Body image dissatisfaction in individuals with obesity seeking bariatric surgery: exploring the burden of new mediating factors

L'insoddisfazione per l'immagine corporea nei candidati alla chirurgia bariatrica: indagine sul ruolo di nuovi correlati psichici

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SUMMARY. Introduction. For bariatric surgery candidates body image dissatisfaction (BID) may influence both psychological well-being and motivation to obtain surgery. This study aims to examine possible psychiatric predictors of BID. In particular, we explored the burden of new associated factors such as early trauma and attachment style (AS), which have not been assessed in previous literature. **Methods.** In this study, 536 patients with extreme obesity (mean Body Mass Index, BMI=43 kg/m^2, SD=6.62) undergoing presurgical psychiatric evaluations as part of a mandatory workup before surgery were chosen as participants. A semi-structured clinical interview was performed to assess psychiatric diagnosis and patients' history of early trauma. BID was assessed using the Body Shape Questionnaire (BSQ). Depression, binge eating, and AS were assessed using self-report instruments. **Results.** Binge eating behavior ($p<0.0001$), depression severity ($p<0.0001$), female gender ($p<0.0001$), and the "need for approval" dimension of insecure AS ($p<0.0001$) were found to be independent and significant predictors of BSQ score. However, early trauma and BMI were not included in the significant regression model ($F_{4,442}=90.784$, $p<0.0001$, adj$R^2=0.446$). **Discussion.** Our results increased the understanding of BID among individuals with extreme obesity. Similar to previous studies, we reported that binge-eating, depressive symptoms, and gender influenced BID. Neither early trauma nor BMI were associated with BID. Our novel finding was the significance of insecure AS. Implications for multidisciplinary approaches to obesity treatment are discussed. Identifying critical features of BID to be targeted in pre- and post-operative behavioral interventions may open new possibilities for providing effective support for individuals over the course of their therapy. **Conclusions.** For some individuals living with obesity, developmental and relational processes such as insecure AS may play a substantial role in the development of BID.

KEY WORDS: body image dissatisfaction, attachment style, binge eating disorder, depression, bariatric surgery, gender, trauma.

RIASSUNTO. Introduzione. Nei candidati alla chirurgia bariatrica, l'insoddisfazione per l'immagine corporea può influenzare il benessere psichico e le motivazioni che spingono all'intervento chirurgico. Il nostro studio ha l'obiettivo di esplorare i possibili predittori psichiatrici dell'insoddisfazione per l'immagine corporea. In particolare, abbiamo studiato il ruolo dei traumi precoci e dello stile di attaccamento adulto, aspetti non ancora esplorati dalla letteratura. **Metodi.** Un gruppo di 536 pazienti, candidati alla chirurgia bariatrica (Indice di Massa Corporea, IMC, medio ± DS, =43±6.62), è stato sottoposto alla visita psichiatrica necessaria per l'idoneità all'intervento. La diagnosi psichiatrica secondo i criteri del DSM-IV-TR e la presenza di traumi prima dei 15 anni di età sono state valutate con un'intervista clinica semi-strutturata. L'insoddisfazione per l'immagine corporea, i sintomi depressivi, il disturbo da alimentazione incontrollata e lo stile di attaccamento sono stati valutati con test psicometrici auto-somministrati. **Risultati.** Il comportamento tipo binge eating ($p<0,0001$), i sintomi depressivi ($p<0,0001$), il genere femminile ($p<0,0001$) e la dimensione dell'attaccamento insicuro "bisogno di approvazione" ($p<0,0001$) sono risultati predittori significativi e indipendenti di insoddisfazione per l'immagine corporea. Il trauma precoce e l'IMC non sono risultati significativi nel modello di regressione ($F_{4,442}=90,784$, $p<0,0001$, adj$R^2=0,446$). **Discussione.** I nostri risultati migliorano la comprensione dell'insoddisfazione per l'immagine corporea nei pazienti con obesità severa. Abbiamo confermato il ruolo del binge eating, della depressione e del genere sull'insoddisfazione. Il trauma e l'IMC non sono risultati significativi. Il dato emerso dallo studio è stato quello di dimostrare che lo stile di attaccamento influenzava l'immagine corporea nei pazienti con obesità severa. Le implicazioni per il trattamento multidisciplinare dell'obesità sono discusse criticamente. Identificare aspetti critici dell'insoddisfazione corporea che possono beneficiare di interventi psicoterapeutici pre- e post-operatori potrebbe aprire nuovi scenari nell'ottica di un supporto efficace nel tempo. **Conclusioni.** Per alcuni pazienti affetti da obesità, lo stile di attaccamento che si sviluppa nei primi anni di vita e influenza le relazioni adulte potrebbe giocare un ruolo cruciale nel determinare l'insoddisfazione corporea.

PAROLE CHIAVE: insoddisfazione per l'immagine corporea, stile di attaccamento, binge eating disorder, depressione, chirurgia bariatrica, genere, trauma.

INTRODUCTION

Body image dissatisfaction (BID) is not limited to the discrepancies between one's current and ideal body shape. The construct of BID is complex and multidimensional including attitudinal components of body image such as negative affects and distress concerning one's own body[1,2].

In individuals with extreme obesity, dissatisfaction with physical has been reported with a lifetime prevalence of above 74%[3]. It is notable that body image has been found to be poorer among bariatric surgery candidates than in individuals attending non-surgical weight-loss programs and those without obesity[4]. In the bariatric population the BID is a compelling concept for many reasons.

Patient's motivations to undergo weight-loss surgery may depend on several factors such as a desire to improve physical functioning, to resolve present comorbidities, or an aspiration to reduce BID[5].

Bariatric surgery candidates may have the erroneous belief that resultant weight-loss after surgery will completely resolve their pre-existing BID and psychological difficulties[6]. Accordingly, patients may have unrealistic goal/ideal expectations concerning the outcomes of surgery, in case where BID remains undetected and untreated[7]. Another issue comes from the hypothesis that highly body-dissatisfied individuals may not adhere to dietary adjustments, which are recommended before and after surgery[8,9]. The most common evidence for this is that as severe BID can be associated with symptoms of psychological distress, the perception that physical and mental health amelioration is impossible can be common among patients, leading to the belief that their diet cannot help them[10,11].

Further it has been well-established that individuals with extreme obesity are often targets of discrimination, stigma, and self-stigma as a result of their physical appearance, which may lead to psychological suffering[12,13]. Severe BID has also been found to be associated with higher morbidity as a result of related eating disorders and mental distress[14]. Thus, considering the above, it is clear that BID is a critical issue for bariatric surgery candidates, and the development of additional psychological interventions to address this may be required[15].

Clarifying the determinants of BID should be imperative for researchers and may help explain why some patients with obesity experience psychological consequences of their condition, while others do not.

BID is a core symptom of non-normative eating behavior and eating disorders, which are prevalent in individuals with obesity and seem to become more serious with increasing BMI[16,17]. It may be hypothesized that the relationship between eating disorders and BID is bidirectional, with binge-eating disorder (BED) being a risk factor for the development of BID[18], and BID a factor leading to binge eating, as it is known to contribute to anorexia nervosa and bulimia nervosa[19]. However, in patients with obesity a higher level of BID has been observed in those with BED than in those without BED[20].

Although BID has been detected in individuals suffering from various eating disorders, we hypothesized that the body image dissatisfaction sought by in patients with extreme obesity might be quite different from those of patients with eating-disordered patients[21], showing different risk factors[22]. It should be noted here that not all bariatric candidates suffer from psychiatric or eating disorders[23]. Furthermore, individuals with obesity are often victims of prejudices, with some experiencing this treatment from infancy to adulthood[24,25]. There is a large body of literature on the relationship between BID and obesity. In particular, focusing on bariatric surgery candidates alone, gender, ethnicity, self-esteem, and psychiatric comorbidities such as depressive disorders have all been previously associated with greater BID[26].

In addition, it has been reported that body image disparagement is not always present in individuals with obesity, but it is most common in those who have experienced childhood or adolescent onset of obesity, affective disturbances, and those who have received negative feedback by significant others in regards of their weight[27]. Therefore, it is clear that a complex interplay between sociocultural, familiar, psychological, and interpersonal experiences may contribute to the development of BID. In particular, in this study we tested the hypothesis that early life experiences such as childhood trauma and the attachment style may represent pivotal risk factors[28,29].

People who have experienced childhood trauma have been found to be at an increased risk of developing obesity as adults[30]. Furthermore, in patients with eating disorders, early life trauma has been found to be associated with BID[31]. The attachment style (AS) is a psychological feature that develops in early life and it is based on the quality of an individual's experiences with their caregivers: further, it can consequently influence individuals' future intimate relationships. Securely-attached individuals tend to perceive themselves as worthy of care and will trust others to provide care if needed. By contrast, insecurely-attached individuals tend to display "avoidant" (involving mistrust of others, social isolation, fear of intimacy) or "anxious/ambivalent" (involving fear of abandonment) attitudes in social relationships[32,33].

As throughout the life span, certain people are more vulnerable than others to sociocultural influences on their body image, we speculated that in patients with morbid obesity this susceptibility might be explained by the attachment theory[34]. Considering body image developing as one ages, has relationships, and receives feedback from peers and family members, secure AS may be a protective factor[35]. On the other hand, it should be noted that low self-esteem may characterize some kinds of insecure attachment style, which in turn has been found to be correlated with body dissatisfaction[20,36].

Insecure AS has been previously associated with BID in individuals who do not suffer from obesity, but instead have anorexia nervosa, bulimia nervosa, or eating disorder not otherwise specified who did not suffer from obesity[37-39]. However, there has been limited research examining AS in bariatric surgery candidates, with the few existing publications reporting poorer quality of life and problematic eating behaviors in those with attachment insecurity[40-42].

Since BID may significantly influence patients' psychological well-being and approaches to bariatric surgery, an investigation of the putative factors implicated in BID etiology is warranted. Thus, the aim of this study was to retrospectively explore the psychiatric features of BID. In particular, we tested the burden of possible associated factors, such as early trauma and AS, which have not yet been assessed in the current literature.

MATERIALS AND METHODS

Procedure and participants

This research is a part of a larger observational longitudinal study that involves assessing consecutive bariatric surgery candidates before surgery, and one, and five years after surgery.

The current study utilized cross-sectional data collected from bariatric surgery candidates referred to the Psychiatric Unit at the University of Rome Tor Vergata for a pre-operative psychosocial evaluation.

A total of 569 individuals were approached, of which 33 declined to participate and were consequently not enrolled in the study. Thus, 536 patients with extreme obesity participated in the study.

Clinical evaluation

A clinical interview was conducted as part of the required pre-operative psychosocial evaluation. This semi-structured interview aimed at evaluating patients' weight, dieting history, motivation for seeking surgery, expectations concerning the surgical outcome, medical comorbidities, and medication use.

In this phase, experienced clinical psychiatrists made diagnostic assessments according to DSM-IV-TR criteria.

BMI was calculated using the formula weight (kg)/[height (m)]^2: Participants' weights and heights were measured while they were wearing street clothes.

Psychometric instruments

The Early Traumatic Life Events (ETLE) questionnaire[43] is an instrument used to record whether individuals have experienced any of 10 different traumatic life events between the ages of 0 and 15 years. In our study, experienced clinical psychiatrists used this to interview participants in order to determine whether any of the following traumatic events had occurred early in their lives about the occurrence in their lives: separation from their natural mother (as a result of: death of their mother; a long absence exceeding 100 days, their mother suffering from an illness; being given up for adoption; being raised in a foster home; being raised by other family relatives or unrelated persons; or the divorce or separation of their parents); separation from their natural father (as a result of: death of their father; a long absence exceeding 100 days, their father suffering from an illness; being given up for adoption; being raised in a foster home; being raised by other family members or unrelated persons, because he was performing military service or was a prisoner of war, the separation or divorce of their parents; or as a result of their father's imprisonment); and separation from their parents, for over than 100 days, and as a result of: the participant suffering from an illness; the participant suffering from a severe physical handicap during childhood; a sibling suffering from a severe physical handicap; severe marital problems between parents; one or both parents suffering from alcohol addiction; their mother or father suffering from a severe psychiatric illness (other than alcohol dependence); violence in the family, including physical abuse of the respondent; or sexual molestation or abuse. The ETLE data can be analyzed either in a categorical manner, reporting the presence or the absence of early trauma, or in a dimensional fashion, calculating the total amount of early traumatic events using a scale ranging from 0 to 10 points[43].

Along with the ETLE questionnaire, the Italian versions of the following self-report psychometric instruments were also administered to our participants:

Body Shape Questionnaire

The Body Shape Questionnaire (BSQ) is a 34-items self-report measure of body shape dissatisfaction. Each item is scored from 1 ('never') to 6 ('always') and the overall score is the sum of all items scores, giving a range from 34 to 204: higher scores reflect greater BID. The BSQ has demonstrated good reliability and validity in previous research, and has been widely used in studies of BID featuring both non-clinical and clinical populations, including individuals with obesity and bariatric surgery candidates[44,45].

Beck Depression Inventory-Second Edition

The Beck Depression Inventory-Second Edition (BDI-II) was administered to measure the severity of current depressive symptoms. This is a 21 item self-report instrument that uses a four-point scale ranging from 0 ('no symptoms present') to 3 ('very intense symptoms'). For each item, participants are asked to choose the statement best describing how they felt over the previous week[46]. BDI-II has been widely used to examine individuals with obesity[47] and bariatric surgery candidates[48], and has shown a high internal consistency (Cronbach's alpha for the test ranges from 0.89 to 0.92).

Binge Eating Scale

The Binge Eating Scale (BES) is a 16-item self-report questionnaire used to assess the presence of binge eating behavior, which is indicative of the existence of an eating disorder. This scale was designed specifically for individuals with obesity. The questions focus on behavioral characteristics, such as the amount of food consumed, as well as emotional, and cognitive responses, such as guilt or shame. Total scores range from 0 to 46 and the cut-off for possible BED is ≥17[49]. In a previous study conducted on an Italian population with obesity[50], BES was found to have acceptable internal consistency as revealed by its Cronbach's alpha of 0.78.

Attachment Style Questionnaire

The Attachment Style Questionnaire (ASQ) was employed to examine adult AS using a dimensional approach. This measures common aspects of attachment theory such as dependence, trust, and self-reliance in general relationships. Specifically, it is a 40-item self-report questionnaire, with response options ranging from 1 ('totally disagree') to 6 ('totally agree'). Participants are instructed to consider their close relationships with peers (whether romantic or not) when answering the questions. The ASQ includes five subscales, each related to a factor central to adult AS. First, 'confidence' (in one's self and others; ASQ-CON) represents secure attachment, and it is unique because the other four scales represent dimensions of insecure attachment. Next, 'need for approval' (ASQ-NFA) and 'preoccupation with relationships' (ASQ-PRE) assess the anxiety (concerning abandonment) dimension of the AS. Finally, the 'discomfort with closeness' (ASQ-DIS) and 'relationships as secondary' (ASQ-RAS) subscales relate to the avoidance (of becoming close to others) dimension of AS. For this five subscales, internal consistency measured using Cronbach's alpha, has been reported to range from 0.76 to 0.84. in a previous study, the ASQ has demonstrated good test-retest stability over a 10-week period with relia-

bility coefficients ranging from 0.67 to 0.78 for the five scales[51]. The authors of this previous study also reported significant associations between the ASQ subscales and relatively distinct attachment groups (secure, avoidant, and anxious/ambivalent), as well as a pattern of correlations with measures concerning family functioning and personality, and a lack of correlation with Lie scores from the Eysenck Personality Questionnaire. Thus, its reliability, construct, criterion validity, and ease of administration, make the ASQ a useful instrument for research purposes. Additionally, it also helpful to note that the five-factor structure of the ASQ was previously replicated in an Italian study[52].

Statistical analysis

Descriptive statistics (means, SDs, frequencies, and percentages) were used to describe the variables in the study's sample. Internal consistency of the BSQ, BDI-II, and BES scales, as well as the five ASQ subscales, was assessed using Cronbach's alpha (a); meanwhile, a t-test for independent samples and Pearson's product-moment correlation were used for univariate analyses, and stepwise multiple linear regression analyses were conducted in order to identify the predictors of the total BSQ score (the dependent variable, -DV). Further, as effect-size measures, the Beta-standardized coefficients (β) and R^2 change were also reported in order to evaluate the degree of association between the significant independent predictor(s) and the DV. Statistical significance was set at $p<0.01$.

RESULTS

Descriptive statistics

Of the 536 bariatric surgery candidates enrolled in this study, 379 were women and 157 were men; for the entire sample, the mean age was 43.88 years (SD=11.28) and the mean BMI was 42.98 kg/m^2 (SD=6.62). By applying DSM-IV-TR, we found that 46% of the sample met the criteria for possessing a lifetime psychiatric disorder (major depressive disorder: 62%; anxiety disorder: 14%; bipolar disorder: 9%; borderline personality disorder: 13%; and psychotic spectrum disorder: 2%). Meanwhile, through the clinical review, the lifetime prevalence of BED in the sample was found to be 33%. Detailed descriptive statistics of the entire sample are reported in Table 1.

The BSQ, BDI-II, and BES scales showed high internal consistency (Cronbach's alpha: 0.96, 0.87, and 0.90, respectively), which conforms with the reliability findings expressed in related literature for these scales[44,45,47,49,50]. However, the ASQ subscales were found to have lower Cronbach's alpha values than those reported in previous studies (confidence: 0.71; discomfort with closeness: 0.71; relationship as secondary: 0.74; need for approval: 0.77; and preoccupation with relationships: 0.74). These results, however, did conform to those obtained in studies with English[52] and Italian[53] samples and, thus, we considered this to be an indicator that the ASQ subscales had good internal consistency.

Of the 447 subjects who completed the ETLE questionnaire, 32% reported experiencing at least one traumatic event between 0 and 15 years of age. Table 2 shows the different types of early traumatic events mentioned by the 141 individuals who reported a history of early trauma.

Table 1. Descriptive statistics of the sample. Data are reported as mean (SD) and frequencies.

	Values
Gender (female/male)	379/157
Age (years)	43.88 (11.28)
Married (no/yes)	254/265
Employed (no/yes)	78/441
BMI (kg/m^2)	42.98 (6.62)
Psychiatric disorders[a] (no/yes)	292/244
Binge Eating Disorder (no/yes)	261/130
Medical comorbidity[b] (no/yes)	146/390
BDI-II	11.22 (8.97)
BSQ	119.93 (34.42)
BES	14.56 (9.96)
ASQ-CON	34.68 (6.05)
ASQ-DIS	34.88 (7.25)
ASQ-RAS	17.60 (6.30)
ASQ-NFA	19.36 (6.84)
ASQ-PRE	26.98 (7.45)
ETLE (no/yes)	306/141
ETLE (dimensional score)	0.68 (1.23)

[a]major depressive disorder: 62%; anxiety disorders: 14%; bipolar disorders: 9%; borderline personality disorders: 13%; psychotic spectrum disorders: 2%.
[b]hypertension: 43%; hyperlipidemia: 24%; hyperglycemia: 25%; nocturnal apnea syndrome: 14%.
Legend: BMI= Body Mass Index; BDI-II= Beck Depression Inventory-II; BSQ= Body Shape Questionnaire; BES= Binge Eating Scale; ASQ-CON= Attachment Style Questionnaire – 'confidence' subscale; ASQ-DIS= 'discomfort with closeness' subscale; ASQ-RAS= 'relationships as secondary' subscale; ASQ-NFA= 'need for approval' subscale; ASQ-PRE= 'preoccupation with relationships' subscale; ETLE= early traumatic life events.

Univariate analyses

The t-test for the independent sample demonstrated that the female bariatric surgery candidates had higher total BSQ scores than the male group, and higher total BSQ scores were also found for participants with a history of psychiatric disorder in comparison to those without a psychiatric disorder. As shown in Table 3, no differences in total BSQ scores were apparent in relation to the grouping variables of 'marital status', 'employment', 'medical comorbidity', and 'ETLE categorical score'; however, Pearson correlation analysis revealed BID (BSQ scores) had significant positive correlations with current depression severity (BDI-II scores), binge-eating behavior (BES scores), insecure AS subscales, and the 'ETLE dimensional score' (Table 4).

Table 2. Prevalence of different type of early trauma life events (ETLE). The questionnaire concerning this aspect of the study was completed by 447 participants, of which 141 reported having a history of early trauma.

Separation from the mother	32 (7%)
Separation from the father	58 (13%)
Separation due to subject's illness	8 (2%)
Physical handicap of the subject	8 (2%)
Physical handicap of sibling	19 (4%)
Parents' marital conflict	56 (13%)
Parental alcohol addiction	22 (5%)
Parental psychiatric illness	37 (8%)
Physical abuse	34 (8%)
Sexual abuse	24 (5%)

Stepwise multiple linear regression analyses

In the first regression model, the variables evaluated as predictors of total BSQ score included age, gender, BMI, history of psychiatric disorder, current depression severity (BDI-II score), binge-eating behavior (BES score), and the five ASQ dimensions (ASQ-CON, ASQ-DIS, ASQ-RAS, ASQ-NFA, ASQ-PRE). The first regression model was applied to all 536 subjects and was found to be significant ($F_{4,531}$=113.031, p<0.0001), explaining 45.6% (adjusted R2=0.456) of the variance in the total BSQ score. Further, four variables were entered into the significant model and were found to be significant independent predictors of BSQ score: participants with higher BSQ scores had higher levels of binge-eating behavior (BES: β=0.409, R2 change=0.338, p<0.0001), higher depression severity (BDI-II: β=0.187, R2 change=0.058, p <0.0001), were women (gender: =-0.210, R2 change=0.035, p<0.0001), and reported higher 'need for approval' - insecure attachment (ASQ-NFA: β=0.154, R2 change=0.025, p<0.0001). Table 5 shows detailed results for the first regression model.

In the second regression model, the dimensional score of ETLE was added to the independent variables used in the first regression model. This model was applied to 447 participants and was also found to be significant ($F_{4,442}$=90.748, p<0.0001), explaining 44.6% (adjusted R2=0.446) of the variance in the total BSQ scores. Additionally, controlling for the ETLE dimensional score, BES score (β=0.393, R2 change=0.323, p<0.0001), BDI-II score (β=0.201, R2 change=0.065, p<0.0001), gender (β=-0.205, R2 change=0.029, p<0.0001), and ASQ-need for approval (β=0.158, R2

Table 3. Results of the t-test for the independent sample of the total Body Shape Questionnaire score.

	mean	DS	t	df	p
Gender Female Male	 126.673 103.662	 32.951 32.470	7.389	534	<0.0001
Married No Yes	 119.831 119.906	 34.589 34.248	-0.025	517	0.980
Employed No Yes	 113.833 121.331	 39.895 33.355	-1.774	517	0.077
Psychiatric disorder No Yes	 113.853 127.209	 33.892 33.682	-4.556	534	<0.0001
Medical comorbidity No Yes	 121.882 119.408	 34.754 34.280	0.737	532	0.461
ETLE No Yes	 118.853 122.525	 34.260 33.262	-1.063	445	0.289

Table 4. Results of the Pearson correlation analysis between the total Body Shape Questionnaire score and other variables.

	r	$p_{2\text{-tailed}}$
Age	0.037	0.396
BMI	-0.056	0.198
BDI-II	0.495	<0.0001
BES	0.591	<0.0001
ASQ-CON	-0.245	<0.0001
ASQ-DIS	0.333	<0.0001
ASQ-RAS	0.160	0.001
ASQ-NFA	0.403	<0.0001
ASQ-PRE	0.352	<0.0001
ETLE dimensional score	0.109	0.022

Table 5. Results of regression analysis for all 536 subjects. The dependent variable was the total Body Shape Questionnaire score and the independent variables are listed below. The regression model is significant ($F_{4,531}$ = 113.031, p<0.0001) and explains 45.6% of variance. BES, BDI-II, gender, and ASQ-NFA were entered into the significant model and are independent predictors of BSQ.

	Beta	t	p
BES	0.409	10.746	<0.0001
Gender	-0.210	-6.479	<0.0001
BDI-II	0.187	4.771	<0.0001
ASQ-NFA	0.154	4.262	<0.0001
ASQ-DIS	0.06	1.644	0.101
ASQ-CON	0.047	1.267	0.206
BMI	-0.039	-1.221	0.223
ASQ-PRE	0.041	1.024	0.306
Psychiatric disorder	0.035	0.984	0.325
Age	0.012	0.375	0.708
ASQ-RAS	0.001	0.04	0.968

Table 6. Results of regression analysis for 447 subjects. The dependent variable was e thtotal Body Shape Questionnaire score. The dimensional score of ETLE was added to the independent variables (listed below). The regression model is significant ($F_{4,442}$=90.748, p<0.0001) and explains the 44.6% of variance. BES, BDI-II, gender, ASQ-NFA were entered into the significant model and are independent predictors of BSQ.

	Beta	t	p
BES	0.393	9.393	<0.0001
BDI-II	0.201	4.609	<0.0001
Gender	-0.205	-5.735	<0.0001
ASQ-NFA	0.158	3.965	<0.0001
ASQ-DIS	0.062	1.528	0.127
Psychiatric disorder	0.047	1.183	0.237
ASQ-PRE	0.046	1.040	0.299
ASQ-CON	0.043	1.056	0.291
ETLE dimensional score	0.031	0.864	0.388
BMI	-0.027	-0.765	0.444
Age	0.011	0.304	0.761
ASQ-RAS	0.010	0.240	0.810

change=0.025, p<0.0001) were entered into the significant model and were confirmed to be, as in the first regression model, independent predictors of BSQ scores. Table 6 shows detailed results for the second regression model.

DISCUSSION

In our sample of patients with extreme obesity, BID was found to be highly prevalent, with over 60% of the patients reporting moderate to marked levels of dissatisfaction. Examining this further, we found that one in three patients had reached a severe degree of dissatisfaction, and only 13.4% did not report negative feelings concerning their body shape. To measure BID, we used the BSQ, which has been widely applied in studies on bariatric surgery and has been reported to be ideal for such a task, mainly as a result of its focus on subjectively rating of distress and other weight-related aspects of body shape[20,54].

According to previous data, suggesting that bariatric surgery candidates with a higher frequency of binge eating and lower psychological functioning showed more severe body dissatisfaction[55], we confirmed that the level of BID was associated with a lifetime history of psychiatric disorder, depressive symptoms, and the binge eating severity. Conversely, age, the presence of medical comorbidities, being married, or unemployed, and BMI were not found to be associated with higher levels of BID.

Although the experience of psychological trauma before the age of 15 was not found to be correlated with BID, body concerns were higher in participants who reported experiencing numerous traumatic events, suggesting a possible cumulative effect[56-58].

Lastly, relatively secure AS was found to be correlated with lower BID. Greater attachment security is characterized by the ability to address interpersonal stressors such as appearance-related messages from peers and society[38,39]. Securely attached individuals can involve themselves in close relationships more easily, and may accept mutual dependency without fearing of being abandoned by or becoming too close to others as a result of their body image. In contrast, all the patterns of insecure AS were found to be associated with higher BID levels.

Although these findings suggest a relationship exists between the variables explored and BID, these correlations cannot prove causality. Thus, we performed regression analyses with the aim of either ascertaining the relevance of each significant variable in regard to BID or speculating a possible cause and effect relationship. Consequently, consistent with previous research on bariatric surgery candidates, our study confirmed that BED, current depressive symptoms, and female gender were significant and independent predictors of BID[59].

Focusing on our finding concerning the significance of female gender, greater levels of BID have been reported in female clinical and non-clinical populations than in male populations[60], and studies have found that BID is more strongly related to women's desire to lose weight than that of men[61]. Thus, in this respect, our findings support literature that reports gender to be a leading determinant of mental health among individuals with extreme obesity[62,63].

Surprisingly, neither the history of early trauma nor BMI were found to be risk factors for BID in the present study.

One possible explanation regarding the finding concerning trauma, may be that we did not account separately for the exact timing of traumatic events, that is, whether they occurred in early childhood, childhood, or adolescence which represent different windows of vulnerability during human development. Additionally, we did not explore other adversities, such as bullying, which other studies have found to be strongly associated with an increased risk of adult obesity[64,65].

Another interesting aspect of our results is that, despite the fact that many other studies have reported a correlation between BMI and BID, we could not replicate this finding[66,67]. One possible reason for this may relate to the hypothesis that as body weight increases, the development of BID undergoes a threshold effect, remaining stable once the threshold is exceeded[68]. Moreover, it should also be noted that our result is consistent with the theory that a discrepancy exists between the attitudinal components of body image, such as discomfort, anxiety, and shame concerning one's own body, and the objective reality of one's appearance. According to this perspective, differences between how one sees one's self and how one would ideally like to be may cause the development of such a discrepancy, this situation may be a result of the internalization of society's standards of attractiveness and developmental influences, coupled with low self-esteem[68].

Considering the above, it is clear that in the present study the severity of BID was affected by factors other than weight.

In particular, a novel finding of our study is the significance of insecure AS, a basic personality characteristic that can influence various life domains, on the development of BID. A critical issue concerning obesity is that negative stereotypes, such as having a lower sense of autonomy and self-efficacy, and being unable to lose weight, can easily af-

fect the behavior of patients. These mistaken beliefs and insecure AS embody mutual psychopathological dimensions.

Moreover, through examining the subscales of the ASQ, we also found that only 'need for approval', which is an aspect of the anxiety dimension of attachment, constitutes a significant risk factor for higher BID independent from eating disorder psychopathology, gender, and depression.

The burden of negative affects, such as anxiety and low self-esteem, which are characteristic of the 'need for approval' dimension, may represent crucial aspects of attachment-related insecurity that can lead to a higher risk of severe BID. In particular, the 'need for approval' dimension reflects feelings of low self-worth, anxiety concerning abandonment, and fear of rejection by others. Further, expectations of being dismissed and self-perceived weakness, which are common among insecurely attached individuals, may also result in the development of negative feelings in regard to one's body image.

Moreover, in individuals with extreme obesity, it is possible that this insecure-anxious AS represents a latent enduring personality characteristic that increases the distress caused as a result of a perceived to experienced powerlessness and vulnerability concerning social messages regarding appearance and attractiveness[69].

This hypothesis has been supported by other studies, including those that have featured non-obese individuals and non-clinical populations, reporting that attachment anxiety elicits a negative environmental influence on BID[70,71].

Overall, the results of this study deepen our understanding of BID among individuals with extreme obesity. BID is a multifaceted psychosocial construct with affective and behavioral consequences, particularly in such individuals. As discussed above, BID is a core component of motivation to undergo and expectations of surgery. Furthermore, it has been suggested that BID can influence surgical outcome in terms of weight loss[72], and treatment satisfaction, as well as cause complications such as long-term vomiting[73], inhibited sexual functioning[74], poor subjective well-being[75], and reduced quality of life[76,77]. Given the rising rates of obesity and bariatric surgery, increasing our knowledge of body image disturbances is compelling, as new insights can lead to potential implications for the development of a multidisciplinary approach to obesity treatment.

An example of such new approach would be body image therapy. The marked distress caused by BID may serve as a drive for treatment-seeking. However, in case where such surgical treatment is not effective in regard to improving psychological well-being, body image therapy may constitute a potential starting point for therapeutically assisting these patients[72]. This form of treatment is becoming increasingly popular, with a marked increase shown in recent years in the number of therapeutic approaches applied to BID, such as mindfulness, group-based cognitive-behavioral, and dance and movement therapy.

Further, considering therapeutic novel measures, enhancing the doctor-patient relationship and therapeutic alliance represents a prerequisite for and the main advantage of therapeutic efficacy[78]. The benefits of the therapeutic alliance are independent from those of the different kinds of psychotherapy and may have a key role in improving BID.

Another implication suggested by the results of this study is that a distressing preoccupation with body weight and shape might reflect the existence of various psychological factors, such as insecure AS, and bariatric surgery cannot address such issues.

Given that certain therapeutic approaches can be based on AS theory[79], for bariatric surgery candidates with high levels of BID, a strategic target for psychotherapies could be insecure AS; for example, it has previously been reported that patients with anxious AS benefit when their therapist helps them to understand and differentiate their emotions[80].

In particular, therapists might attend to patients' attachment insecurity by managing their need to be accepted and feelings of low self-worth.

Furthermore, psychological interventions might increase patients' insight into bariatric surgery, highlighting the recognition of the negative effects of BID.

While our findings support the theory that there is a great deal of psychological complexity and heterogeneity in terms of BID in bariatric surgery candidates, they also raise questions concerning the characteristics of BID once weight-loss is achieved[81,82]. Existing literature indicates that, after bariatric surgery, the majority of patients experience improvements in their body image. These findings have been reported regardless of the different aspects of body image disturbance explored and psychometric instruments used[83]. However, the impact of bariatric surgery on body image is not reported as uniformly positive. After surgery, BID has been found to be still higher in this population than in the general population[66]. This finding could be partly due to residual body image concerns following weight loss, which have been termed 'phantom fat'[84]. Another contributing factor might be that after weight loss, some bariatric surgery patients still have a BMI higher than normal BMI[85,86]. Moreover, in most individuals the excess skin resulting from dramatic weight loss can influence BID and play a key role in individuals' decision to undergo body-contouring surgery[87].

Considering this, it would be stimulating for the study field to conduct prospective studies into the extent of change in BID after surgery and whether it is maintained after the honeymoon period, as well as into the interplay between psychiatric comorbidities, trauma history, and AS in relation to BID changes.

Limitations

We acknowledge that there are several limitations to this study. First, the study used a cross-sectional design; however, to determine the direction of the relations between the explored variables, a longitudinal study must be conducted. Secondly, the sample consisted of patients seeking surgery and, therefore, they had reason to conceal or minimize their psychiatric symptoms, as this could help them obtain approval for the procedure. Finally, we addressed trauma history using a retrospective measure, which may be subject to distorted recall on the part of the participants.

CONCLUSIONS

In conclusion, this study provided a new insight into methods of improving the mental health assessment of bariatric surgery candidates. Researchers and clinicians should be

willing to take into consideration potential risk factors when assessing BID in patients with extreme obesity. For some individuals living with obesity, developmental and relational processes such as insecure AS may play a substantial role in the development of BID. Identifying critical features of BID to be targeted in pre- and post-operative behavioral interventions may open new possibilities for providing effective support for individuals over the course of their therapy.

Conflict of interests: the authors declare that they have no conflict of interest.

Ethical approval: all procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.
This study is a part of a larger study that was approved by the Institutional Ethic Review Committee of the University of Rome Tor Vergata and the subjects participated after providing informed, voluntary, written consent. Participants were informed that taking part in the study would not influence their suitability for surgery, and that they could withdraw from the study at any point, without detriment of their treatment.

Informed consent: informed consent was obtained from all individual participants included in the study.

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