-point Likert scale (never, rarely, often, sometimes, very often, always). The instrument takes approximately 15 minutes to complete. In some psychometric studies, the BSQ-34 had adequate test-retest reliability, ranging from 0.88 to 0.93 (Cooper et al., 1987; Rosen et al., 1996). It also has a homogeneous factor structure to describe concerns with body shape. A unitary dimension of concern with shape was achieved (Rousseau, Knotter, Barbe, Raich, & Chabrol, 2005). The global score of the BSQ-34 is the sum of all items. Higher scores indicate greater concern about body image.

The Eating Attitudes Test (EAT-26) is a standardized self-report measure of symptoms and concerns of eating disorders (Garner, Olmstead, Bohr, & Garfinkel, 1982). This questionnaire is a screening tool that helps determine whether an individual might have an eating disorder that needs professional attention. It comprises affirmative statements, such as the following: "I feel that food controls my life" "I like to try new high-calorie foods." Although it has been validated with anorexia nervosa patients, this measure is not designed to make a diagnosis of an eating disorder. Nonetheless, it can be an important tool to identify individuals who are prone to develop eating disorders (Rosen et al., 1996). The response options are on a 6-point Likert scale (always, usually, often, sometimes, rarely, and never). The sum of all items produces a score of concerns about eating behaviors. The instrument additionally asks for the participant's weight and height to compute the BMI using a standardized formula (ratio of

weight by height squared). Psychometric studies indicated that the EAT-26 has a factor structure that is composed of three dimensions: (1) Dieting, (2) Bulimia and Food Preoccupation, and (3) Oral Control. The first factor describes an overestimation of body size and has a Cronbach's  $\alpha$  of .90. The second factor is positively related to bulimia and a heavier body weight and has a Cronbach's  $\alpha$  of .83. The third factor largely comprises items that reflect self-control about food and it has Cronbach's  $\alpha$  of .90 (Garner et al., 1982).

### *2.3 Procedure*

This study used a fixed-size sampling design that was initially set at 200 participants, considering such factors as time, the interviewer's availability, and the precision of the analysis. The students were selected by stratified sampling from the university. We chose to use a total sample size of 219 to increase statistical power, as recommended in the literature (Wolf, Joye, Smith, & Fu, 2016).

The recruitment process was conducted by contacting each teacher of the students' classes individually. They were told about the purpose of the experiment and gave permission to administer the study instruments during their classes. The evaluation was conducted in 1 day by trained undergraduate psychology students in the classroom. The estimated completion time for both scales was 30 minutes. Participation was voluntary and anonymous. Anyone who did not wish to participate was given the opportunity to decline. The participants were informed that the goal of the study was to better understand the many facets of the concept of body image perception and eating behaviors, and they were asked to complete the EAT-26 and BSQ-34. The test application was randomized between participants, such that half of the students began with the EAT-26 while the other half began with the BSQ-34.

### *2.4 Statistical Analysis*

The initial examination of the distribution properties of the variables was performed, and missing values for continuous variables were replaced using the Imputation by Predictive Mean Matching (PMM) algorithm. PMM is a semi-parametric imputation approach that yields plausible imputations and preserves the original data distributions, often outperforming traditional methods (Vink, Frank, Pannekoek, & van Buuren, 2014). Only one participant did not answer the "gender" question and was excluded from the analysis, resulting in an operational database that was composed of 219 participants. The total score for each scale was calculated by summing the scores for each item.

Descriptive statistics were performed to summarize the sample data. Hypothesis testing for means was performed using independent *t*-tests. Differences in proportions were calculated using a Binomial test setting of .5 as the default probability. Two regression models were fitted, with the aim of predicting BSQ-34 and EAT-26 scores based on age, BMI, whether students and their families were engaged in physical activities or sports or not, and the results of each scale.

The models were fitted via Ordinary Least Squares (OLS) and Least Absolute Selection and Shrinkage Operator (LASSO). LASSO avoids the overfitting that is prone in OLS by imposing a penalty to values that cause some of the parameter estimates to be zero (McNeish,

2015). This is achieved by constraining the sum of the absolute values of the estimates based on a tuning parameter ( $\lambda$ ), described by the following equation:

$$\begin{aligned}\hat{\beta}^{lasso} &= \arg \min \|y - X\beta\|_2^2 + \lambda \sum_{j=1}^p \|\beta_j\| \\ &= \|y - X\beta\|_2^2 + \lambda \|\beta_1\|\end{aligned}$$

where  $\|y - X\beta\|_2^2$  is the Loss, and  $\|\beta_1\|$  is the penalty.

Several  $\lambda$  were derived via cross-validation. The  $\lambda$  that was chosen was the one that minimized the cross-validation error. Variable selection for composing the final regression models was based on this tuning parameter, and the derived coefficients were interpreted.

The data were analyzed using R 3.4 (R Development Core Team, 2011), tidyverse (Wickham, 2016), and GLMNET (Yuan, Ho, & Lin, 2012) software. Values of  $p < .05$  were considered statistically significant.

### 2.5 Ethical Procedures

The Research Ethics Committee of Pontifical Catholic University of Rio de Janeiro (PUC-Rio) approved this research.

## 3. Results

The descriptive and inferential statistics are shown in Table 1. Independent  $t$ -tests were conducted to compare mean scores on the EAT-26 and BSQ-34 between males and females. The results were significant for the EAT-26 ( $t_{215.01} = -4.72, p < .001$ ) and BSQ-34 ( $t_{204.47} = -6.511, p < .001$ ). The overall mean scores for females were higher than for males. On the EAT-26, females had a mean score of 18.4 (SD = 10.1), and men had a mean score of 12.65 (SD = 8.19). On the BSQ-34, females (M = 94.26, SD = 34.86) also had higher mean scores than males (M = 64.2, SD = 32.87).

The difference in BMI between males and females was significant ( $t_{163.54} = -2.99, p < .05$ ). Males had a higher BMI than females (24.1 and 22.58, respectively). No difference was found between males and females in the percentage of participants who engaged in physical activities or sports ( $Z = .65, p = .42$ ) or whether their families were also engaged in these activities ( $Z = .0009, p = .97$ ).

Table 1. General characteristics of the participants

Sex	EAT-26	BSQ-34	BMI	Sports	Family sports	Total sample
Male	12.65 (8.19)	64.24 (32.87)	24.1	.4	.48	93
Female	18.48 (10.09)	94.26 (34.86)	22.58	.45	.48	126
$p$	< .001	< .001	.003	.42	.976	.989
Cohen's $d$	.65	.89				

A multiple linear regression model was created to determine the relationship between EAT-26 and BSQ-24 scores and the social and demographic characteristics of the participants. This method examines the way in which multiple independent variables are related to one dependent variable. In this analysis, all of the variables were entered into the prediction equation simultaneously. Table 2 and Table 3 report the results.

Table 2. Regression coefficients for predicting BSQ-34 score based on sociodemographic predictors and EAT-26 scores

Predictor	<i>b</i>	95% CI	$\beta$	95% CI	sr2	95% CI	R
(Intercept)	-19.58	[-46.00, 6.84]					
Female	20.05**	[12.89, 27.21]	.27	[.17, .36]	.06	[.02, .10]	.40**
Age	-1.01*	[-1.79, -.23]	-.12	[-.21, -.03]	.01	[-.01, .03]	-.06
BMI	3.16**	[2.19, 4.12]	.31	[.21, .40]	.08	[.03, .13]	.21**
Play sports?	3.15	[-3.89, 10.19]	.04	[-.05, .14]	0	[-.01, .01]	-.04
Family sports?	.45	[-6.48, 7.38]	.01	[-.09, .10]	0	[-.00, .00]	-.03
EAT-26	2.29**	[1.94, 2.64]	.61	[.52, .70]	.33	[.24, .42]	.68**
R <sup>2</sup>	.588**						
95% CI	[49,.64]						

Note. CI, confidence interval; sr2, semiparital correlation coefficient.

This first model accounted for 58.8% of the variability of BSQ-34 scores, which was significant ( $F_{6,204} = 48.55, p < .001$ ). The coefficient for some of the predictors was not significant, meaning that it was not possible to determine whether the value of the corresponding parameter in the underlying regression model was not indeed zero.

Table 3. Regression coefficients for predicting EAT-26 score based on sociodemographic predictors and BSQ-34 scores

Predictor	<i>b</i>	95% CI	$\beta$	95% CI	sr2	95% CI	R
(Intercept)	9.05*	[1.42, 16.69]					
Female	-.42	[-2.65, 1.82]	-.02	[-.13, .09]	0	[-.00, .00]	.30**
Age	.25*	[.02, .48]	.11	[.01, .21]	.01	[-.01, .03]	.02
BMI	-.55**	[-.85, -.26]	-.2	[-.31, -.09]	.03	[-.00, .07]	-.01
Play sports?	-2.12*	[-4.15, -.08]	-.11	[-.21, -.00]	.01	[-.01, .03]	-.13
Family sports?	-.44	[-2.46, 1.58]	-.02	[-.12, .08]	0	[-.00, .00]	-.08
EAT-26	.19**	[.16, .22]	.73	[.62, .84]	.39	[.29, .49]	.68**
R <sup>2</sup>	.508**						
95% CI	[40,.57]						

Note. CI, confidence interval; sr2, semiparital correlation coefficient.

This second model accounted for 50% of the variability of EAT-26 scores, which was also significant ( $F_{6,204} = 35.06, p < .001$ ). Despite the significance of the two models, some of the predictors were not significant, indicating the necessity of constructing an optimal regression equation and investigating specific predictor variables. The goal of finding the best model depends on the interface of finding the best-fitting straight line through the points (regression line) and the most parsimonious model (i.e., the fewest predictors). Several techniques can be used for this model selection, and LASSO regression was performed. The LASSO model is a shrinkage method that is applied to deal with the model's overfitting, resulting in a greater reduction of the magnitude of coefficients for the weak predictors than those for the strong predictors. Because of this, LASSO is a form of regularized linear regression that penalizes the absolute size of the regression and reduces the false-positive error rate to choose a more parsimonious model.

The model selection achieved three predictors for the BSQ-34 and two for the EAT-26. In OLS models,  $R^2$  can be interpreted as the fraction of the total variation of the outcome that is accounted for by regressing the outcome on the explanatory variable, and the root of mean squared errors (RMSE) reflects a measurement of accuracy, in which more accurate models have fewer errors. In penalized models, such as LASSO,  $R^2$  and RMSE are biased and less informative because of the shrinkage method, which can introduce bias in these indicators.

For the BSQ-34, women had higher BSQ-34 scores (an average of 22.04 higher) when holding constant the other predictors. For each point increase in BMI, the BSQ-34 score is expected to increase by an average of 1.3 when holding constant the other predictors. Finally, for each point increase on the EAT-36, the BSQ-34 score is expected to increase by an average of 1.65. For the EAT-26, women had higher scores (an average of 2.21 higher) when holding constant the other predictors. A one unit increase in the BSQ-34 score increased the average EAT-26 score by .12 when holding constant the other predictors.

Table 4. Multiple regression coefficient

Predictor	b
BSQ-34	
(Intercept)	12.47
Women	22.04
BMI	1.30
EAT-26	1.65
$R^2$	.526
EAT-26	
(Intercept)	4.66
Women	2.21
BSQ-34	.12
$R^2$	.425



#### 4. Discussion

No consensus has been reached among researchers with regard to the factors that are involved in eating disorders and body dissatisfaction. Brazilian students have high rates of eating disorders and body dissatisfaction. The present study explored aspects of body image and eating behaviors in Brazilian college students. We also investigated the ability of two established instruments to predict each other's scores. Our results are consistent with findings in the literature. Women were more prone to present dissatisfaction with their own body and a greater tendency to develop eating disorders compared with men. We also investigated the important relationship between body dissatisfaction and eating behaviors. Our findings suggest that the BSQ-34 score and the female gender predict EAT-26 scores. EAT-26 scores, the female gender, and BMI were predictors of BSQ-34 scores.

Previous studies have shown that women are more prone to be dissatisfied with their body than men (e.g., Bucchianeri et al., 2013; Ferreiro, Seoane, & Senra, 2014; Laus, Costa, & Almeida, 2015). Unsurprising, therefore, is that Brazilian women in the present study had higher BSQ-34 scores. Women usually want thinner bodies, whereas men aspire to have a more muscular body (Cho & Lee, 2013; Karazsia, Murnen, & Tylka, 2017). A higher BMI for men may not necessarily mean that they are further away from their ideal body because it could indicate that they are closer to a bulkier, muscular body size (Bucchianeri et al., 2013). Women's dissatisfaction with their own body and their higher scores on the BSQ-34 may reflect the greater body image disturbances that are typically found in women (Laus et al., 2015). One possible explanation for this gender difference may be related to the fact that women are constantly under pressure as they are sexualized and objectified throughout their entire lives (Moradi & Huang, 2008).

We also corroborated the common finding that women tend to have a higher prevalence of eating disorders (e.g., Ferreiro et al., 2014; Striegel-Moore et al., 2009). This was demonstrated by the results of the EAT-26, which measures symptoms and concerns of eating disorders. This pattern again may reflect the importance that women give to their weight and shape, which can lead to compensatory behaviors, such as dieting and purging (Anderson & Bulik, 2004; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). Such behaviors can lead to symptoms of eating disorders. Importantly, however, the EAT-26 is only a screening test, and further evaluation is necessary to identify specific eating disturbances that are prevalent in this population.

Our results support the idea that body dissatisfaction and eating disorders are closely related (American Psychiatric Association, 2013). The regression analysis that was conducted in the present study revealed that BSQ-34 and EAT-26 scores predicted each other. This suggests a two-way relationship between eating disorders and body dissatisfaction as measured by these two instruments. Feelings of dissatisfaction with the body are associated with dysfunctional eating behaviors (Fernandes, da Silva, Medeiros, Queiroz, & Melo, 2017; McFarland, Petrie, & Blaine, 2010), likely as an attempt to achieve the ideal body. However, the way in which eating disorders can lead to body dissatisfaction is not yet well explored. This could mean that people can engage in a behavioral loop, in which body dissatisfaction leads to an eating

disorder that, in turn, can lead to body dissatisfaction. Further studies are necessary to explore this issue.

Interestingly, in Brazilian undergraduate students, BMI only predicted body dissatisfaction scores, although some studies reported an association between BMI and eating disorder symptoms (Kumar et al., 2016). The relationship between BMI and body dissatisfaction is straightforward. One's weight can serve as dynamic physical marker that the individual can use to form a body image (Bucchianeri et al., 2013). However, the lack of an association between BMI and eating disorder symptoms is more intriguing. Likewise, physical activity did not predict any disturbances in body perception. These results suggest that disturbances in the perception of body image can lead to eating disorder symptoms, even if the individual is engaged in physical activities and the actual body size and weight are adequate (Ferrari, Santos Silva, & Petroski, 2012; Lopes et al., 2017; Nunes et al., 2001). This is generally the case for such eating disorders as bulimia nervosa, in which people usually maintain what is considered a healthy or normal weight despite the presence of detrimental eating habits (American Psychiatric Association, 2013).

The present study has limitations. First, our data were gathered using single-source self-reported questionnaires, which can lead to bias. Second, we used a non-random sample. Third, no agreement has been reached on the factor structure of the EAT-26 (Ocker, Lam, Jensen, & Zhang, 2007). Therefore, the results of the present study should be generalized with caution. This study focused on the Brazilian undergraduate population. Any extension of these results can suffer from interference from cultural and age differences (Stephens, Schumaker, & Sibiya, 1999). However, these limitations are intrinsic to the majority of observational designs and have little impact on the main purpose of the present study.

## 5. Conclusion

Our results support the idea that body dissatisfaction and eating disorders are associated. BSQ-34 and EAT-26 scores predicted each other, suggesting that both instruments can be used together as a strategy to identify eating disorders and body dissatisfaction. These findings indicate the importance of evaluating body satisfaction in people with suspected eating disorders because BMI alone may not be a reliable source. Disturbances in body image perception may be an important predictor of inadequate eating habits. Future research is needed to understand the ways in which these measures are related to each other. Overall, our findings address the importance of investigating eating behaviors and body dissatisfaction among young adults.

## Acknowledgements

This research was funded by Mapfre - FALLO 25 ("Convocatoria de 25 ayudas a la investigación Ignacio H. de Larramendi: Prevención y Seguridad Vial, Promoción de la Salud, y Seguro y Previsión Social").

## References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental*

*disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Anderson, C. B., & Bulik, C. M. (2004). Gender differences in compensatory behaviors, weight and shape salience, and drive for thinness. *Eating Behaviors*, 5(1), 1-11. <http://dx.doi.org/10.1016/j.eatbeh.2003.07.001>

Añez, E., Fornieles-Deu, A., Fauquet-Ars, J., López-Guimerà, G., Puntí-Vidal, J., & Sánchez-Carracedo, D. (2016). Body image dissatisfaction, physical activity and screen-time in Spanish adolescents. *Journal of Health Psychology*, 23(1), 36-47. <http://dx.doi.org/10.1177/1359105316664134>

Bucchianeri, M. M., Arikian, A. J., Hannan, P. J., Eisenberg, M. E., & Neumark-Sztainer, D. (2013). Body dissatisfaction from adolescence to young adulthood: findings from a 10-year longitudinal study. *Body Image*, 10(1), 1-7. <http://dx.doi.org/10.1016/j.bodyim.2012.09.001>

Cash, T. F., & Pruzinsky, T. (1990). *Body images: development, deviance, and change*. New York: Guilford.

Cho, A., & Lee, J. H. (2013). Body dissatisfaction levels and gender differences in attentional biases toward idealized bodies. *Body Image*, 10(1), 95-102. <http://dx.doi.org/10.1016/j.bodyim.2012.09.005>

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairbum, C. G. (1987). The development and validation of the body shape questionnaire. *International Journal of Eating Disorders*, 6(4), 485-494.

[https://doi.org/10.1002/1098-108X\(198707\)6:4<485::AID-EAT2260060405>3.0.CO;2-O](https://doi.org/10.1002/1098-108X(198707)6:4<485::AID-EAT2260060405>3.0.CO;2-O)

Dos Santos Alvarenga, M., Philippi, S. T., Lourenço, B. H., De Moraes Sato, P., & Scagliusi, F. B. (2010). Body image dissatisfaction in female Brazilian university students. *Jornal Brasileiro de Psiquiatria*, 59(1), 44-51. <http://dx.doi.org/10.1590/S0047-20852010000100007>

Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: prevalence, persistence, correlates, and treatment-seeking. *Journal of American College Health*, 59(8), 700-707. <http://dx.doi.org/10.1080/07448481.2010.546461.Eating>

Etcoff, N., Orbach, S., Scott, J., & D'Agostino, H. (2004). *The real truth about beauty: A global report*. White paper. New York: StrategyOne. Retrieved from [http://www.clubofamsterdam.com/contentarticles/52%20Beauty/dove\\_white\\_paper\\_final.pdf](http://www.clubofamsterdam.com/contentarticles/52%20Beauty/dove_white_paper_final.pdf)

Fernandes, A. C. C. F., Da Silva, A. L. S., Medeiros, K. F., Queiroz, N., & Melo, L. M. (2017). Avaliação da auto-imagem corporal e o comportamento alimentar de mulheres. *Revista Brasileira de Nutrição Esportiva*, 11(63), 1-10

Ferrari, E. P., Santos Silva, D. A., & Petroski, E. L. (2012). Association between perception of body image and stages of behavioral changes among physical education university students. *Revista Brasileira de Cineantropometria e Desempenho Humano*, 14(5), 535-544. <http://dx.doi.org/10.5007/1980-0037.2012v14n5p535>

- Ferreiro, F., Seoane, G., & Senra, C. (2014). Toward understanding the role of body dissatisfaction in the gender differences in depressive symptoms and disordered eating: a longitudinal study during adolescence. *Journal of Adolescence*, *37*(1), 73-84. <http://dx.doi.org/10.1016/j.adolescence.2013.10.013>
- Garner, D. M., Olmstead, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The Eating Attitudes Test: psychometric features and clinical correlates. *Psychological Medicine*, *15*, 871-878. <http://dx.doi.org/10.1017/S0033291700049163>
- Karazsia, B. T., Murnen, S. K., & Tylka, T. L. (2017). Is body dissatisfaction changing across time: A cross-temporal meta-analysis. *Psychological Bulletin*, *143*(3), 293-320. <http://dx.doi.org/10.1037/bul0000081>
- Kumar, S., Singh, A. K., Manpreet, K., & Ankush, S. (2016). The prevalence of eating disorder among young girls and boys by using Eating Attitude Test (Eat-26). *International Journal of Physical Education, Sports and Health*, *338*(35), 378-381.
- Laus, M. F., Costa, T. M. B., & Almeida, S. S. (2015). Gender differences in body image and preferences for an ideal silhouette among Brazilian undergraduates. *Eating Behaviors*, *19*, 159-162. <http://dx.doi.org/10.1016/j.eatbeh.2015.09.003>
- Laus, M. F., Kakeshita, I. S., Costa, T. M. B., Ferreira, M. E. C., de Sousa Fortes, L., & Almeida, S. S. (2014). Body image in Brazil: recent advances in the state of knowledge and methodological issues. *Revista de Saude Publica*, *48*(2), 331-346. <http://dx.doi.org/10.1590/S0034-8910.2014048004950>
- Lewinsohn, P. M., Seeley, J. R., Moerk, K. C., & Striegel-Moore, R. H. (2002). Gender differences in eating disorder symptoms in young adults. *International Journal of Eating Disorders*, *32*(4), 426-440. <http://dx.doi.org/10.1002/eat.10103>
- Lopes, M. A. M., Paiva, A. D., Lima, S. M. T., Cruz, K. J. C., Rodrigues, G. P., & Carvalho, C. M. R. G. (2017). Perception of body image and nutritional status in nutrition undergraduates from a public university. *Demetra*, *12*(1), 193-206. <http://dx.doi.org/10.12957/demetra.2017.22483>
- McFarland, M. B., Petrie, T. A., & Blaine, M. (2010). Measuring male body dissatisfaction: factorial and construct validity of the Body Parts Satisfaction Scale for Men. *Journal of Counseling Psychology*, *59*(2), 329-337. <http://dx.doi.org/10.1037/a0026777>
- McNeish, D. M. (2015). Using LASSO for predictor selection and to assuage overfitting: a method long overlooked in behavioral sciences. *Multivariate Behavioral Research*, *50*(5), 471-484. <http://dx.doi.org/10.1080/00273171.2015.1036965>
- Medeiros, T. H., Caputo, E. L., & Domingues, M. R. (2017). Insatisfação corporal em frequentadoras de academia. *Jornal Brasileiro de Psiquiatria*, *66*(1), 38-44. <http://dx.doi.org/10.1590/0047-2085000000148>
- Moradi, B., & Huang, Y. P. (2008). Objectification theory and psychology of women: A decade of advances and future directions. *Psychology of Women Quarterly*, *32*(4), 377-398.

<http://dx.doi.org/10.1111/j.1471-6402.2008.00452.x>

Muth, J. L., & Cash, T. F. (1997). Body-image attitudes: What difference does gender make? *Journal of Applied Social Psychology*, 27(16), 1438-1452. <http://dx.doi.org/10.1111/j.1559-1816.1997.tb01607.x>

Nunes, L. G., Santos, M. C. S., & Souza, A. A. (2017). Fatores de risco associados ao desenvolvimento de bulimia e anorexia nervosa em estudantes universitários: Uma revisão integrativa. *HU Revista*, 43(1), 61-69.

Nunes, M. A., Olinto, M. T., Barros, F. C., & Camey, S. (2001). Influência da percepção do peso e do índice de massa corporal nos comportamentos alimentares anormais. *Revista Brasileira de Psiquiatria*, 23(1), 21-27. <http://dx.doi.org/10.1590/S1516-44462001000100006>

Ocker, L. B., Lam, E. T. C., Jensen, B. E., & Zhang, J. J. (2007). Psychometric properties of the Eating Attitudes Test. *Measurement in Physical Education and Exercise Science*, 11(1), 25-48. <http://dx.doi.org/10.1080/10913670709337010>

Pereira Junior, M., Campor Junior, W., & Silveira, F. V. (2013). Percepção e distorção da autoimagem corporal em praticantes de exercício físico: A importância do exercício físico na imagem corporal. *Revista Brasileira de Nutrição Esportiva*, 7(41), 345-352.

R Development Core Team (2011). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. Retrieved from <https://www.r-project.org>

Rodgers, R. F., McLean, S. A., & Paxton, S. J. (2015). Longitudinal relationships among internalization of the media ideal, peer social comparison, and body dissatisfaction: implications for the tripartite influence model. *Developmental Psychology*, 51(5), 706-713. <http://dx.doi.org/10.1037/dev0000013>

Rosen, J. C., Jones, A., Ramirez, E., & Waxman, S. (1996). Body Shape Questionnaire: Studies of validity and reliability. *International Journal of Eating Disorders*, 20(3), 315-319. [http://dx.doi.org/10.1002/\(SICI\)1098-108X\(199611\)20:3<315::AID-EAT11>3.0.CO;2-Z](http://dx.doi.org/10.1002/(SICI)1098-108X(199611)20:3<315::AID-EAT11>3.0.CO;2-Z)

Rousseau, A., Knotter, A., Barbe, P., Raich, R. M., & Chabrol, H. (2005). Étude de validation de la version française du Body Shape Questionnaire. *Encephale*, 31, 162-173. <http://dx.doi.org/10.1016/j.erap.2015.06.001>

Smolak, L., & Thompson, J. K. (2011). *Body image, eating disorders, and obesity in youth: assessment, prevention, and treatment* (2nd ed.). Washington, DC: American Psychological Association.

Spitzer, B. L., Henderson, K. A., & Marylin, T. Z. (1999). Gender differences in population versus media body sizes: a comparison over four decades. *Sex Roles*, 40(7-8), 545-565. <http://dx.doi.org/10.1023/A:1018836029738>

Stephens, N. M., Schumaker, J. F., & Sibiyi, T. E. (1999). Eating disorders and dieting behavior among Australian and Swazi university students. *Journal of Social Psychology*,

139(2), 153-158. <http://dx.doi.org/10.1080/00224549909598369>

Striegel-Moore, R. H., Rosselli, F., Perrin, N., DeBar, L., Wilson, G. T., May, A., & Kraemer, H. C. (2009). Gender difference in the prevalence of eating disorder symptoms. *International Journal of Eating Disorders*, 42(5), 471-474. <http://dx.doi.org/10.1002/eat.20625>

Tiggemann, M. (2004). Body image across the adult life span: stability and change. *Body Image*, 1(1), 29-41. [http://dx.doi.org/10.1016/S1740-1445\(03\)00002-0](http://dx.doi.org/10.1016/S1740-1445(03)00002-0)

Vink, G., Frank, L. E., Pannekoek, J., & Van Buuren, S. (2014). Predictive mean matching imputation of semicontinuous variables. *Statistica Neerlandica*, 68(1), 61-90. <http://dx.doi.org/10.1111/stan.12023>

Wickham, H. (2016). *tidyverse: Easily Install and Load "Tidyverse" Packages*. R package version 1.0.0.

Wolf, C., Joye, D., Smith, T., & Fu, Y. (2016). *The SAGE Handbook of Survey Methodology*. Los Angeles, California: Sage.

Yuan, G. X., Ho, C. H., & Lin, C. J. (2012). An improved GLMNET for l1-regularized logistic regression. *Journal of Machine Learning Research*, 13, 1999-2030.

### Copyright Disclaimer

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).