“Gender Differences in the Psychopathology of Obesity: How Relevant is the Role of Binge Eating Behaviors?”

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Research Article

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Title

“Gender differences in the psychopathology of obesity: how relevant is the role of binge eating behaviors?”

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Abstract

Purpose: the aim of the study is the identification of the main psychopathological correlates of obese candidates for bariatric surgery, with particular attention to the relation between them and gender.

Methods: 273 candidates for bariatric surgery for obesity underwent a psychiatric evaluation with compilation of psychometric scales: Revised Symptom Checklist 90-R (SCL-90R), Eating Disorder Examination Questionnaire (EDE-Q), Binge Eating Scale (BES), Body Uneasiness Test (BUT), Obesity Related Well-Being (O.R. WELL). The sample has been divided on the basis of Gender and Binge Eating Disorder (BED) severity; comparisons between the groups is performed with an analysis of variance model (ANOVA) or a Pearson’s Chi-squared test. Further we also divided our sample in a Severe Binge Eating group (scores > 27), a Mild to Moderate group (18 < scores < 26) and a low/no symptoms group (scores < 17).

Results: male and female subjects showed a difference in BES, with higher scores reported among women (17.50 ± 9.59) than men (14.08 ± 8.64). Women also showed higher scores across most of the SCL-90R domains and worse outcomes in terms of quality of life. Both women and men of Severe Binge Eating group reported higher scores of the SCL-90R.

Conclusion: symptoms of BED, along with the Body Image Dissatisfaction (BID) are among the most important to investigate in candidates for bariatric surgery, to improve the surgery outcome.

Level of evidence: III – evidence from cohort analytic study.

Keywords: obesity, bariatric surgery, gender, psychopathology, binge eating disorder, body image dissatisfaction.

Introduction

Obesity is one of the biggest global health challenges of the coming decades, given the progressive increase in its prevalence and the important consequences on the psycho-physical health.

Obesity is generally defined based on the Body Mass Index (BMI), which corresponds to the ratio of body weight to height (kg/m^2) [1]; an adult subject is considered overweight if the BMI is between 25-29.9 kg/m^2 and obese if the BMI $> 30 \text{ kg/m}^2$. Obesity may be distinguished into 3 classes: class I obesity if BMI is between 30-34.9 kg/m^2 , class II obesity if BMI is between 35-39.9 kg/m^2 and class III obesity (severe) if BMI is $> 40 \text{ kg/m}^2$ or $> 35 \text{ kg/m}^2$ in the presence of weight-related comorbidities [2].

From an epidemiological point of view, obesity is a global pandemic, with a presence in the world of about 2.1 billion overweight or obese individuals. It has been estimated that globally 37% of men and 38% of women have a BMI $> 25 \text{ kg/m}^2$ [3].

Obesity and overweight are the fifth leading cause of death globally. The reduction in life expectancy affects both sexes equally but it is significantly higher in subjects with severe obesity [4–6].

Obesity has important repercussions on the mental health and the psychosocial sphere of affected subjects, linked to the significant impairment of the quality of life and the associated low self-esteem and distortion of body image. Obese subjects are typically discriminated, have a lower level of education and, in the specific case of women, lower economic income and less likelihood of marriage [7–9]. As for psychiatric disorders, Duarte-Guerra et al. carried out interviews with 393 obese subjects referring to bariatric surgery services. Psychiatric disorders were found in 57.8% of the enrolled subjects, with anxiety and mood disorders that were the most common [10]. In the specific case of depressive disorder, the correlation with obesity seems to go both way: in people with a diagnosis of depressive disorder and/or the use of antidepressant drugs the risk of developing obesity is higher than in general population and in adult subjects suffering from depression, especially if they are females, it is very likely to find a condition of overweight and obesity [7, 11]. Although this is not a contraindication to surgery, these patients have a high chance of post-surgical depression and little chance of losing weight to the expected extent [12]. In this sense recent evidences suggest the importance of the screening for depression and other psychiatric disorders before surgery [13, 14] because of the fact that prevalence of psychopathological conditions among candidates for bariatric surgery is greater than in general population [15].

BED is defined by the presence of frequent episodes of uncontrolled excessive food intake in the absence of compensation conduct and it has a significant correlation with overweight and obesity conditions [16, 17]. Patients with BED develop obesity with a frequency of 3 to 6 times greater than those without and 30% of BED patients were obese children; moreover, the prevalence of BED varies between 3.3 and 5.5% among

obese subjects, and familiarity for BED represents a risk factor for the development of obesity in adulthood [16–18]. The disorder most commonly affects young adults between 15 and 27 years [16] and the female sex. The fact that the disorder has an uneven distribution between the sexes is mainly due to hormonal factors (estrogen in women) [19].

From an etiopathogenetic point of view, BED is the result of a complex interaction between individual biological factors and sociocultural environmental factors. In fact, BED is highly heritable with an important link with dopaminergic and opioid system genes [17, 20]. Psychological factors typically associated with BED include low self-esteem, marked dissatisfaction with one's body image, perfectionism, emotional dysregulation, while diet and nutritional habits may be considered the most important behavioral risk factors [17]. From a social and cultural standpoint, the most important factors involved in BED development seem to be the idealization of the concept of beauty and thinness, with women that seem to be more susceptible to this idealization [17, 19] .

Bariatric surgery represents the therapeutic option for the treatment of obesity conditions that are not solvable through non-surgical interventions. According to the criteria established by the National Institutes of Health, surgery should be considered in patients with BMI > 40 kg/m² and those with BMI between 35 and 40 and associated comorbidities [21]. The only neurological and psychiatric conditions that are considered absolute contraindications to the surgical intervention are confirmed dementias, severe oligophrenia (IQ<50) and psychosis, as well as Substance Use Disorders and Bipolar Disorder when not stabilized; Mood and/or Anxiety Disorders, Eating Disorders and Personality Disorders are considered relative contraindications, likely to be reassessed after appropriate therapy [22].

The aim of our study was to highlight the psychopathological aspects of obese candidates for bariatric surgery, with particular attention to the correlation with the gender, in the perspective of a clustering that can help predict post-operative outcomes.

Materials and Methods

The current study was conducted at the Bariatric Surgery Department of SS. Annunziata Hospital in Chieti (Italy). 273 subjects over the age of 18 have been evaluated by a psychiatrist at the Psychiatric Outpatient Clinic of the same Hospital.

The evaluation consisted of two phases:

- Phase 1, Pre-surgery: all participants received a detailed explanation of the design of the study and were asked to provide informed consent according to the Helsinki Declaration (1997). The participants underwent a psychiatric examination, a psychometric evaluation and an evaluation of the suitability for surgical treatment.
- Phase 2, Post-surgery: Patients underwent three follow-up visits 6 months (T1), 12 months (T2), and 24 months (T3) after surgery. A psychiatric and psychometric evaluation have been performed at each timepoint.

At the time of this analysis, the recruitment has been suspended because of COVID-19 pandemic. Moreover, most of the non-urgent surgeries have been delayed and many of the patients enrolled at baseline has not been able to continue the procedures. For these reasons, the analysis presented in the current study will focus only on the baseline measures we collected from July 2015 to January 2020.

Psychometric measures. The following baseline measures have been collected in order to provide a complete psychological and psychiatric evaluation of the enrolled subjects:

- Revised Symptom Checklist 90-R (SCL-90-R) [23, 24]: a self-administered questionnaire, aimed at investigating the severity of the psychiatric symptoms experienced by the patient during the week before administration.
- Eating Disorder Examination Questionnaire (EDE-Q) [25]: a self-administered questionnaire, which aims to evaluate behaviors related to eating disorders present in the last 4 weeks.
- The Binge Eating Scale (BES) [26]: a self-administered test for the evaluation of uncontrolled eating disorder in obese subjects.
- Body Uneasiness Test (BUT) [27, 28]: a psychometric self-administration test for the evaluation of body image disorders.
- Obesity Related Well-Being (O.R.WELL) [29]: a self-administered test aimed at investigating the quality of life related to obesity.

Statistical Analysis. Demographic data and baseline evaluations are presented as continuous variables with their mean and standard deviation and discrete data are summarized by a count and percentage. The main sample has been further divided on the basis of Gender (Male, Female) and BED severity (Absent, Mild to Moderate, Severe): comparisons between the groups is performed with ANOVA or Pearson's Chi-squared test, for continuous or discrete variable respectively. Potential covariates were evaluated for inclusion on a model-by-model basis such that covariates that significantly predicted the outcome measures were retained in a Linear Mixed Model. Covariates that were evaluated included Gender, Age, BMI and severity of BED. The final linear model presented here included both Gender and BED severity. All statistical tests were two sided and tested at a 5% level of significance.

Results

Participant Characteristics. A total of 273 subjects signed an informed consent and completed the psychometric evaluation and were enrolled in the bariatric surgery protocol and included in the study. Demographic characteristics are listed in Table 1. As reported above, the recruitment was completely unbiased and open to patients eligible for bariatric surgery, although the sample was gender-unbalanced with only 73 men and 200 women recruited and successfully included.

Gender-related differences. Given the difference in sample size and the potential role of Gender bias in Psychological Distress associated with obesity and overweight [30, 31], in order to minimize the possible gender bias in our analysis, we looked into the two gender groups separately (Table 2). There were no

differences between the two groups in terms of age and years of education, although they differed in terms of occupational status (91.8% men employed vs 46.5% of women, $p < 0.001$) and BMI (M: 44.13 ± 7.36 , F: 40.95 ± 6.77 , $p < 0.001$). In terms of Eating Behavior, male and female subjects showed a difference in scores related to Binge Eating Disorder, with higher scores in BES reported among women (17.50 ± 9.59) than men (14.08 ± 8.64). At the same time, when we investigated Binge Eating Disorder severity classes [32], we found only a small difference in severity classes representation between the two groups (Table 1). As expected, women showed higher scores across all the domains evaluated by the Body Uneasiness Test and most of Eating Disorder Evaluation subscales, although no differences have been found in terms of Restrictions (Table 2). Regarding Psychopathological features, both groups reported scores above the general population cutoffs (see below, SCL90R and Psychological Distress). Women showed higher scores across most of the SCL90R domains and worse outcomes in terms of quality of life, as assessed by the O.R.WELL questionnaire.

Binge Eating Disorder. Given the high impact of Binge Eating Disorder on both bariatric surgery outcomes [22] and psychopathology and psychological distress [33–35], we divided our sample on the basis of the Binge Eating Scale in three subsamples: a Severe Binge Eating group, including people with scores higher than 27 (n. 50); a Mild to Moderate group, including people with scores between 18 and 26 (n. 70); and a group with low/no symptoms reported (scores < 17) who did not meet diagnostic criteria for a Binge Eating Disorder (n.153). Demographic characteristics, psychometric measures and Binge Eating-related differences are reported in Table 2. The three groups did not differ in terms of gender, age, occupational status, education and BMI. As expected, the three groups differed in terms of all the domains across both the EDE and the BUT, except for the Restriction subscale of the EDE that once again resulted stable across groups. At the same time, both number and severity of mental health symptoms as reported by the SCL90R differed between groups, with higher scores reported by people with severe Binge Eating Disorder (Table 2).

SCL90R and Psychiatric Symptoms. As mentioned above, the SCL-90-R has been administered in order to evaluate a broad range of psychiatric symptoms. In the main sample, the SCL-90R Global Score Index varied from a minimum of 0 and a maximum of 3.13 (mean score 0.79 ± 0.60).

Looking more in details, we can observe that SCL90R mean scores were above the standard cut-offs [36] for psychiatric illness in the general population (Table 2, Figure 1). In particular, the mean scores for Somatization (1.08 ± 0.73), Interpersonal Sensitivity (0.92 ± 0.82), Depression (0.91 ± 0.78) and Other Symptoms (1.01 ± 0.65) were higher than the cut-offs (0.9), while the mean scores for Obsessive-Compulsive Symptoms (0.87 ± 0.69) and Paranoid Ideation (0.80 ± 0.72) were just above the cut-offs (Figure 1).

See Figure 1

Moreover, applying the general population cut-offs, we observed that 32.5% (n = 89) of the total sample reported a Global Severity Index score higher than the general population. Nevertheless, 54% (n = 149) of the participants reported mild to severe symptoms in the Somatization Dimensions, 40% (n = 109) mild to severe symptoms of Depression, 38.5% (n = 105) mild to severe symptoms in Interpersonal Sensitivity, 37.7 % (n = 103) reported mild to severe symptoms in the Obsessive-Compulsive Dimension and 35.5% (n = 97) of the participants revealed Paranoid Ideation (Figure 2).

See Figure 2

The percentage of people reporting a score above the cut-off in different SCL90R domains varied across Binge Eating Disorder severity classes, as showed by Figure 3.

See Figure 3

Although, we did not find any effect of Binge, Gender, or any Gender * Binge interaction on the percentage of people reporting scores higher than the general population cut-offs in any of the SCL90R domains.

The linear mixed-effects model showed a main effect of Binge Eating Disorder severity on the Global Index Severity of the SCL90R, with scores increasing in both the severe and mild Binge Eating Disorder groups compared to the group with no BED symptoms reported [Severe: $\beta = 0.772$, $p = 0.0002$; Mild: $\beta = 0.375$, $p = 0.016$]. The same main effect of BED severity was found on the number of positive symptoms reported (PST subscale) [Severe: $\beta = 27.775$, $p = 0.0002$; Mild: $\beta = 15.338$, $p = 0.0065$] and the distress associated with those symptoms (PSDI subscale) [Severe: $\beta = 2.27$, $p = 0.0339$; Mild: $\beta = 2.025$, $p = 0.0067$]. There were, however, no main effects of Gender, nor an interaction effect between Gender and Binge Eating Severity. A similar main effect of Binge Eating Disorder severity were found on the single domains of the SCL90R (Figure 4), with the single scores be increased in the severe and/or mild Binge Eating Disorder groups in the following domains: Somatization [Severe: $\beta = 0.45$, $p = 0.013$; Mild: $\beta = 0.530$, $p = 0.0076$], Obsessive-Compulsive [Severe: $\beta = 0.859$, $p = 0.0003$; Mild: $\beta = 0.428$, $p = 0.0169$], Interpersonal Sensitivity [Severe: $\beta = 1.249$, $p = 0.00001$; Mild: $\beta = 0.392$, $p = 0.0601$], Depression [Severe: $\beta = 0.834$, $p = 0.0025$; Mild: $\beta = 0.406$, $p = 0.0501$], Anxiety [Severe: $\beta = 0.704$, $p = 0.0027$; Mild: $\beta = 0.304$, $p = 0.0843$], Hostility [Severe: $\beta = 0.620$, $p = 0.0070$; Mild: $\beta = 0.368$, $p = 0.0334$], Phobia [Severe: $\beta = 0.563$, $p = 0.0022$], Paranoid Ideation [Severe: $\beta = 0.733$, $p = 0.0038$], Psychoticism [Severe: $\beta = 0.788$, $p = 0.0002$], other symptoms [Severe: $\beta = 0.969$, $p = 0.0001$; Mild: $\beta = 0.522$, $p = 0.0036$].

See Figure 4

Moreover, a main effect of gender has been found, with women showing higher scores than men in the following domains: Somatization [$\beta = 0.258$, $p = 0.0303$], Obsessive-Compulsive [$\beta = 0.257$, $p = 0.0170$], Interpersonal Sensitivity [$\beta = 0.315$, $p = 0.0123$], Depression [$\beta = 0.255$, $p = 0.0446$]. There were, however, no interaction effects between Gender and Binge Eating Severity in the SCL90R domains except for the Other Symptoms, where we observed a main interaction effect between Gender and Binge Eating Severity, with women with severe Binge Eating Disorder showing lower scores than men in the same group [$\beta = -0.605$, $p = 0.0212$].

Eating Disorders Evaluation. As mentioned above, both gender and binge eating-related groups differed in terms of EDE scores, except for the Restrictions subscale that have been found to be consistent across groups. The linear mixed-effects model showed a main effect of Binge Eating Disorder severity on the total score of the EDE, with score found to be increased in both the severe and mild Binge Eating Disorder groups compared to the group with no BED symptoms reported [Severe: $\beta = 1.324$, $p = 0.0003$; Mild: $\beta = 0.780$, $p = 0.0041$].

Moreover, a main effect of Gender has been observed, with women reporting higher scores than men [$\beta = 0.600$, $p = 0.0003$]. Although, no interaction effect between Gender and Binge Eating Severity has been found. According with previous observations, there were no main effects of Binge or Gender on the subscale for Restrictive Behaviors, while main effects of both variables have been observed in the other subscales, with higher scores reported in female subjects and binge eating groups: weight-related concerns [Severe: $\beta = 1.714$, $p = 0.0001$; Mild: $\beta = 0.764$, $p = 0.0183$, Female: $\beta = 0.741$, $p = 0.0002$], body shape-related concerns [Severe: $\beta = 1.900$, $p = 0.0002$; Mild: $\beta = 0.947$, $p = 0.0121$, Female: $\beta = 0.959$, $p = 0.00001$], diet-related concerns [Severe: $\beta = 1.756$, $p = 0.0001$; Mild: $\beta = 1.106$, $p = 0.0007$, Female: $\beta = 0.478$, $p = 0.0145$] (Figure 5).

See Figure 5

Body Uneasiness Test. As reported in Table 2, both gender and binge eating-related groups showed different scores across all the domains of the Body Uneasiness Test. The linear mixed-effects model showed a main effect of both Binge Eating Disorder severity and gender on the total score of Global Severity Index of the BUT, with scores found to be increased in both the severe and mild Binge Eating Disorder groups [Severe: $\beta = 1.561$, $p = 0.0001$; Mild: $\beta = 0.849$, $p = 0.0035$] and in female subjects [F: $\beta = 0.937$, $p = 0.00001$]. No interaction effect between Gender and Binge Eating Severity has been found. Regarding the number of positive symptoms reported (PST subscale) and the related distress (PSDI subscale), we found a main effect of both binge and gender [PST: Severe: $\beta = 7.461$, $p = 0.0142$; Moderate: $\beta = 5.899$, $p = 0.0103$; F: $\beta = 5.567$, $p = 0.0001$; PSDI: Severe: $\beta = 1.146$, $p = 0.0024$; F: $\beta = 0.777$, $p = 0.0001$]. Moreover, an interaction effect between gender and Binge Eating Disorder severity has been found on the PSDI subscales, where female subjects with severe Binge Eating Disorder showed lower distress related to the reported symptoms compared to the male subjects in the same group [$\beta = -0.860$, $p = 0.0369$].

Similar main effects of Binge Eating Disorder severity and female gender were found across the BUT's subscales, with the single scores found to be increased in the severe and/or mild Binge Eating Disorder groups and in female subjects: Avoidance [Severe: $\beta = 1.624$, $p = 0.0003$; F: $\beta = 0.762$, $p = 0.0002$], Body Image Concerns [Severe: $\beta = 1.854$, $p = 0.0001$; Mild: $\beta = 1.022$, $p = 0.0032$; F: $\beta = 1.081$, $p = 0.00001$], Compulsive Self-Monitoring [Severe: $\beta = 0.909$, $p = 0.0084$; Mild: $\beta = 0.572$, $p = 0.0277$; F: $\beta = 0.694$, $p = 0.00001$], Depersonalization [Severe: $\beta = 1.384$, $p = 0.0011$; Mild: $\beta = 0.843$, $p = 0.0084$; F: $\beta = 0.902$, $p = 0.00001$], Weight Phobia [Severe: $\beta = 1.724$, $p = 0.0002$; Mild: $\beta = 0.995$, $p = 0.0042$; F: $\beta = 1.083$, $p = 0.00001$] (Figure 6).

See Figure 6

Across all the domains, women in the group with severe BED showed a lower increase in the subscales' scores than the men in the same group, even though an interaction effect between gender and Binge Eating Disorder severity has been found only for the Weight Phobia subscale [$\beta = -1.023$, $p = 0.0450$]. This last finding may be due to the fact the women without Binge Eating Disorder presented higher scores than men.

Discussion

Our population consisted mainly of women (70% of the sample) consistent with other samples of people with obesity and BED seeking for bariatric surgery [37, 38]. This higher demand for treatment among women is related to the specific consequences of obesity on women's health [39]. Moreover, women are also affected by higher levels of stigma related to overweight [40] and they suffer more than men with the same BMI in terms of quality of life, with more severe psychosocial deficits [30]. According with previous evidences, in our study women reported lower quality of life compared to males with the same BMI. Further, the psychopathological load seemed to be higher among women, even though this effect tends to disappear among subjects reporting BED. Also, women were found less comfortable with their body image and more prone to report body image distortions than men. Though, the gender differences highlighted in all the investigated domains were found to disappear among subjects with a diagnosis of severe BED.

According to previous evidences, our results show that patients with severe BED may experience difficult relationships with their body image: the severity of BED was the main factor driving the body image perception. It is well known that patients with BED have many difficulties in accepting their body, attributing an improper value to weight and body shapes. Moreover, BED is associated with dysfunction in eating behaviors as well as psychiatric comorbidity [17]. Body image is one of the aspects of the mental representation of oneself and it is defined as the psychological experience of the appearance and function of one's body [41], especially with regard to physical and external characteristics [42]. In this sense, the relationship with one's body represents an essential element in the construction of everyone's identity, conveying personality, social, cultural, psychological and biological factors [43]. The body image travels along a gradient of satisfaction with one's physical appearance that, moving away from the "ideal" image produced by one's own expectations and those of others can lead to the appearance of real disorders [44]. It is now clear that BED represents one of the main risk factors as well as an indication of the fallout of conditions such as obesity, various eating disorders [45] and a whole series of psychopathological conditions [41, 46]. In the specific case of the BED-obesity relation, a previous study shows that obese are subjected to an unacceptable stigmatization linked to their aspect, which in most cases pushes them to suffer the burden of living in their own body feeling sadness, shame, frustration and feeling rejected by others until they renounce having relationships and regularly attending school and work environments [43]. Moreover, BED has been found significantly related with low self-esteem and poor quality of life in subjects with BED regardless of what the levels of BMI were [47]. Our results confirm these findings.

On the other hand, our results show that higher BED severity scores were related to worse scores in all the dimensions of the SCL-90R. In accordance with recent literature, these results allow to consider patients with BED at greater risk of developing psychiatric disorders compared to subjects without BED diagnosis [16]. Moreover, a BED diagnosis in obese subjects is so frequently associated with the presence of other psychiatric disorders that it can almost be considered a marker of psychopathological conditions [15]. The most frequently are anxiety and mood disorders, borderline, obsessive-compulsive and avoidant personality disorders,

substance use disorders. Due to the presence of these comorbidities, patients with BED may be considered at greater suicidal risk than the general population, especially in the presence of depressive symptoms [17].

Because of BID and BED play a central role in the psychopathology of obese subjects, it is crucial to evaluate the patients who turn to bariatric surgery, in order to identify the factors that can associate with negative outcome and a poor adherence to post-operative indications. Obese patients seeking bariatric surgery in order to lose weight are the most psychologically affected, with high levels of concern and dissatisfaction related to body shape, which correlate negatively with the success of therapies [42]. The use of bariatric surgery usually intervenes after the failure of the other dietary-nutritional, physical and pharmacological measures. The psychopathological discomfort often led obese patients to choose surgery as the last possibility; it is important to identify and manage psychiatric comorbidities to improve the post-surgery outcome as much as possible.

Strength and limits

Our study has been conducted on a particularly large population, in which we investigated several dimensions of both eating behavior and psychopathology. However, the fact that 70% of this population was composed by women represents the main limitation of our work, determining a gender bias common to other samples of obese seeking for bariatric surgery [31, 32]. A further limitation of our study is the lack of post-surgery data due to COVID-19 pandemic.

What is already known on this subject?

Obesity is a condition that affects human in both physical and mental dimensions. Moreover, many psychopathological conditions can be traced in obese patients, threatening the positive outcome of bariatric surgery.

What this study adds?

Our work highlights the importance of thoroughly investigating the presence of BED in candidates for bariatric surgery. In our sample this disorder is so pervasive as to overcome gender differences and influence all psychopathological dimensions.

Declarations

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Conflicts of interest/Competing interests The authors declare that they have no conflict of interest.

Availability of data and material The raw data supporting this article will be made available by the authors.

Code availability Not applicable.

Authors' contributions All Authors contributed to the development of the study concept and design. CN, LL, RC, LC, LG and LA contributed to collect data to be included in the article. CM performed statistical analysis. CN, LL and CM wrote the first draft of the article. All Authors revised the article and MP, GM and MG performed substantial comments and approved the final version of the article.

Ethics approval The study was approved by the local Ethics Committee (University of Chieti-Pescara Italy).

Consent to participate Patients provided their written informed consent to participate in this study.

Consent for publication Patients give their consent for publication of this article.

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Figures

Figure 1

SCL-90R scores in obese patients eligible for bariatric surgery (distribution and mean values)

Figure 2

Percentage of subjects above the general population cutoffs for SCL-90R scores (total sample)

Figure 3

Percentage of subjects scoring above the SCL-90R cutoffs for the general population according to Binge Eating Disorder severity and gender

Figure 4

Effects of Binge Eating Disorder severity and gender on the SCL-90R scores. Differences between groups: Wilcoxon test. Dashed lines: general population cut-offs (0.9).

Figure 5

Effects of Binge Eating Disorder severity and gender on the Eating Disorder Evaluation (EDE). Differences between groups: Wicoxon test.

Figure 6

Effects of Binge Eating Disorder severity and gender on the Body Uneasiness Test. Differences between groups: Wilcoxon test.

Supplementary Files

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