






Factors associated with perception of the current silhouette and body image dissatisfaction in adults with obesity

Fatores associados à percepção da silhueta atual e à insatisfação da imagem corporal em adultos com obesidade

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ABSTRACT

Objective

To verify the factors associated with the perception of current silhouette and body image dissatisfaction in adults with obesity.

Methods

Cross-sectional study derived from the baseline of a randomized clinical trial. The perception of current silhouette and dissatisfaction with body image, defined by the difference between the perception of current and ideal silhouette, were obtained from a scale that ranged from one (smallest silhouette) to nine (largest silhouette). The independent variables investigated as associated factors (crude and adjusted linear regression) were: sex, age, skin color, body mass index (kg/m²), percentage of body fat, level of physical activity, and food intake.

Results

Sixty-nine obese individuals (body mass index ≥ 30 kg/m²) were studied, 42 of whom were female and with the following mean values: 34.7 (± 7.2) years; 33.5 (± 2.8) kg/m², and current silhouette of 6.6 (± 0.9). All were dissatisfied with their excess body weight. The categories associated with a perception that matched the current silhouettes were male sex, white skin color, and higher body mass index values when compared to female sex, non-white, and lower body mass index values, respectively. Regarding body image dissatisfaction, white people had lower scores than those with other skin colors.

Conclusion

Being male, having white skin color, and having a higher body mass index were risk factors for the perception of larger body silhouettes, while only non-white skin color was associated with dissatisfaction with body image.

Keywords: Body image. Body dissatisfaction. Exercise. Obesity.

RESUMO

Objetivo

Verificar os fatores associados à percepção da silhueta atual e à insatisfação com a imagem corporal em adultos com obesidade.

Métodos

Estudo transversal derivado da linha de base de um ensaio clínico randomizado. A percepção de silhueta atual e a insatisfação com a imagem corporal, definida pela diferença entre a percepção da silhueta atual e da ideal, foram obtidas a partir de uma escala variando de um (menor silhueta) a nove pontos (maior silhueta). As variáveis independentes investigadas como fatores associados (regressão linear bruta e ajustada) foram: sexo, idade, cor da pele, índice de massa corporal (kg/m²), percentual de gordura corporal, nível de atividade física e ingestão alimentar.

Resultados

Foram investigados 69 obesos (índice de massa corporal ≥ 30 kg/m²), sendo 42 do sexo feminino e com os seguintes valores médios: 34,7 ($\pm 7,2$) anos; 33,5 ($\pm 2,8$) kg/m² e silhueta atual de 6,6 ($\pm 0,9$). Todos estavam insatisfeitos pelo excesso de peso corporal. As categorias que se associaram à percepção da silhueta atual foram o sexo masculino, a cor de pele branca e maiores valores de índice de massa corporal quando comparados os dados referentes ao sexo feminino, a pessoas de cor da pele não branca e a menores valores de índice de massa corporal, respectivamente. Quanto à insatisfação com a imagem corporal, pessoas consideradas brancas tiveram escores mais baixos que aquelas com outras cores de pele.

Conclusão

Ser do sexo masculino, ter cor da pele branca e ter maior índice de massa corporal foram fatores de risco para a percepção de silhuetas corporais maiores, enquanto apenas a cor da pele não branca esteve associada à insatisfação com a imagem corporal.

Palavras-chave: Imagem Corporal. Insatisfação Corporal. Exercício Físico. Obesidade.

INTRODUCTION

Obesity is considered an epidemic disease of great magnitude in the global scenario and has become a public health problem. In 2016, it already affected 13% of the world's adult population with strong repercussions in the form of psychological consequences and a decline in quality of life [1,2]. Its growth in recent years has spread beyond high-income countries to low- and middle-income countries as well. Due to multifactorial causes such as environmental, behavioral, genetic, social, and cultural factors, obesity is directly related to dissatisfaction with Body Image (BI) [3].

This, in turn, corresponds to the self-perception of physical appearance and thoughts, beliefs, and attitudes towards the body [4]. For Cash et al. [5], BI is part of a multidimensional construction, referring to a person's perceptions and attitudes, including feelings, thoughts, and behaviors regarding their own body and appearance. It is a construct that goes beyond aesthetics, in which the way individuals perceive themselves interferes with their relationship with themselves and with the people around them. When the self-perception of physical appearance is far from what the individual considers ideal, dissatisfaction with BI is declared. In the obesogenic setting, such dissatisfaction is related to overweight, in which the subjects crave smaller silhouettes. This phenomenon favors physical and mental illness, which can lead to depression, anxiety, and eating disorders [6,7].

The association between the nutritional status of obesity and Body Dissatisfaction (BD) is already widespread in the literature, with individuals with obesity being more dissatisfied compared to those considered eutrophic [8]. In addition, anthropometric indicators such as Body Mass Index (BMI) and body fat percentage (BF%), commonly used to detect this disease, are positively correlated with this outcome [9,10]. Other factors also influence the perception of BI, such as sex. Men tend to

be dissatisfied due to low body weight, while women tend to be dissatisfied due to excess weight. Even so, the female public is dissatisfied in higher degrees both in eutrophic individuals and in those with obesity [8]. Age mediates this relationship, as young people and the elderly tend to present dissatisfaction more frequently [11]. On the other hand, aspects related to lifestyle and health have been little explored. More physically active individuals are less likely to be obese and have a positive BI perception; however, there is a lack of evidence regarding the relationship between sedentary behavior and eating habits and the construct of BI [4,12].

Dissatisfaction with one's BI can form barriers to the regulation of emotions that, for biological and psychological reasons, lead to problems especially related to inadequate eating habits and physical inactivity, which culminates in the vicious cycle of obesity. Simonsen et al. [13] indicated that BI has a much greater impact on health than body size itself. This means that equally overweight individuals can have very different physical and psychological health outcomes depending on how they feel about their bodies. Therefore, understanding BI and its associated factors is important to specify the social and psychological experience of those with obesity, as well as the general health consequences related to the etiology and treatment of obesity. Furthermore, clinically, people with obesity constitute a very heterogeneous group and, although they report current BI to a lesser degree than eutrophic subjects, it seems to be more useful to consider how BI differs within the target population itself. In this sense, the present study aimed to verify the sociodemographic, lifestyle, and health factors associated with the perception of the current silhouette and dissatisfaction with BI in adults with obesity based on baseline data from a randomized clinical trial.

METHODS

Cross-sectional study derived from baseline data of a randomized clinical trial. Inclusion criteria were: individuals with a BMI between 30 and 39.9 kg/m² and aged between 20 and 50 years; who presented a medical certificate with authorization to practice physical exercise and an electrocardiogram performed in the past year; who were not engaged in physical exercise programs in the last three months; who did not have a diagnosis of any chronic diseases other than obesity; who did not have musculoskeletal diseases limiting the practice of physical exercise; who did not use medication to control and/or treat obesity; and who had not undergone surgical procedures aimed at reducing body weight. Participants who did not meet all above-mentioned criteria were excluded.

Perception of the current silhouette and dissatisfaction with BI were investigated using the silhouette scale by Stunkard [14]. It consists of nine silhouette images for each sex, being one the (smallest silhouette) and nine (the largest). When looking at the image, participants mark the number that represented their current silhouette and then mark the number that represented their ideal silhouette. The BD was calculated by subtracting the current silhouette value from the ideal silhouette, the result varying from -8 to +8. Individuals with a variation equal to zero were satisfied with their BI; those with results less than zero were dissatisfied due to excess weight; and those greater than zero dissatisfied with thinness.

To obtain the sociodemographic variables, the Question Pro® software was used. Participants received a link to access and answer the questions, which addressed the following information: age (in full years), sex (female or male), skin color (white or other), and education (elementary school, secondary education, and higher education).

To assess body composition, BMI and percentage of body fat were used, obtained through tetrapolar electrical bioimpedance (InBody 770). Experienced evaluators performed the procedures

and followed standardized guidelines [15]. The test was performed in the morning in a room with a temperature between 20° and 25°C. Individuals received specific guidance, such as not drinking alcoholic and/or energy drinks and not practicing physical activity the day before. On the day of measurement, participants were instructed to abstain from food and liquids for four hours before the assessment. Women who were menstruating on the scheduled date were rescheduled for another date when they were not menstruating. During the evaluation, the participants remained in an orthostatic position holding the two levers, with their feet placed under a platform. For the examination, participants wore bathing suits and were barefoot and did not wear earrings and/or rings or other metal. This multi-frequency bioelectrical impedance device is calibrated weekly according to the manufacturer's guidelines by a team of laboratory technicians. In addition, it has validation to assess the body composition of young adults and sensitivity to detect changes after interventions [16,17].

The level of physical activity and sedentary behavior were measured using accelerometry. For seven consecutive days, participants wore Actigraph® accelerometers, model Gt3x, fixed to their waists with an elastic band. For the data to be considered valid, 10 hours of recording per day were required for at least three days a week and one day on the weekend. Thereafter, all data were weighted for 16 hours a day for seven days. Based on the cutoff points of Freedson et al. [18], activities with less than 100 counts are considered as sedentary behavior, from 1,952 to 5,724 counts as moderate physical activity, and above 5,725 as vigorous physical activity.

Daily energy consumption (kcal/day) was measured using a 24-hour food record applied by nutrition professionals, in which participants reported verbally all food and beverages consumed, as well as the amount of each one. This process was repeated in three days, the first one being in person and the following ones through telephone contact. The recall was for the day before and corresponds to two weekdays and one weekend. To analyze energy consumption, data were entered according to the "Manual for the Assessment of Food Consumption in Population Studies" [19] in the Nutrition Data System for Research® software, grad pack 2017 (NCC Food and Nutrient Database, University of Minnesota, Minneapolis, MN, USA).

In the descriptive statistics, we used mean, standard deviation, median, minimum, and maximum values for continuous variables, including absolute and relative frequencies for categorical variables. To characterize the sample, the following sociodemographic variables were used: age, sex, skin color, and education. The analysis of normality of data distribution was performed using the Shapiro-Wilk test, considering statistical significance when p -value < 0.05 . Variables related to BI, BMI, body fat percentage, and energy consumption had normal distribution, while physical activity (light, moderate, and vigorous) and sedentary behavior did not.

To verify the association between the perception of the current silhouette and BD with sociodemographic, lifestyle and health variables, crude and adjusted linear regression was performed. In the adjustment, the first level was composed of the demographic variables; the second level, by education; and the third level, by lifestyle and health variables: BMI, percentage of body fat, minutes of physical activity, sedentary behavior, and daily energy consumption. For the insertion of the variables in the model, the backward selection technique was considered, with $p \leq 0.20$.

This study was submitted to the Ethics Committee for Research with Human Beings at the Federal University of Santa Catarina and was approved under technical report n° 2,448,674 (CAAE 79893517.0.0000.0121). The project was registered and approved by the *Registro Brasileiro de Ensaios Clínicos* (Brazilian Registry of Clinical Trials) under the number RBR-3c7rt3 and all participants signed the Informed Consent Form. Further methodological details can be consulted in the protocol study [20].

RESULTS

Of the 500 volunteers who signed up to participate in the study, 69 met the eligibility criteria and were randomized. Of these, 39.1% were men with a mean age of 34.7 (± 7.2) years. Most of the sample consisted of white subjects (79.7%) with complete higher education (76.8%). Table 1 presents the characterization of the sample based on sociodemographic factors.

Regarding BMI, the sample had an average of 33.5 (± 2.8) kg/m² and body fat percentage of 40.2 (± 7.1). As for moderate physical activity, the median was 49 min/day, ranging from 16 to 147. In contrast, sedentary behavior had a median of 400 min/day, ranging between 190 and 645. Other information on lifestyle, variables of life, and health can be seen in Table 2.

The variables related to the perception of BI had a mean of 6.6 (± 0.9) for the current silhouette, 4.2 (± 0.8) for the perception of the ideal silhouette, and -2.5 (± 0.8) for the points of BD.

For perception of the current silhouette (Table 3), crude analyses identified an association with sex, skin color, and BMI, indicating that male individuals with white skin color and with higher BMI values perceived themselves as larger compared to their peers (female sex, non-whites, and lower BMI values, respectively). In turn, dissatisfaction with BI was only associated with skin color, in which non-white individuals were more dissatisfied (Table 3).

Table 4 presents the final models, already adjusted, of association between sociodemographic, lifestyle, and health variables with perception of the current silhouette ($p=0.001$; $R^2=0.34$; VIF: 1.05) and BD ($p=0.001$; $R^2=0.14$; VIF: 1.01). The perception of the current silhouette was associated with sex, skin color, and BMI. Thus, men perceived their bodies to be larger when compared to women, and white skin individuals perceived themselves to be larger than non-whites.

Table 1 – Characterization of study participants according to sociodemographic variable. Florianópolis (SC), Brazil, 2018. (n=69).

Variable	n (%)
Sex	
Female	42 (60.9)
Male	27 (39.1)
Skin color	
White	55 (79.7)
Other	14 (20.3)
Education	
Elementary School	2 (3.0)
Secondary Education	12 (17.3)
Higher Education	55 (79.7)

Note: n: Absolute frequency; %: Relative frequency.

Table 2 – Characterization of study participants according to lifestyle and health variables. Florianópolis (SC), Brazil. (n=69).

Variable	Mean (\pm SD)
Body Mass Index	33.5 (± 2.8)
Body Fat (%)	40.2 (± 7.1)
Energy consumption (kcal / day)	2.429 (± 515)
Variable	Median (min-máx)
PA light (minutes / day)	503 (271-671)
PA Moderate (minutes / day)	49 (16-147)
PA Vigorous (minutes / day)	1 (0-32)
Sedentary Behavior (minutes / day)	400 (190-645)

Note: SD: Standard Deviation; PA: Physical Activity.

Table 3 – Crude analysis of the association between sociodemographic and lifestyle and health variables and the perception of current silhouette and body dissatisfaction in adults with obesity, Florianópolis (SC), Brazil, 2018. (n=69).

Variables	Coefficient	95% CI	R ²	VIF	p-value
Perception of the current silhouette					
Sex ^a	-0.52	-0.94; -0.10	0.08	1	0.015
Age	0.08	-0.02; 0.03	0.001	1	0.752
Skin color ^b	0.63	0.13; 1.14	0.09	1	0.015
Education	0.01	-0.07; 0.08	0.00	1	0.849
Body Mass Index	0.13	0.07; 0.20	0.19	1	<0.001
Percentage of Body Fat	-0.00	-0.03; 0.03	0.00	1	0.844
Energy consumption	0.00	-0.00; 0.00	0.06	1	0.057
PA light	0.00	-0.00; 0.00	0.04	1	0.158
PA Moderate	0.00	-0.00; 0.01	0.01	1	0.597
PA Vigorous	0.01	-0.02; 0.05	0.01	1	0.482
Sedentary Behavior	-0.00	-0.00; 0.00	0.04	1	0.152
Body dissatisfaction					
Sex ^a	0.16	-0.24; 0.57	0.01	1	0.419
Age	-0.03	-0.05; 0.00	0.05	1	0.060
Skin color ^b	-0.66	-1.13; -0.19	0.10	1	0.006
Education	0.03	-0.04; 0.10	0.01	1	0.426
Body Mass Index	-0.03	-0.11; 0.04	0.01	1	0.337
Percentage of Body Fat	-0.00	-0.03; 0.03	0.00	1	0.983
Energy consumption	-0.00	-0.00; 0.00	0.02	1	0.212
PA light	-0.00	-0.00; 0.00	0.02	1	0.257
PA Moderate	-0.00	-0.00; 0.00	0.00	1	0.782
PA Vigorous	0.00	-0.03; 0.04	0.00	1	0.774
Sedentary Behavior	0.00	-0.00; 0.00	0.02	1	0.296

Note: ^aThe male sex is the reference; ^bThe other category for skin color is the reference. p-values highlighted in bold represent statistical significance. 95% CI: Confidence Interval; PA: Physical Activity; VIF: Variation Inflation Factor.

Table 4 – Adjusted analysis of the association between sociodemographic and lifestyle and health variables and the perception of current silhouette and body dissatisfaction in adults with obesity, Florianópolis (SC), Brazil, 2018. (n=69).

Variable	Coefficient	95% CI	VIF	p-value
Perception of the current silhouette				
Sex ^a	-0.62	-0.98; -0.26	1.01	0.001
Skin color ^b	0.50	0.05; 0.95	1.07	0.029
Body Mass Index	0.13	0.6; 0.19	1.07	0.001
Body dissatisfaction				
Age	-0.02	-0.05; 0.01	1.01	0.085
Skin color ^b	-0.63	-1.09; -0.17	1.01	0.008

Note: ^aThe male sex is the reference; ^bThe other category for skin color is the reference. 95% CI: Confidence Interval; VIF: Variation Inflation Factor.

For BMI, the increment of 0.13kg/m² indicated an increase of one point in the perception of the current silhouette. When considering BD, it was observed an association only with skin color, in which white people had lower BD scores.

DISCUSSION

This study aimed to verify the factors associated with the perception of current silhouette and dissatisfaction with BI in obese adults. The BI dissatisfaction seems to affect significantly more people with obesity than those of normal weight, evidenced in measurements by different methods, such as questionnaires and scales [8]. It was noticed that the perception of the current silhouette

was associated with sex, skin color, and BMI. In other words, men perceived their bodies to be larger when compared to women, and white-skinned individuals perceived themselves to be larger than non-whites. As for BMI, those with a higher BMI perceive their current silhouettes to be concomitantly larger. When considering BD, an association with skin color was identified, suggesting that non-white people were more dissatisfied with their bodies.

Women perceived themselves as having smaller body silhouettes when compared to men; however, there was no difference in the degree of dissatisfaction with BI. A study by Rothwell et al. [21] points out that BD is influenced by cultural internalization of ideal body types, which have different standards for men and women. Individuals of both sexes seem to be negatively affected in relation to body satisfaction when frequently exposed to idealized standards. In the present study, both men and women were in the same obesity framework, which, in itself, seems to imply levels of BD.

Damasceno et al. [22] used the same instrument used in the present study to collect the ideal and current image perception. The results obtained indicated that men wanted a body with greater volume, with a greater amount of mass, and a lower level of body fat. In contrast, in the study by Sadibolova et al. [23], women perceived their body larger than it really was by idealizing a lean body, whereas in men the perception of being underweight or dissatisfaction was observed by idealizing a larger body. This fact may reflect the social phenomenon that labels the male sex as the one who should be stronger, bigger, and more vigorous. In this sense, perceiving oneself with a larger silhouette, even in conditions of obesity, may not be totally related to the negative stereotype of excess fat.

The female body, in turn, has suffered numerous influences over the years, especially by the media and the social environment. Although there are records of civilizations that praise women with big bodies, currently there is an overvaluation of the apparently healthy, thin, and young body as the reference for beauty and desire. More than ever, submission to the demands of society is perceived, fostered by industries that make resources available for this incessant search for the “ideal body” [24]. For Araújo et al. [24], the search for the ideal body and the distortion of the current image is linked to the ego, the social imposition, and the standards imposed by the media, thus revealing a fine line between the healthy and the harmful. Although people are aware of this paradigm and the health risks involved, such aesthetic standards remain desirable to many far and wide. Marques et al. [25] conducted a prospective examination of the relationships between social media use and body dissatisfaction in a representative sample of adults. The authors concluded that greater use of social media significantly predicted body dissatisfaction one year later, especially in women. Such findings suggest that raising awareness of how to use social media positively across the community could be important actions to take.

Also, in relation to sociodemographic factors, although age individually did not present a statistically significant association with BI, it remained in the model, adjusting the relationship between BD and skin color. The present study presents a relatively small number of individuals in the sample and with a restricted age range, with little variation, which directly impacts the findings of statistical significance. Still, even with the marginal *p*-value, there is a tendency for younger participants to be more dissatisfied when compared to older ones. In this sense, especially among the younger public, protest behaviors can occur that make the individual vulnerable to concerns related to their body and appearance, resulting in the distortion of BI, by either overestimation or underestimation of body size [26].

Lipowska et al. [11] presented adulthood as a stage of stability in the perception of BI and greater satisfaction. Tiggemann et al. [27], along the same lines, did not find significant differences

in body satisfaction and dissatisfaction between young (18 to 34 years old) and middle-aged (35 to 49 years old) adults. In the present study, a peculiar characteristic of the sample is the fact that all participants were obese. As this is a condition that by itself negatively affects BI, it is possible that, over the years, such individuals get used to the way they perceive themselves. It was proposed by Algars et al. [9] that it is insufficient to only study how age affects the general BI, because adults may be more satisfied with certain aspects of their bodies and less satisfied with others based on their age. Body satisfaction can also fluctuate during different stages of adult life.

The level of education was not associated with BI, corroborating other studies that evaluated adults with obesity and reinforcing that it is an irrelevant variable, given this clinical condition. It is hypothesized that individuals with a lower level of education have less knowledge about health in general and, consequently, are not clear on the repercussions caused by obesity, such as the distortion of BI itself. In addition, highly educated people generally have higher income. This provides them with more resources to cope with aesthetic issues, which can easily influence their perception of BI. Individuals with non-white skin color were more dissatisfied with their BI. The BD in black people was reported especially regarding the desire to increase the silhouette [28]. However, these studies were also not carried out exclusively with people with obesity, who face discrimination on a daily basis. Thus, it is possible that, when added to racial prejudice and social inequalities experienced by black people, aspects related to BI have their importance accentuated for these individuals.

When analyzing lifestyle and health factors, it was noted that BMI was directly associated with the perception of current silhouette. The higher this index, the greater the silhouette perceived by the participants. This predictable result has been previously reported [29]. However, when analyzing BD, it was not possible to detect such an association. Ferreira et al. [29] found significant differences in BD between individuals of normal weight, grade I, and grade II obesity. The present study had a homogeneous group of participants with little variation in BMI and degrees of obesity. In this sense, finding differences in BI dissatisfaction according to BMI becomes unfeasible.

The other lifestyle factors (BF%, physical activity, sedentary behavior, and energy consumption) were not associated with the perception of current silhouette or BD. In the literature, studies linking BI with BMI are widely disseminated, rather than the percentage of fat [29,30]. A possible cause for this preference is the easy applicability and low cost of BMI. In previous studies, low levels of physical activity and high levels of sedentary behavior were associated with greater degrees of BD in individuals of all nutritional statuses [30,29]. Lower levels of physical activity and excessive sedentary behavior are associated with increased body weight and, consequently, with the development of obesity.

As for energy consumption, no association was found with BI in this study. On the other hand, Oliveira et al. [31] established an association between body dissatisfaction and unhealthy eating habits. This is because the women most dissatisfied with their body image had a higher consumption of ultra-processed foods. This relationship deserves public health attention, both with regard to the prevention of chronic diseases and the reduction of deleterious effects on mental health. New investigations are also suggested that explore this theme and that can clarify this relationship in greater depth.

Despite not having found an association between BI and energy consumption and the percentage of body fat, the present study was innovative in analyzing them, serving as an incentive for these variables to be studied in greater depth in the future. This study leaves as a collaboration for health professionals especially those of the physical education field who work with adults with obesity a reminder to consider aspects beyond metabolic and body composition variables and provide care for the psychosocial demand of this population. In addition, it is suggested that interventions

focused on the obese population also create strategies that collaborate to change the perception of BI. Furthermore, actions of a generalized nature that aim to reduce social inequalities, especially related to sex, race, and ethnicity, can contribute not only to the evolution of society itself, but also to the prevention and treatment of obesity and other related diseases. The stigma of the “ideal body” needs to be overcome and replaced by a functional body.

It is important to consider as a limitation that the participants were about to start a period of intervention, a factor that, positively or negatively, may have interfered with the self-perception of the ideal and current silhouette. Furthermore, the reduced sample size can also be considered a weakness for allowing inferences to be statistically consolidated.

CONCLUSION

The results of this study indicated that male sex, white skin color, and higher values of BMI were the factors associated with the perception of larger body silhouettes, while only individuals with non-white skin color were associated with BI dissatisfaction.

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CONTRIBUTORS

AR STREB, CG VIEIRA, and GF DEL DUCA participated in all stages of the study, from conception to design, analysis, and interpretation of data, and writing of the manuscript. CS SILVA, C BERTUOL, and P VARGAS participated in data analysis and interpretation and manuscript writing. All authors reviewed and approved the final version of the article.