

## Research Article

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# Binge eating disorder and related features in bariatric surgery candidates

<https://doi.org/10.1515/med-2019-0043>

received March 11, 2019; accepted April 24, 2019

**Abstract:** Objective: The present study sought to: 1) assess the prevalence of Binge Eating Disorder (BED) and abnormal eating behaviors in bariatric surgery candidates; 2) compare patients with and without BED as regards to eating disturbances, psychological characteristics, and health status; 3) individuate which factors were significantly related to binge eating severity. Methods: Sixty-three preoperative patients (17 males and 46 females) were screened by means of an ad hoc socio-demographic schedule, the Rosenberg Self-Esteem Scale, the Eating Disorders Inventory-3, the Binge Eating Scale, and the General Health Questionnaire-28. BED diagnosis was performed through a clinical interview. Results: BED and disordered eating, such as episodes of binge eating, sense of lack of control over eating and inappropriate compensatory behaviors, appear common in patients undergoing weight loss surgery. Significant differences between BED and non-BED subjects in relation to eating disturbances and psychological characteristics emerged. Multiple regression analysis revealed that only emotional dysregulation significantly predicted binge eating vulnerability. Conclusion: The recognition of factors involved in the development and maintenance of disordered eating in bariatric patients may support the choice of particular therapeutic strategies and improve bariatric surgery outcome. Further studies on this issue would be useful.

**Keywords:** Binge Eating Disorder; Obesity; Psychopathology; Emotional Dysregulation; Bariatric surgery candidates

## 1 Introduction

Binge Eating Disorder (BED) is a highly prevalent psychological condition in obese bariatric surgery candidates and is associated with various forms of psychopathology [1], including symptoms of depression and anxiety disorders [2]. The literature suggests also that eating problems, such as binge eating, persist after surgery care and could affect weight loss and its maintenance [3]. However, the findings are not consistent across studies and a varied of methodological issues has been highlighted [4].

Overall, BED subjects have been found to report more disturbances in eating attitudes [5, 6], lower self-esteem and higher psychiatric comorbidity, as well as substance abuse disorders [6], when compared to obese patients undergoing bariatric surgery without BED. Riener and colleagues [7] found that patients with BED reported higher scores of disinhibited eating, unsatisfactory relationships and an earlier onset of obesity, usually during childhood, than subjects without this condition. There were no differences as regards to depression and mental stress between BED and non-BED groups. In this study, approximately 30% of participants were scheduled for surgical treatment. In another research [8], BED individuals, compared to obese control, showed higher scores on MMPI-2-RF internalizing and externalizing scales. Still, 13% of obese adolescent undergoing bariatric surgery met diagnostic criteria for Eating Disorder (ED) diagnoses and 27% reported a sense of loss of control (LOC) over eating. LOC eating was associated with impairments in weight-related quality of life and on psychosocial factors, such as depressive symptomatology [9].

Research on body image disturbance in pre-bariatric surgery patients is limited. Among extremely obese

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seeking gastric bypass surgery, women reported significantly higher levels of body dissatisfaction than men. In predicting body dissatisfaction, binge eating and a sense of inadequacy accounted for a significant amount of the variance. No significant associations were reported between Body Mass Index (BMI), ethnicity, the age of onset of overweight, childhood trauma and body dissatisfaction for both genders [10].

In terms of the BED occurrence among candidates for weight loss surgery, eating disturbances seem to be not significantly associated with demographic variables, such as sex, age, BMI [2, 6] or less education [2]. While, depression and low self-esteem have been suggested to account for unique variance in binge eating in both Caucasian and African American women [11]. Overall, research has supported the hypothesis that BED patients are inclined to experience difficulties with emotion regulation [12] and these difficulties account for unique variance in emotional overeating and general eating pathology [13]. Negative mood predicts binge eating onset and maintaining in BED [14] and bulimia nervosa [15], although obese adults with BED seem to reveal less antecedent painful emotions than the bulimic group [16]. Similarly, emotion regulation difficulties were found to mediate the relationship between attachment insecurity and emotional eating [17] and between weight bias internalization and dysfunctional eating behaviors [18] in bariatric surgery candidates.

## 1.1 The current study

In sum, dysfunctional eating behaviors are common in preoperative patients and may affect surgical outcome. Given this, the first purpose of the current study was to assess the prevalence of binge eating disorder and abnormal eating behaviors in bariatric surgery candidates and compare patients with and without BED as regards to eating disturbances, psychological characteristics, and health status. Furthermore, we sought to individuate which factors were significantly related to binge eating severity. The reason for examining these factors and relationships is to improve bariatric surgery outcomes.

## 2 Method

### 2.1 Participants and procedures

Participants included 63 obese patients (17 males and 46 females) with a mean age of 35.17 years (SD=10.28), who

were seeking surgical treatment at two centers for bariatric surgery in southern Italy from November 2017 to October 2018. They were informed of the nature of the study and only two individuals refused to take part to the study. All of them agreed to participate signed an informed consent form and completed the questionnaire within 3 days of their scheduled surgery date. All measures were administered in Italian and presented in randomized order for each participant. The diagnosis of BED was performed through a semi-structured interview according to the diagnostic criteria of the DSM V [19].

Individuals were ineligible if they had medical, cognitive or psychiatric impairment established through a preoperative psychological screening at admission.

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. The study was approved by the Ethic Board of the Department of Psychology and by the Ethic Committee of the School of Medicine, University of Campania “Luigi Vanvitelli”.

### 2.2 Measures

#### 2.2.1 Demographic data

Participants were asked to fill in a form with information about age, gender, race/ethnicity, relationship status, education level, and age of onset of their obesity. Additional questions concerned about abuse/violence histories, substance use, and self-injurious behaviors.

#### 2.2.2 Rosenberg Self Esteem Scale (RSES)

The RSES [20] is a 10-item self-report measure that assesses global self-esteem. Scores range from 0 to 30, with lower scores indicating lower self-esteem. Sample Cronbach's alpha is .74.

#### 2.2.3 Eating Disorders Inventory-3 (EDI-3)

The EDI-3 [21] is a 91-item inventory exploring eating-related psychopathology. Three scales are specific for eating disorders (Drive for Thinness, Body Dissatisfaction, and Bulimia) and nine evaluate psychological aspects relevant for eating disorders (Low Self-esteem, Personal Alienation, Interpersonal Insecurity, Interpersonal Alienation,

Interoceptive Deficits, Emotional Dysregulation, Perfectionism, Asceticism, and Maturity Fear). Sample Cronbach's alpha ranges from .62 to .82.

#### 2.2.4 Binge Eating Scale (BES)

The BES [22] is a 16-item self-report measure to assess the behavioral as well as the cognitive and emotional symptoms associated with binge eating. The score range is from 0 to 46 with higher scores indicating more severe binge eating problems. Sample Cronbach's alpha is .83.

#### 2.2.5 Binge Eating Disorder

The diagnosis of BED was performed through a semi-structured interview according to the diagnostic criteria of the DSM V [19] by a clinical psychologist with experience on eating disorders.

#### 2.2.6 The General Health Questionnaire – 28 (GHQ-28)

The GHQ-28 [23] is a 28-item measure of somatic symptoms, anxiety, social dysfunction, and depression. Sample Cronbach's alpha ranges from .40 to .73.

#### 2.2.7 Body Mass Index (BMI)

Each individual was weighed and measured in height.

### 2.3 Statistical analysis

Statistical analyses were carried out using SPSS 20 version. First, the Chi-square ( $\chi^2$ ) test was conducted for categorical variables and the Mann-Whitney U test was conducted for comparisons between groups. Next, Pearson correlation coefficients were investigated to inspect associations among all of the study variables, and multiple regression was used to identify factors that were independently related to binge eating. Value of p less than or equal to .01 was considered statistically significant since the examined group was of small size.

## 3 Results

### 3.1 Preliminary analyses

Preliminary univariate distributions of observed scores were examined for normality and multicollinearity. Values of Skewness and Kurtosis indicated that there wasn't a violation of the normal distribution. Furthermore, there was no evidence of multicollinearity. All analyses were based upon available data.

### 3.2 Sample characteristics

The preliminary sample consisted of 68 bariatric surgery candidates. Of these, 5 individuals were excluded because returned incomplete questionnaires, so the final sample included 63 Caucasian patients, of whom 73% (N=46) women, with a mean age of 35.17 years (SD=10.28) and a mean BMI of 40.50 (SD=5.75). Thirty-seven (58.7%) were morbidly obese (defined as BMI>40 Kg/m<sup>2</sup>). Most patients (96.8%) held a diploma of higher education or less. About 82.5% of patients (N=52) were accepted for gastric bypass, 15.9% (N=10) for a laparoscopic sleeve gastrectomy and an additional patient for a laparoscopic gastric banding.

Demographic characteristics and personal background of the patients are shown in Table 1.

### 3.3 Prevalence of BED and abnormal eating behaviors

Overall, thirteen (21.3%) of the patients met DSM V criteria for BED.

Thirty (47.6%) participants reported regularly binge eating, 54.8% (N=17) feel out of control when eating, 65.4% (N=17) ate rapidly, over half (N=14) ate until uncomfortable, 61.5% (N=16) ate when not hungry, 50% (N=12) ate alone because embarrassed and the vast majority (89.3%, N=25) felt disgusted and distress after overeating. Over a third (N=12) of participants declared to adopt inappropriate compensatory behavior, such as purging, fasting or excessive exercise.

### 3.4 Group comparisons of study variables

As shown in tables 2, there were no significant differences between BED and non-BED (NBED) groups as regards to respective demographic variables, such as sex (p=.664),

**Table 1:** Sociodemographic characteristics in obese adult seeking bariatric surgery (N=63)

	N (%)
N	63
Gender	
Male	17 (27%)
Female	46 (73%)
Age, mean years (standard deviation)	35.17 (10.28)
Body Mass Index, mean (standard deviation)	40.50 (5.75)
Education	
High School or less	61 (96.8%)
Marital status	
Single	14 (22.2%)
Engaged	12 (19%)
Married	33 (52.4%)
Divorced	3 (4.8%)
Widowed	1 (1.6%)
Age of onset obesity, mean years (standard deviation)	20.87 (10.98)
Childhood trauma	5 (7.9%)
Substance Use	12 (19.7%)
Self-injury	15 (23.8%)
Bariatric Procedure	
Gastric bypass	52 (82.5%)
Laparoscopic sleeve gastrectomy	10 (15.9%)
Laparoscopic gastric banding	1 (1.6%)

age ( $p=.341$ ), BMI ( $p=.218$ ) and the onset of obesity ( $p=.681$ ). Compared to those without BED, individuals with BED reported lower self-esteem ( $p=.010$ ), scored significantly higher on Binge Eating Scale ( $p=.000$ ) and on all EDI-3 scale ( $p<.010$ ), except for Body Dissatisfaction ( $p=.378$ ), Interpersonal Alienation ( $p=.117$ ) and Perfectionism ( $p=.022$ ). Non-BED and BED did not differ significantly in GHQ-28 scales ( $p>.01$ ). Differences were found regarding substance use ( $p=.008$ ) and self-injury behaviors ( $p=.006$ ).

### 3.5 Correlations

Prior to conducting regression analyses, bivariate correlations were run to ensure there were significant associations among the variables of interest (demographic variables, eating disturbances, psychological characteristics, and health status). Correlation analysis showed significant relationships between BES score, RSES self-esteem ( $p=.002$ ), GHQ-28 anxiety ( $p=.003$ ), EDI-3 Drive for Thinness ( $p=.010$ ), EDI-3 Bulimia ( $p=.000$ ), EDI-3 Interoceptive Deficit ( $p=.002$ ), EDI-3 Emotional Dysregulation ( $p=.000$ ) and EDI-3 Asceticism ( $p=.000$ ) (Table 3). These variables were selected to be included in the regression analyses except for Bulimia. This scale assesses the tendency to think about and to engage in binge-eating [21]. Thus, the use to predict BES score seemed duplicative.

Binge eating was not significantly associated with demographic variables of sex ( $r=.016$ ,  $p=.899$ ), age ( $r=.078$ ,  $p=.541$ ) and BMI ( $r=-.069$ ,  $p=.589$ ). Accordingly, these variables were not used as covariates in the analyses.

### 3.6 Predictors of Binge Eating Symptoms

Specifically, the contribution of self-esteem, anxiety, drive for thinness, interoceptive deficits, emotional dysregulation, and asceticism was assessed through a linear regression analysis performed on BES score. For regression equations using six or more predictors, an absolute minimum of 10 participants per predictor variable is appropriate [24]. Multiple regression analyses revealed that only EDI-3 Emotional Dysregulation scale ( $B=.469$ ,  $p=.001$ ), significantly predicted binge eating (Table 4). The total variability of the variable explained by the model was 37% (Adjusted  $R^2=.370$ ,  $F=6.300$ ,  $p=.000$ ).

## 4 Discussion

The findings of this study show how BED and disordered eating, such as episodes of binge eating, sense of lack of control over eating and inappropriate compensatory behaviors, appear common in patients undergoing for weight loss surgery and are mainly associated with low self-esteem, emotional dysfunction, impulse behaviors, including substance use and self-injury behaviors, self-destructiveness, distress and reticence in social situations.

Overall, the prevalence of BED in surgery candidates ranges from 2% to 49% [25], depending on the method of assessment and the criteria employed. As such, our finding

**Table 2:** Characteristics for binge and non binge-eating disorder group on study variables

	Non-Binge-eating Disorders N=46	Binge-eating Disorders N=13	Mann-Whitney U	p
Gender			0.189*	.664
Male	14 (82.4%)	3 (17.6%)		
Female	34 (77.3%)	10 (22.7%)		
Body Mass Index	41.03	38.82	242.000	.218
Age (years)	34.17	37.38	366.000	.341
Age of onset obesity	20.10	20.92	329.500	.681
Rosenberg Self Esteem Scale	20.60	17.15	165.500	.010
Binge Eating Scale	12.35	24.77	574.000	.000
Eating Disorders Inventory - 3				
Drive for Thinness	14.47	20.15	442.500	.010
Bulimia	6.48	16.62	523.500	.000
Body Dissatisfaction	26.90	28.62	362.000	.378
Low Self-Esteem	5.08	10.46	502.000	.001
Personal Alienation	4.94	9.17	436.500	.003
Interpersonal Insecurity	7.88	10.31	461.000	.008
Interpersonal Alienation	8.09	10.23	384.500	.117
Interoceptive Deficits	8.63	16.54	514.500	.000
Emotional Dysregulation	4.85	12.92	526.500	.000
Perfectionism	7.28	11.15	424.000	.022
Asceticism	7.13	12.69	507.000	.001
Maturity Fears	12.83	18.23	478.500	.003
General Health Questionnaire-28				
Somatic Symptom	1.62	1.85	348.000	.406
Anxiety	1.12	2.62	429.500	.029
Social Disfunction	6.36	5.77	185.500	.015
Depression	0.17	0.38	341.000	.427
Substance Use	6 (12.8%)	6 (46.2%)	7.095*	.008
Self-Injury	8 (16.7%)	7 (53.8%)	7.626*	.006

Note: \* Chi-square ( $\chi^2$ ) test

of 21% is congruent with those reported by the literature, although it was much lower than the 48% assessed fol-

lowing the criteria of the DSM V by Vinai and colleagues [1] among Italian obese patients seeking bariatric surgery.

**Table 3:** Correlations, means (standard deviations), skewness, and kurtosis of the study variables for the complete sample (N=63)

	1	2	3	4	5	6	7	8
1. BES Total Score	–							
2. RSES Self-esteem	-.382**	–						
3. GHQ-28 Anxiety	.365**	-.354**	–					
4. EDI3 Drive for thinness	.329**	-.288	.229	–				
5. EDI3 Bulimia	.637***	-.241	.349**	.441***	–			
6. EDI3 Interoceptive Deficits	.386**	-.463***	.164	.490***	.588***	–		
7. EDI3 Emotional Dysregulation	.564***	-.417***	.205	.253	.650***	.609***	–	
8. EDI3 Asceticism	.459***	-.370***	.210	.450***	.587***	.636***	.697***	–
Mean (standard deviation)	15.19 (8.32)	19.83 (5.01)	1.49 (1.76)	15.70 (6.70)	8.65 (7.50)	10.16 (7.51)	6.48 (6.10)	8.34 (4.58)
Skewness	.511	-.406	1.116	-.373	.953	.793	.987	.656
Kurtosis	.059	.253	.593	-.782	.111	-.113	.334	.890

Note: \*\*\*  $p < .000$ ; \*\*  $p < .01$

Abbreviations: BES=Binge Eating Scale; RSES=Rosenberg Self-Esteem Scale; GHQ=General Health Questionnaire; EDI=Eating Disorder Inventory

**Table 4:** Regression analysis predicting binge eating symptoms

Model	B	SE B	B	t	Tolerance	VIF
(Constant)	9.494	5.530		1.717		
RSES Self-esteem	-.143	.206	-.087	-.693	.692	1.446
GHQ-28 Anxiety	.884	.540	.185	1.637	.850	1.176
EDI3 Drive for thinness	.194	.158	.156	1.225	.676	1.480
EDI3 Interoceptive Deficits	-.075	.170	-.069	-.444	.450	2.223
EDI3 Emotional Dysregulation	.630	.214	.469	2.945*	.429	2.331
EDI3 Asceticism	.082	.295	.046	.278	.405	2.472

F=6.300,  $p < .000$ ; Adjusted  $R^2 = .370$

Note: \*  $p < .001$

Abbreviations: RSES=Rosenberg Self-Esteem Scale; GHQ=General Health Questionnaire; EDI=Eating Disorder Inventory; VIF=Variance Inflation Factor

In line with other studies, gender, age, and BMI were not different between the groups [2, 6]. While, when compared to obese patients without BED, BED subjects reported lower self-esteem and greater preoccupation with weight, the tendency to think about and to engage

in episodes of uncontrollable overeating and more difficulties with emotion regulation, including being able to clearly identify emotional states. These latter results confirm the findings of Vinai and colleagues [1], although in the current research a difference in the measure of body

dissatisfaction was not found. One reason for this may be that severely obese patients have an already higher level of body dissatisfaction, which is not further aggravated by the presence of BED. This is in agreement with evidence that the mean score on this EDI-3 scale for both two groups was over 27, a number which is very similar to that seen among eating disordered individuals [21]. However, research on body dissatisfaction in obese bariatric surgery candidates has received limited attention in the literature and future empirical studies should investigate this suggestion.

Additionally, our findings have shown that pre-bariatric surgery patients with BED report more distress and reticence in social situations. This datum probably reflects the decreased social and interpersonal functioning indicated by Hsu and colleague [5] and partially supports the evidence that patients with BED experience more stressful relationships [7].

Unexpectedly, BED patients scored significantly higher on the EDI-3 asceticism scale. This finding is surprising and it is not yet described by other investigators. Asceticism implies the pursuit of spiritual ideals such as self-denial, control of bodily sensations, and sacrifice [21]. In addition to the rejection for weakness, overall it refers to the tendency to consider pleasure as shameful, and it involves not only fasting but also other practices of renunciation, including sexual abstinence and various forms of bodily flagellation. From this viewpoint, self-restrictions could only be part of a more general theme of renouncing physical gratifications to the detriment of the body. Feelings of anger and a self-destructive impulse are, indeed, considered some of the features strongly implicated in ascetic behaviors [26]. Consistently with the issue, self-injurious behaviors frequently are reported in EDs [27], and angry feelings and excessive control over anger were found characterized anorectic patients scoring high on EDI-2 asceticism scale [28]. In this study, the asceticism resulted also strongly associated with ineffectiveness, interoceptive awareness and impulsiveness scales of EDI-2. However, the authors did not investigate if and how these variables interact with others in explaining ED onset. Similarly, of the EDI-2 scales, only interoceptive awareness and asceticism scales were found to differentiate a group of bulimic patients from a general psychiatric control group [29]. There is not literature encouraging a theoretical rationale for the relationship between asceticism and BED, and it may even seem contradictory. In our opinion, the link could be found in a self-destructive impulse underlying and in the pursuit of mortification of the body through self-denial and suffering. In this sense, emotional dysregulation is a key psychopathological

element of binge eating disturbances, relates to “*mood instability, impulsivity, anger, and self-destructiveness*” [21]. Accordingly, the study confirms the association between substance use and BED. Further studies on this construct would be very useful.

In contrast with some studies [2], BED than non-BED patients did not differ in terms of levels of anxiety and depressive symptoms. One reason for this may be caused by small sample size or may be due to an inadequate assessment. Furthermore, results could have been confused by exclusionary criteria for which individuals were ineligible if they had severe psychiatric conditions. However, other studies did not support the relationship between binge eating disorder and health status [5].

Finally, another important contribution of this research was individuated which factors were significantly related to binge eating. In line with findings from other researchers [30], our results revealed that difficulty in impulse regulation (not specifically in relation to eating behavior) is the strongest predictor of binge eating. This is consistent with the idea that difficulty in impulse control regarding emotional states is one of the prominent features strongly implicated in BED occurrence as well as in the maintenance of the disorder, and it might represent the root of the pathology. However, this study was based on small sample sizes and thus further investigation in this area should deepen this datum.

Within eating disorder literature, self-esteem [31] and interoceptive awareness [32, 33] are considered very important vulnerability factors in the development of these diseases. In the present study, they hadn't a direct effect on binge eating. There are several possible explanations for such results. In our opinion, one potential mean by which these variables are related to binge eating vulnerability is through their effects on impulse regulation difficulties. In this regard, identification of internal emotional states has been shown to be an essential prerequisite for emotion regulation [34, 35]. Future empirical studies should investigate this suggestion.

## 4.1 Conclusion

The results of the present study have noteworthy implications for obesity treatment. In our opinion, the recognition of potential factors involved in the development and maintenance of disordered eating in bariatric patients may support the choice of particular therapeutic strategies and improve bariatric surgery outcome. Specifically, emotion regulation difficulties may be to address both pre- and post-surgery in order to reduce binge eating

and to improve health outcomes [36]. Furthermore, this study presents a unique contribution to the literature by illustrating the pursuit of mortifying own body through self-denial and suffering of patients seeking bariatric surgery. This issue should be taken into account when assessing bariatric surgery candidates and further studies on the role of asceticism in emotion regulation difficulties and BED vulnerability would be useful.

## 5 Limitation

Several limitations necessitate being considered when interpreting the findings of the present study. First of all, these results need to be further tested on a larger sample and must include a control group. The sample is very heterogeneous: adolescents, young adults, and adults have different contexts and life goals. Moreover, the cross-sectional design precludes a final conclusion with regard to directionality. Longitudinal studies are necessary to establish the direction of the relationship identified. These limitations should be addressed in further studies.

**Acknowledgments:** Appreciation is expressed to Dr. Giuseppina Antonia Silvestro Crispo and Dr. Doriana Elia for their help with data collection.

**Contributors:** Cella and Cotrufo designed the study and wrote the protocol. All authors conducted literature searches and provided summaries of previous research studies. Cella, Fei, D'Amico, Giardiello, and Allaria assisted with data collection. Cella conducted the statistical analysis and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

**Funding:** No funding was received.

**Conflict of Interest:** The authors declare that they have no conflicts of interest.

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