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Dissatisfation-related food behavior is associated with a risk of eating disorders in physically active women

La conducta alimentaria y factores relacionados se asocian con un riesgo de trastornos alimentarios en las mujeres físicamente activas

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ABSTRACT

Introduction: Studies have shown that most women have body dissatisfaction and desire to reduce your silhouette, which are associated to the risk of developing eating disorders. A important number of women engaged in sports is known for presenting an inadequate eating behavior and display a body dissatisfaction. However there are few studies that have addressed this issue among those subjects attending fitness centers, who are also concerned about their body shape.

Objective: The aim of this study was to evaluate the risk of developing eating disorders and factors that are associated with this risk among physically active women at fitness centers.

Materials and methods: Representative sample consisted of 356 young women who exercise in fitness centers in the city of Aracaju, SE, Brazil (CAAE - 19845413.3.00 00.5546). A questionnaire with socioeconomic data, physical activity data and adoption of diets/supplements for weight loss and body awareness was applied, as well as the Eating Attitudes Test (EAT-26).

Results and discussion: The results showed a considerable prevalence of eating disorders (25,8%) and body dissatisfaction (73,9%). The most women are dissatisfied due to overweight (54,9%) and desired to reducing their silhouette in 2 degrees. Logistic regression showed that the adoption of diets/supplements (OR = 2,71), excessive concern with body shape (OR = 3,52), low self-esteem (OR = 2,14), and degree of body dissatisfaction (OR = 1,37) were associated with risk of developing eating disorders ($p < 0.05$). However, schooling was considered a protective factor for the development of eating disorders (OR = 0,13).

Conclusion: Women at fitness centers who had at least one of the variables (lower schooling, adoption of diets/supplements for weight loss, feelings of inferiority and body dissatisfaction) are more likely to develop eating disorders. These data represent a concern since at least two of ten women at fitness centers presented risk of developing eating disorders in addition to the high prevalence of body dissatisfaction.

KEYWORDS

Eating disorders, EAT-26, body image, active women

RESUMEN

Introducción: Los estudios han demostrado que la mayoría de las mujeres tienen insatisfacción corporal y el deseo de reducir su silueta y estos factores están asociados con el riesgo de desarrollar trastornos de la alimentación con. Un número importante de mujeres que participan en los deportes es conocido por presentar un comportamiento inadecuado de la conducta alimenticia y insatisfacción corporal.

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Sin embargo, hay pocos estudios que han abordado esta cuestión entre aquellas que hacen ejercicios en los centros de acondicionamiento físico, que también se preocupan por su forma del cuerpo.

Objetivo: El objetivo de este estudio fue evaluar el riesgo de desarrollar trastornos de la conducta alimentaria y los factores que se asocian con este riesgo entre las mujeres físicamente activas.

Material y Método: La muestra representativa consistió en 356 mujeres jóvenes que hacen ejercicios en los centros de acondicionamiento físico en la ciudad de Aracaju, SE, Brasil (CAAE - 19845413.3.0000.5546). Se aplicó un cuestionario con datos socioeconómicos, datos de la actividad física y la adopción de dietas/suplementos para la pérdida de peso y el conocimiento del cuerpo, así como el Test de Actitudes Alimentarias (EAT-26).

Resultados e discusión: Los resultados mostraron una considerable prevalencia de los trastornos de la conducta alimentaria (25,8%) y la insatisfacción corporal (73,9%). Las mayoría de las mujeres no están satisfechas debido al exceso de peso (54,9%) y deseaban reducir su silueta en 2 grados. La regresión logística mostró que la adopción de dietas/suplementos (OR = 2,71), excesiva preocupación por la forma del cuerpo (OR = 3,52), la baja autoestima (OR = 2,14), y el grado de insatisfacción corporal (OR = 1,37) se asociaron con el riesgo de desarrollar trastornos de la alimentación (p <0,05). Sin embargo, la escolarización se considera un factor protector para el desarrollo de trastornos de la alimentación (OR = 0,13).

Conclusiones: Las mujeres en los gimnasios que tenían al menos una de las variables (menor escolarización, adopción de dietas/suplementos para la pérdida de peso, sentimientos de inferioridad y la insatisfacción corporal) son más propensas a desarrollar trastornos de la alimentación. Estos datos representan una preocupación, ya que al menos dos de cada diez mujeres en los centros de acondicionamiento físico presentan riesgo de desarrollar trastornos de la alimentación además de la alta prevalencia de la insatisfacción corporal.

PALABRAS CLAVE

trastornos de la alimentación, EAT-26, imagen corporal, mujeres activas

ABBREVIATIONS

BD: Body dissatisfaction.

FC: Fitness centers.

ED: Eating disorders.

EAT-26: Eating Attitudes Test with 26 questions.

BMI: Body Mass Index.

BACKGROUND

Exercise is considered to be a protective factor against the development of various diseases, especially those that are associated with physical inactivity. It is believed that in the long term, exercise can promote a greater satisfaction of the body image, especially among women[1]. On the other hand, exercise is also associated with a search for faster results in weight loss. In women with an abnormal eating behavior, this can cause an increment in body dissatisfaction (BD)[2].

Fitness centers (FC) have gained more importance in a social context and have the potential to influence the lifestyle of this particular population[3]. Exercises performed within these environments are associated with a greater concern about body image in young women, which can increase the likelihood of them developing eating disorders (ED)[4].

Studies have shown that most women are dissatisfied with their body image and they wish to reduce their silhouette[5-7]. Such dissatisfaction can lead towards an adoption of strategies and abnormal eating behavior in order to achieve their goals, in this case, a weight loss[7]. The strategies mainly include diet and exercise[7,8]. Thus, the literature shows that there is a negative relationship between BD and the strategies for weight loss (diet and exercise) in women and that this is associated with the risk of developing ED[8-11].

ED consist of a disease of multifactorial orders that are characterized by an abnormal eating behavior and this can lead to serious complications in one's physical health and the resulting psychological and nutritional experiences of the individual. ED include anorexia nervosa, bulimia nervosa, binge eating disorders, and other specified and unspecified ED (previously known as ED, or not otherwise specified, or EDNOS). They constitute a group of disorders involving a disturbed body image coupled with an eating and/or weight loss behavior[12] that causes severe distress and impairment to the quality of life.

The risk of ED is more common among young women, affecting both those that have an excess weight problem[13] and those that show an inadequacy in their body weight and have to exercise regularly[14]. Currently, sedentary[11], physically active[14], and athletic women[5,9], for the most part, are known for presenting an inadequate eating behavior and display a BD even when they are not overweight. Besides, the prevalence of ED has appeared to be higher in those participants who engaged in particular types of sports, such as esthetic sport (e.g., dancing and gymnastics), leanness and muscle definition sport (e.g., gym users), or weight-related sports (e.g., wrestling)[15].

An excessive concern with one's body image, with muscle definition, and with sex appeal, prevails in FC and these are possible factors that influence the risk of physically active behavior for the development of BD and ED[4]. Studies have assessed the presence of ED and the factors that are associated

with these disorders among women. However, there are few studies that have addressed this issue among those subjects attending FC, since FC are an environment for social groups that are strongly influenced by current beauty standards. Socioeconomic heterogeneity, the different objectives that are related with exercise, body satisfaction, and the adoption of diets and supplements, can be expressed in different ways. Other studies have not yet evaluated an association with the risk of developing ED among physically active young women at FC. Therefore, the goal of this study was to evaluate the prevalence of the risk of developing eating disorders, together with the factors that are associated with this particular risk among physically active women at fitness centers.

MATERIALS AND METHODS

Participants

This is a descriptive cross-sectional study that included physically active young adult women (18-35 years) who had enrolled in the FC of Aracaju, Sergipe, Brazil, and who were registered in the CREF/SE (Regional Council of Physical Education of Sergipe) for the year 2011. Gender, age, and the study's environment of this protocol were chosen according to the eating disorder-related studies[5-11] previous mentioned and in which this kind of a population were more likely to develop ED. Exclusion criteria that were adopted were the practice of physical activity less than three times per week, pregnancy, or lactating women.

This sample was representative of women attending fitness centers in Aracaju, SE during 2011 and the size was determined from a sample calculation of those adopting a confidence level of 95%, a sampling error of 4.56 percentage points, and an estimated prevalence of ED of 28.8%. This study was conducted in Northeastern Brazil[16] and included at least 315 women who voluntarily answered a questionnaire. Selection of FC for the data collection was performed for convenience and totaled 31 fitness centers. However, care was taken to include all regions of the city of Aracaju and the study considered small, medium, and large sized FC. This study collected data about the fitness centers in proportion to their size and their region.

Measures

A questionnaire was delivered to each participant within the fitness centers and this was divided into three sections. First section referred to personal and socioeconomic data (age, weight, height, schooling, and if she was pregnant or lactating), the practice of physical activity (how long was the practice of regular physical activity, how many times per day, and the days/hours per week), together with the adoption of diets/supplements for a weight loss.

Second section was divided into two parts. First part referred to a body perception assessment using a questionnaire with closed answers of yes or no ("Are you satisfied with your physical appearance?", "Does a concern about your physical appearance make you exercise more?", "Are you afraid of losing weight?", "Are you afraid of getting fat?", "Do you compare your physical appearance with others?", "Does it make you feel bad being in the same environment as people that you think are stronger than you?")[17]. Second part was composed of Stunkard´s Figure Rating Scale[18] properly validated for the Brazilian population[19]. In this evaluation, the volunteers were asked to indicate which silhouette would correspond to their current body silhouette and what would be the ideal silhouette. Degree of BD was given by subtracting the current figure by the ideal figure resulting in a score ranging from -8 to 8 (positive values expressed the desire to be slimmer and negative values expressed the desire to be fatter. "Zero" corresponded to a satisfaction with their current body size)[19].

Third section referred to the risk of developing ED, and for this, the Eating Attitudes Test (EAT-26) having been validated for young women in Southern Brazil was used. It consisted of 26 questions with answers of frequency on the Likert scale and the score was performed as follows: answers of "always" scored three points, "very often" scored two points, "often" scored one point, and "others" did not score. This scoring did not occur in Question Number 26, where the score was given in the reverse order: "Never" = 3; "Rarely" = 2; "Sometimes" = 1; and once again, "others" did not score. The EAT-26 rates the risk of developing ED with those people who have scores equal to or greater than 21 points[20]. Final score of the EAT-26 questionnaire presents a subclinical diagnosis of ED and this questionnaire is well recognized and is used in the literature to assess the risk of developing ED[2,8,9,11,16,22].

Nutritional status was rated by using the Body Mass Index (BMI) according to the standards of the World Health Organization[21] and by using self-reported weight and height.

Statistical Analysis

For the data analysis, STATA Software Version 11 was used. Association between a risk of developing ED (EAT Risk) with other variables was analyzed by the Chi-Square Test where the EAT Risk was considered as a dependent variable (No = 0 and Yes = 1). Others variables (BMI, age, schooling, the time of physical activity practice, the weekly frequency, the daily frequency, the hours per day, the types of physical activities, the receipt of instructions to lose weight, the use of a diet and/or a supplement for a weight loss, the degree of body dissatisfaction, "a comparison of one's physical appearance with others", "concern about one's physical appearance made the subject exercise more ", "being in the same environment as people she thought were stronger than her made her feel bad"), were considered independent.

After the performance of the bivariate tests of association, the multivariate analysis was performed by using the logistic

regression model. All of the variables that showed an association with the dependent variables at a significance level of 20% ($p < 0.20$) were selected. The stepwise forward procedure for the elaboration of the multiple model was used and the variables remained in the model if $p < 0.05$ when using the STATA software. The strength of the association between the variables was expressed as an estimated odds ratio (crude and adjusted) with a confidence interval of 95% (CI 95%). The model adjustment was checked by using the Hosmer-Lemeshow test.

This study was approved by the Ethics Research Committee (CAAE - 19845413.3.0000.5546) and complied with the ethical principles of the Declaration of Helsinki and followed the precepts established in the National Legislation.

RESULTS

This study included 386 women who undertook a physical activity in FC in the city of Aracaju, Sergipe, Brazil. Thirty women were excluded according to the exclusion criteria, which left a representative sample of 356 young adult women at fitness centers in this city. These women had mostly complete or incomplete higher education (59%), normal weight (75.4%), and had engaged in a physical activity for more than 6 months (55.3%). Although most had normal weight, 45.5% reported to have adopted some type of a diet/supplementation aimed at a weight loss (Table 1).

According to the body perception questionnaire, it was observed that most of the subjects were concerned with their physical appearance and that this would lead them to undertake more exercises (86.2%). They were afraid of getting fat (76.7%).

When the body satisfaction categories were analyzed (dissatisfaction with a "thinness", a satisfaction, and a dissatisfaction with "overweight"), the results showed that 26.1% were satisfied with their body image, 19.1% were dissatisfied with their "thinness", and 54.9% were dissatisfied with being "overweight". Majority of the women who were dissatisfied with their body image (73.9%) saw themselves as being overweight. Their BD degree was assessed by their score on the scale of silhouettes. Thus, it was observed that a high frequency of subjects (32.3%) desired to have an ideal silhouette of up to one degree less than their current silhouette, followed by 16.9% who desired to reduce it by two degrees from their current silhouette (Figure 1).

When evaluating the EAT-26 questionnaire, it was found that 25.8% of the total sample was at a risk of developing ED. Results of the multivariate model are shown in Table 2. Women with higher schooling were less likely to develop ED. Those that had adopted some type of a diet/supplementation for a weight loss in the last 12 months were 2.7 times more likely to develop ED. Those who responded 'yes' to the body perception-related question "Does a concern about your physical appearance make you undertake more exercise?" were 3.52 times more likely to develop ED and those who responded 'yes' to the question "Does it make you feel bad being in the same environment as people that you think are stronger than you?" were 2.14 times more likely to develop ED. For the variable "EAT Risk", it was found that for each increment of one degree in BD, there was a 37% increase in the likelihood for these women to develop ED.

Table 1. Descriptive characteristics of the sample of women who practice physical activity at fitness centers of Aracaju, SE, Brazil, 2013 (n = 356) .

Variables	N	%
Age (years)		
18 – 25	199	55.9
26 – 35	157	44.1
Schooling		
Elementary School	9	2.5
High school	77	21.6
Higher education	210	59
Post-graduation, Master's degree and/ or PhD	60	16.9
Time of regular practice of physical activity		
≤ 6 months	159	44.7
> 6 months	197	55.3
Weekly frequency		
3 to 4 times	183	51.4
≥ 5 times	173	48.5
BMI[a]		
Low weight	11	3.1
Normal weight	266	75.4
Overweight	76	21.5
Presence of some type of diet/supplement for weight loss		
Yes	162	45.5%
No	194	54.5%

[a] BMI: Body Mass Index.

Table 2. Factors associated with EAT Risk. Aracaju, SE, Brazil, 2013 (n = 356).

Dependent variable	Factors	(%)	Crude Analysis [a]		Adjusted Analysis [b]	
			OR (CI95%)	p*	OR (IC95%)	p*
EAT Risk Hosmer-Lemeshow (p = 0,51)	**BMI**					
	Low weight	3.1	1.15 (1.06 – 1.25)	0.01		
	Normal weight	75.4				
	Overweight	21.5				
	Schooling					
	Elementary School	2.5	1.00		1.00	
	High school	21.6	0.22 (0.5 – 0.93)	0.4	0.27 (0.06 -1.23)	0.09
	Higher education and Post-graduation, Master's degree and/ or PhD	59	0.11 (0.30 – 0.47)	0.03	0.13 (0.31 -0.54)	0.00
	Use of diet and/or supplement for weight loss					
	No	54.5	1.00		1.00	
	Yes	45.5	2.97 (1.81 – 4.88)	0.00	2.71 (1.56 -4.68)	0.02
	Feeling of inferiority					
	No	86.5	1.00		1.00	
	Yes	13.5	2.59 (1.38 – 4.87)	0.00	2.14 (1.05 -4.35)	0.03
	Degree of BD[c]	73.9	1.59 (1.29 – 1.95)	0.00	1.37 (1.06 -1.77)	0.01

[a] unadjusted p value (chi-square). [b] adjusted by BMI. [c] body dissafaction. * p <0.05.

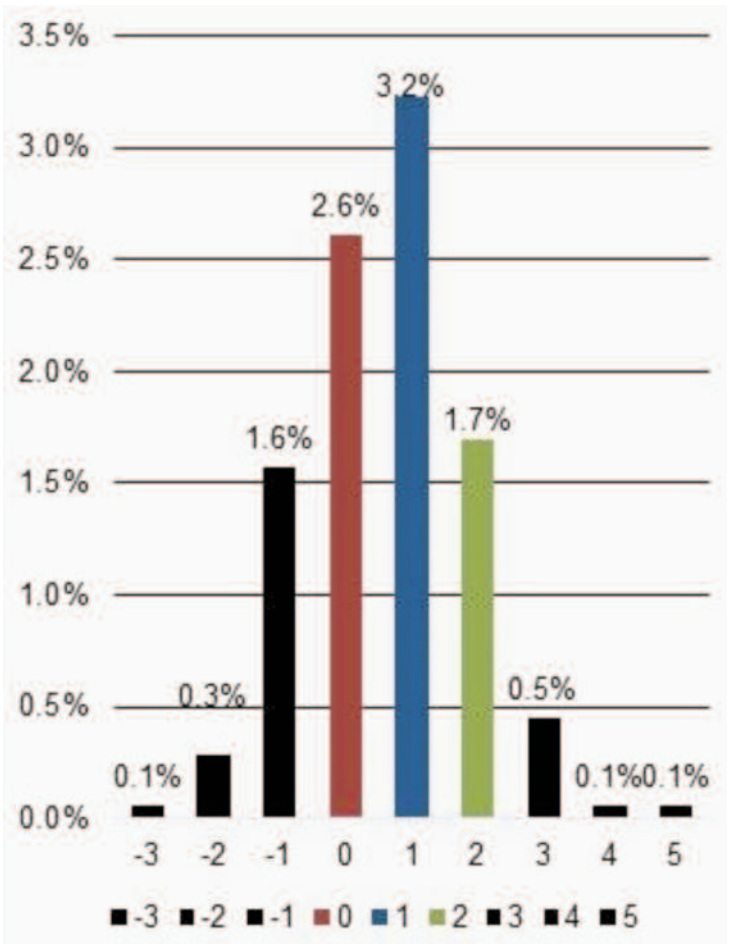
DISCUSSION

Currently, ED have a high prevalence in the younger population, especially among women and the associated factors range from socioeconomic status, such as schooling, up to the change of feelings and behavior that are dictated by the current/ideal beauty pattern[13, 22, 23]. Indeed, this work found that many physically active women were dissatisfied with their body image. Most saw themselves as being overweight and they showed a risk of developing ED. Besides, an adoption of diets/supplements for a weight loss, an excessive concern with their body shape, a low self-esteem, and BD, were associated with a risk of developing ED in physically active young women attending fitness centers.

Some studies have shown that physically active women had a BD, such as the study of Filardo & Leite[6] in which 54.9% of the subjects wanted to reduce weight, and this BD percentage is the same as that found in the present research. The study by Swami *et al.*[5] compared BD among three groups of women attending FC who were considered to be "athletes" for having a high level of training, with professional monitoring. Another group used "Tae Kwon Do" and a third group did very little or no exercise. This study found a greater mean dissatisfaction score in the group of athletes when compared with the other groups, even though the former group had a lower mean BMI. BD seems to be present among women regardless of their level of training, their BMI, and their education. Perhaps the imposition of the media and society on a perfect body is the major factor that can lead women to force this desire into their bodies, which then makes a change of other behavior such as a low self-esteem and ED.

The present study also showed prevalence for a risk for developing ED (25.8%) similar to the results obtained by Alvarenga *et al.*[16] in which 28.8% of active females and sedentary university students in northeastern Brazil were at a risk of developing ED. A study by Höglund & Normén[14] with gym teachers showed that 35% have or had in the past, some type of eating disorder, and that of this total, 72% demonstrated a desire to be thinner. It is noteworthy that these women work in FC, and that besides being teachers, they also undertook exercises within this environment. This

Figure 1. Sample distribution according to your desire to change your silhouette (n = 356).



The blue color presents the women who desired to have an ideal silhouette of up to one degree less than their current silhouette. The red color presents the women who are satisfied with their current silhouette. The green color presents the women who desired to have an ideal silhouette of up to two degree less than their current silhouette.

data is important, because currently, there is an excessive concern about one's body image, especially among women, which may lead to the development of ED.

The study by Weis *et al.*[24] showed that 11.2% of women attending FC were diagnosed with the presence of bulimic features and that most of them used exercise as a compensatory mechanism after an episode of excessive eating. Authors suggested that these women seek FC because "they find there are a variety of bodily practices to satisfy and strengthen their bulimic behavior". These studies reinforce the idea that although fitness centers are environments aimed at improving the quality of life and one's health, they also contribute to the spread of information regarding beauty standards and may promote unhealthy behavior among women who are more prone to develop ED. Images of athletic and muscular bodies, as well as the positioning of mirrors within FC, together with the marketing of products and supplements for the perfect body, are common features of FC and these may contribute to the self-assessment of one's body.

Multivariate model showed that schooling influenced the emergence of inadequate eating behavior, since the lower the schooling, the greater the likelihood of developing ED. Possibly individuals with a higher education have a greater access to information and health services, which contribute to a greater awareness of the risks associated with abnormal eating behavior.

In this present study, those women who had adopted some type of a diet and/or a supplement for a weight loss, were more likely to develop an EAT Risk. Patton *et al.*[25] found that female adolescents who adopted diets in order to lose weight in a moderate or severe form were 4.9 and 18 times more likely to develop ED, respectively. Saeedi *et al.*[26] reported that subjects who used supplements were more likely to develop ED (OR = 3.08). Another study which used a population of adult men and women, has shown that weight loss strategies have the potential to lead to the consumption of food supplements aimed at a weight loss, and that these strategies are directly associated with the development of ED, such as bulimia nervous and binge eating[27]. Factors such as age, gender, and an increased adoption of diets for a fast weight loss are issues that must be considered to be decisive in the development of ED.

In their study with female university students, Damasceno *et al.*[28] claimed that the risk of developing ED was associated with feelings of inferiority and those who engaged in physical activities showed an excessive concern with their body's appearance. Brechan and Kvalem[29] affirmed in their study that there existed body dissatisfaction and over eating disorders; self-esteem was the mediator of this relationship**.** This statement corroborates with the results of this study and showed that those who undertake more exercises due to their concern with their physical appearance were more likely to develop ED. This is similar for those who feel badly in an environment with people that they see as stronger and leaner. It is, therefore, necessary to consider the environment in which the women in this study were questioned. However, as exercise is

a slow way to change one's body shape, this desire to change their bodies can make them most dissatisfied and concerned with their inner feelings of inferiority.

In this present research, BD also influenced the risk of developing ED. Cenci *et al.*[10] showed that BD was the most important factor associated with bulimic behavior and women with a body image distortion were up to 15 times more likely to develop such a behavior when compared with those who were satisfied with their body. Accordingly, Argyrides & Kkeli[9], in a study with young university students, showed that eating disorders were negatively correlated with body satisfaction. Another study with athletes showed that the ones who were engaged in sports practice focused on their body weight and their body image and they had a high degree of body dissatisfaction and more extensive symptoms of eating disorders when compared with those athletes who were not focusing on that[11]. Just like the physically active women at fitness centers, the objective and the pressure of obtaining an ideal body may favor the beginning of dissatisfaction and eating disorders and that these two variables are associated.

Thome & Espelage[2] claimed that the psychological health of women was one of the main factors that can trigger dissatisfaction and an abnormal eating behavior, leading to the development of ED. Regular exercise can promote physical and emotional well-being. However, considering that the study sample was composed of physically active women attending FC, it is necessary to understand whether exercise is able to reverse or promote such a behavior in this type of a population.

Due to the scarcity of studies that include a greater sample of women who undergo exercises in FC, and when considering that this environment has the potential to influence the lifestyle of a population, further studies should be carried out in order to compare these variables among women who are not included in the environment of FC. This would be in an attempt to understand whether the environment may or may not increase the likelihood of developing ED.

CONCLUSION

Despite the lack of studies addressing this relationship in physically active women attending FC, there is a strong association between their body image and the risk of developing ED. This indicates that BD is a predictor for the development of ED and the inadequate practices of weight control among women. In conclusion, women at FC who had at least one of the variables (lower schooling, adoption of diets/supplements for a weight loss, feelings of inferiority, and body dissatisfaction) are more likely to develop ED. These results represent a concern, since at least two out of ten women at fitness centers presented a risk of developing eating disorders in addition to the high prevalence of body dissatisfaction.

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