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Psychopathology in Bariatric Surgery Candidates: A Review of Studies Using Structured Diagnostic Interviews

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Abstract

Psychiatric disorders are not uncommon among severely obese patients who present for bariatric surgery. This paper (1) reviews the results of the published studies using the structured interviews to assess psychopathology in bariatric surgery candidates; (2) compares the prevalence rates of psychiatric disorders across these studies with the data from other population samples; and (3) assesses whether sociodemographic variables appear to affect these prevalence rates. We searched online resources, PubMed, PsychINFO and reference lists of all the relevant articles to provide an overview of evidence so far and highlight some details in the assessment and comparisons of different samples in different countries. The prevalence estimates in the non- treatment obese group did not appear to differ substantially from the general population group in the US or the Italian population samples, although they were relatively higher for the German population. However, the rates of psychopathology in the bariatric surgery candidates were considerably higher than the other two population groups in all the samples. Overall, the most common category of lifetime Axis I disorders in all the studies was affective disorders, with anxiety disorders being the most common category of current Axis I disorders. Certain demographic characteristics are also associated with higher rates of psychopathology, such as, female gender, low socioeconomic status, higher BMI. Overall, methodological and sociodemographic differences make these studies difficult to compare and these differences should be taken into account when interpreting the results.

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Introduction

In terms of societal impact, psychiatric disorders are among the most burdensome of all classes of diseases owing to their high prevalence, frequent chronicity, early age of onset, and accompanying serious impairment. Morbid obesity is often associated with significant psychiatric co-morbidity. Psychological symptoms, such as depression, anxiety and poor self-esteem, were long believed to be prominent in the etiology of obesity, despite scant empirical support [1]. The current consensus among researchers is that psychological symptomatology are quite common among the obese, but may be best understood as correlates, rather than serving as a primary cause [2–4].

Assessing psychopathology in extremely obese bariatric surgery candidates has significant clinical implications both preoperatively and postoperatively. A thorough psychological and psychosocial assessment is essential because of the necessity for long-term behavioral changes on the part of the bariatric surgical candidates. The quality of research in the field of psychiatric comorbidity in bariatric surgery candidates has improved considerably in the last few years. The studies assessing psychopathology in large bariatric surgery samples from different countries using structured diagnostic interviews present valuable data. In this review, we will: (1) review the results of the published studies which used structured interviews to assess psychopathology in bariatric surgery candidates; (2) compare the prevalence rates of lifetime and current psychiatric disorders across these studies with the data from general population samples, and with samples of obese individuals in the general population not currently in weight loss treatment; and (3) assess whether sociodemographic variables (sex, age, ethnicity and educational attainment) appear to affect these prevalence rates.

Prevalence of psychopathology among bariatric surgery candidates

Literature suggests a high prevalence of psychopathology among these individuals [5–10]. However, establishing the prevalence and clinical significance of psychiatric disorders among the severely obese including candidates for weight loss surgery pose complex problems. First is the choice of the population to study. It is well established that obese persons seeking treatment show significantly elevated rates of psychopathology compared to obese persons who are not seeking treatment [3, 8, 11, 12]. Furthermore, research also suggests that individuals seeking medical treatment for obesity (including either surgery or pharmacotherapy) are more likely to have a history of depression and anxiety than obese individuals seeking programs that emphasize dietary restriction or promote weight control [13]. Second, individuals who present for bariatric surgery are generally extremely overweight, and the severity of obesity has been linked to higher rates of psychopathology, including depression [14, 15] and binge eating disorder [16–19]. Also, obesity often results in various physical illnesses, such as diabetes, cardiovascular disease and obstructive sleep apnea [20] and these comorbid conditions are also associated with psychiatric disorders, such as depression [21–25]. Thus, for several reasons, bariatric surgery candidates have high rates of psychopathology, and preoperative psychological evaluation may be important in identifying these individuals.

Published results of psychiatric disorders in bariatric surgery candidates

Despite fairly consistently elevated rates, the available literature has found widely disparate figures of psychiatric disorders in bariatric surgery candidates. Some of this variability undoubtedly results from the divergent approaches used in assessing such populations. The validity and reliability of psychiatric diagnosis in bariatric surgery candidates have been markedly enhanced in the last few years through the use of structured diagnostic interviews, which are the state-of-the-art method for diagnosing psychopathology in clinical research [26]. A structured interview is defined as “an interview consisting of … predetermined questions presented in a definite order.” Such questions “yield diagnostic information based on the patient’s responses and the interviewer’s observations” [27]. The Structured Clinical Interview for DSM IV (SCID) generally takes about one to one and a half hours to administer, and allows for the assessment of the full spectrum of current and lifetime psychiatric diagnoses.

To examine this literature, the published studies were obtained using the following search engines and strategies following consultation with a medical librarian: **PubMed (NLM): Bariatric Surgery** - ((((("gastric banding" OR "gastric bands" OR "gastric band" OR LAGB)) OR (biliary pancreatic diversion OR biliary pancreatic diversions OR biliopancreatic diversion OR biliopancreatic diversions* OR biliopancreatic diversion[Mesh])) OR (sleeve gastrectomy OR sleeve gastrectomies)) OR ((("Anastomosis, Roux-en-Y"[Mesh Terms] OR ("anastomosis, roux-en-y"[MeSH Terms] OR ("anastomosis"[All Fields] AND "roux-en-y"[All Fields]) OR "rouxen-y anastomosis"[All Fields] OR "roux en y"[All Fields])) AND ("obesity"[MeSH Terms] OR "obesity"[All Fields])) OR ("Bariatric Surgery"[Mesh] OR (bariatric surgeries[Text Word] OR bariatric surgery[Text Word])) OR "Obesity, Morbid/surgery"[Mesh] OR gastric bypass OR gastroplasty OR jejunoileal bypass OR lipectomy); **Psychopathology** "Mental Disorders"[Mesh] OR psychological OR psychologist OR interview* OR psychiatric OR depression OR mood OR anxiety OR mental OR bipolar OR compulsive; **PsycInfo (EBSCO)** - (DE "Bariatric Surgery" or roux-en-y OR biliary pancreatic diversion OR biliopancreatic diversion OR sleeve gastrectomy) AND (DE "Psychodiagnostic Interview" OR DE "Diagnostic Interview Schedule" OR DE "Structured Clinical Interview") OR (DE "Psychological Assessment" OR DE "Behavioral Assessment" OR DE "Cognitive Assessment" OR DE "Neuropsychological Assessment"); **Scopus** - (TITLE-ABS-KEY(interview*)) AND (TITLE-ABS-KEY("bariatric surger*" OR "gastric bypass*" OR "gastric band*" OR roux-en-y OR "sleeve gastrectom*" OR "biliary pancreatic diversion*" OR "biliopancreatic diversion*")). All abstracts were reviewed by the first two authors for relevance. The only exclusion criterion was non-English language.

Studies that have utilized the SCID in investigating the current and lifetime prevalences of psychiatric disorders among bariatric surgery candidates include studies from the US, Italy and Germany [28–32]. The published results of these studies are summarized in Table 1. The reason for the wide disparity among the prevalence rates of psychopathology in these studies is a matter of conjecture but the results may be attributable to differences in the nature of the samples, geographical differences, and various other confounding factors, which we will discuss.

The rates of psychopathology (current and lifetime) were roughly equivalent across the studies conducted by Rosenberger et al. [28] and Mauri et al. [30]. Similarly, the results of Kalarchian et al. study [29] were similar to those of Mitchell et al. study [32]. The study of Mühlhans et al. [31] was comparable to Kalarchian [29] and Mitchell et al. [32], with the exception that Mühlhans et al. [31] reported higher rates of current psychiatric disorders, particularly affective disorders. The most common category of lifetime disorders in all the studies was affective disorders, with major depressive disorder being the most common among individual diagnosis. With regard to current psychiatric disorders, anxiety disorders were the most common class in all the studies, the exception being the study of Mühlhans et al. [31], which reported eating disorders, in particular Eating Disorder Not Otherwise Specified (EDNOS, which included BED) to be the most common category.

An extensive body of literature suggests that childhood psychological trauma may increase risk for both psychiatric disorders and obesity [33–35]. This may help to explain the high prevalence of lifetime posttraumatic stress disorder in the bariatric surgery candidates in most of these studies. The studies of Kalarchian et al. [29] and Mitchell et al. [32] in particular, reported high rates of posttraumatic stress disorder (11.8% and 11.1% respectively). A history of childhood sexual abuse is associated with numerous adverse psychological sequelae and has also been linked to the presence of eating disorder behavior and obesity [36]. High prevalence rates of lifetime eating disorders were also found in these two studies (29.5% and 15.6%), providing additional support for the possible association between childhood maltreatment and eating disorder in bariatric surgery candidates. In addition, the available studies suggest high rates of lifetime substance abuse disorders in bariatric surgery candidates; however, less than 1% met diagnostic criteria for the disorder at the time of evaluation across these studies. This discrepancy may reflect underreporting of current problems by these individuals. One possible contributing hypothesis is suggested by the significant inverse relationship between body mass index and alcohol use reported by Kleiner and colleagues [37], who proposed that substance abuse remits when eating behavior predominates because food may compete with alcohol for brain reward systems, making alcohol ingestion less reinforcing. Simon et al. [38] also reported obesity to be associated with an approximately 25% decrease in odds of substance use disorders.

Comparison of prevalence rates of psychiatric disorders in bariatric surgery candidates with other population groups

The results of the above studies suggest that the rates of psychopathology are substantial in bariatric surgery candidates. However, it is also important to compare these rates to the rates in other populations. We compared the lifetime and current prevalence rates of psychiatric disorders among several groups: general population, obese individuals not seeking treatment data, and obese individuals considering bariatric surgery data (Tables 2, 3). Data for the general population estimate in the US adult population were taken from the National Comorbidity Survey- Replication (NCS-R) [38–40], and for the Italian and German population were derived from the European Study of the Epidemiology of Mental Disorders (ESEMeD) Survey [41–44]. The studies rely on nationally representative samples and use face-to-face assessments using the World Mental Health Survey version of the World Health

Organization Composite International Diagnostic Interview (CIDI), which is a structured lay-administered diagnostic interview for the assessment of DSM-IV disorders. In order to examine the prevalence rates for groups in the US, German and Italian populations, we combined the results of two or more studies conducted in each region by calculating the means. Herpertz et al. [41] reported their results broken down by sex, so we recalculated their results to establish estimates for the entire sample.

The prevalence estimates in the non- treatment seeking obese group did not appear to differ substantially from the general population group in the US or the Italian population samples, although they were relatively higher for the German population. However, a consistent pattern was observed for the bariatric surgery candidates, where the current and lifetime rates of psychiatric disorders were considerably higher than the non-treatment seeking obese and general population sample in all three studies.

The literature shows that the relationship between obesity and mental disorders is stronger among those with more severe obesity [15, 44, 45]. As the individuals who are assessed for bariatric surgery are generally severely obese (BMI≥40Kg/m^2), the prevalence of psychopathology is much higher among this group. Previous studies that have assessed conventional measures of psychopathology in persons with lesser degrees of obesity have often found little evidence of increased psychological disturbance [4]. However, in the present review, it is hard to clarify whether the higher rate of psychopathology among treatment groups was related to their extreme obesity or to their treatment-seeking behavior. One of the approaches that could clarify this issue is to stratify obesity by severity (class 1, BMI 30-34.9; class 2, BMI 35-39.9: class 3, BMI ≥ 40). This approach was not used by most of the studies discussed, except those by Mauri et al. [30] and Scott et al. [44]. Another factor that should be kept in mind while comparing the results is that some surveys had provided estimates for current prevalence rates (i.e., past month) and others for 12 month rates (Table 3), which are perhaps somewhat comparable but not necessarily the same as current diagnoses. A final methodological difference which may affect comparison between different groups is that instruments used in the studies were also different, with CIDI used in the studies on general population and non-treatment-seeking obese groups and SCID used in the studies on bariatric surgery candidates. The clinical reappraisal studies conducted by the World Health Organization have shown that CIDI-SCID agreement with DSM-IV diagnoses are generally good, that CIDI lifetime prevalence estimates are generally conservative relative to SCID estimates, and that CIDI 12-month prevalence estimates are generally unbiased relative to SCID estimates [47]. Overall, methodological and cross-national differences make these studies difficult to compare.

Methodological issues and studies of psychiatric disorders in bariatric cases

The evaluation instrument used in all the studies on bariatric surgery candidates was the English, Italian or the German version of the SCID Interview. Four studies [28, 30–32] conducted face-to-face interviews, while that of Kalarchian et al. [29] conducted interviews by telephone. However, previous research has suggested that telephone administration of the SCID yields comparable results as face-to-face administration [26, 48–52].

In the studies of Kalarchian et al. [29], Mühlhans et al. [31], and Mitchell et al. [32], the evaluation process was strictly independent of the approval process for the surgery and the participants were assured that information provided for research would not influence their candidacy for surgery. On the other hand, in the studies of Rosenberger et al. [29] and Mauri et al. [30], the interviews were part of the presurgical evaluation interview, which might have led participants to selectively underreport some aspects of their psychiatric status or history in order to present themselves as psychologically healthy candidates. Fabricatore et al. [53] have described this potential of "impression management" in bariatric surgery candidates. The studies with an independent evaluation process [29, 31, 32] yielded results roughly comparable to each other, and a higher prevalence rates of psychiatric disorders than studies that did not have an independent assessment process. Thus, the rates of psychopathology assessed in these studies may more accurately reflect the true prevalence of such problems.

Another important difference among the studies that should be considered is that the range of psychiatric disorders differed across studies. For example, eating disorder, not otherwise specified (EDNOS) is the most common eating disorder diagnosis in specialized treatment settings and in community samples [54] and two studies [29, 30] did not assess EDNOS, which might have influenced the prevalence rates reported. Somatoform disorders were reported only in the studies of Rosenberger et al. [28], and Mühlhans et al. [31]. Psychotic disorders were mentioned in only these two studies. A current psychotic disorder was an exclusion criterion in the study of Mühlhans et al. [31], whereas Rosenberger et al. [28] reported having found no psychotic disorders. Similarly, the prevalence rates of adjustment disorders were only reported in the study of Rosenberger et al [28]. Thus, these differences in range of disorders assessed could be one of the reasons for variations in the total comorbidity estimate on bariatric surgery candidates. Similarly, comparison with the rates of Axis I disorders in general population groups and non-treatment obese samples have to be made with caution, keeping in mind that disorders assessed in the studies were not always identical.

Effects of demographic variables on prevalence of psychopathology

Sociodemographic factors such as gender, age, education, socioeconomic status and ethnicity may moderate the relationship between obesity and psychiatric disorders [3]. Bariatric surgery candidates are predominantly female which was true in the five studies discussed here, with >70% of their samples being female (Table 4). In the general population, women are known to present with higher rates of Axis I psychiatric disorders than men, especially anxiety and affective disorders [44, 55, 56]. In addition to their elevated baseline risk for depression and anxiety disorders, the risk increases considerably in women who are obese as compared to normal-weight controls [44]. As a result, a difference in prevalence rates between men and women would be expected in bariatric surgery candidates as well [31]. Kalarchian et al. [29] did not report prevalence rates broken down by sex in their study, although, Kalarchian et al. [29] reported that current and lifetime prevalence of Axis I disorders did not differ by sex. Four of the bariatric studies summarized their results separated by sex [28, 30–32]. Mauri et al. [30] found no sex differences among classes of all lifetime and current Axis I disorders. However, when the prevalence of

individual diagnoses was compared between genders, lifetime major depressive disorder was found to be twice as common in women (21.3%) than in men (10.5%). In the study of Rosenberger et al. [28], women were significantly more likely to report a current as well as a lifetime history of any anxiety disorder, and a lifetime history of any affective disorder, especially major depressive disorder. Mühlhans et al. [31] found higher rates of affective and eating disorders (lifetime and current) in women. Thus, the observed instances of differential patterning by sex are consistent with previous reports, with women in general showing higher prevalence rates of common forms of psychopathology compared to men [6, 45, 57–59].

In the three US studies [28, 29, 32], the samples were comprised largely of non-Hispanic whites, so the results may not be generalizable to other cultural or ethnic groups. Of note, Simon et al. [38] reported that the association between obesity and psychopathology is statistically significant only among non-Hispanic whites. Similar results were seen in the general population sample in the NCS-R [39], with non-Hispanic whites having significantly higher risk of anxiety, mood and substance use disorders.

Participant age may also affect the relationship of psychiatric disorders and pursuing bariatric surgery. The mean age for the five samples comprising bariatric surgery candidates ranged from 38-46 years (Table 6). One US survey suggests a stronger association between obesity and psychopathology among those younger than 65 [60]. Similarly, Simon et al. [38] assessed the association between obesity and psychiatric disorders in the general population in four age groups of ≤29, 30-44, 45-59 and ≥60 years. Higher prevalence rates of most of the psychiatric disorders in obese people (BMI≥30) were found in the groups of ≤29 and 30-44 years. Whether the same holds true for bariatric surgery candidates is unclear. Among the studies discussed here, mean age was lowest for the sample reported by Mühlhans et al. [31]; importantly the rates of psychiatric disorders reported were highest in this study, supporting the possibility that there might be some association between current psychopathology and younger age in bariatric surgery samples. Further research is required to investigate whether or not such an association exists.

The samples also varied by their socioeconomic status (SES), and this to some extent depended on from where the populations were drawn. Studies in general suggest that lower SES is associated with higher BMI and a higher rate of obesity [61]. This effect is especially prominent for education as an indicator of SES and the association is particularly strong among women [61]. The bariatric samples in the US studies included patients with a higher educational level than found in the US general population. It may be that the subjects were drawn from centers in urban settings with well established, research-oriented bariatric surgery programs. In the sample of Rosenberger et al. [28], 73.3% had received education beyond high school and in the sample described by Kalarchian et al. [29], 69.7% had received education beyond high school. In the general population in the US, the rate of education beyond high school was reported to be 53.8% [62] and in an extremely obese general population (BMI≥40), the rate was 46.9% [63]. Similarly, the sample described by Mauri et al. [30], had a higher education level (44.9% with a high school diploma or a university degree) compared to the general population in Italy. On the other hand, in the sample of Mühlhans et al. [31], the education level was low compared to the German

general population. Lower SES correlates with an increased risk of psychiatric disorders, especially anxiety and mood disorders [15, 38, 39, 44]. As mentioned earlier, the highest prevalence rates of psychiatric disorders were reported in the study of Mühlhans et al., and lower SES might be one of the factors contributing to these rates. Clearly SES needs to be carefully considered in future studies examining bariatric surgery candidates.

Severity of obesity may also be related to psychopathology in bariatric surgery candidates. Mean BMI of the samples in the five studies ranged from 43.5-52.2 kg/m^2. A positive association between severity of obesity and depression was found in one of the population based studies [15], with obese persons having an approximately 1.5-fold higher prevalence of depression than their normal-weight counterparts, and prevalence was found to be highest among persons with severe obesity (BMI≥40). Similar results were found by Kalarchian et al. [29] in bariatric surgery candidates, who found that higher prevalence of current and lifetime Axis I psychopathologies was related to increasing levels of BMI. Contrary to this, Mauri et al. [30] did not find any significant differences among the 3 BMI obesity classes (moderate, severe, very severe) and the prevalences of current and lifetime axis I and II disorders. Higher mean BMI in the sample of Kalarchian et al. [29] (52.2kg/m^2) compared with the sample of Mauri et al. [30] (43.5kg/m^2) may account for this difference.

The association of eating disorders in obese patients and Axis I and Axis II psychopathology

Obese patients with comorbid BED have significantly higher rates of Axis I and Axis II psychiatric disorders compared to obese patients without BED [65–69]. These findings seem to hold true among bariatric surgery candidates as well. Among the studies reviewed, three [28, 30, 31] examined comorbidity between eating disorders and Axis I psychiatric disorders in bariatric surgery candidates. Consistent with previous studies [7, 70, 71], all observed a higher prevalence rate of psychiatric disorders in patients who also met criteria for an eating disorder diagnosis, a finding that appears consistent regardless of sampling and assessment methods. Rosenberger et al. [28] found that patients with eating disorders were significantly more likely to meet criteria for other psychiatric disorders than those without eating disorders (66.7% vs. 26.7%), particularly for anxiety disorders (45.8% vs. 10.7%). In the study of Mühlhans et al. [31], 83.6% of the participants with a lifetime eating disorder diagnosis reported atleast one other lifetime psychiatric disorder while 45.2% of those without a lifetime eating disorder diagnosis exhibited another psychiatric disorder.

Recently, Jones-Corneille et al. [72] also estimated the prevalence rates of psychopathology in bariatric surgery candidates with and without BED. A significantly greater percentage of BED than non-BED participants had a lifetime history of any Axis I disorder (65.9% vs. 39.3%) and any current Axis I disorder (47.7% vs. 16.5%), which was consistent with the results of the studies reviewed here. In general, evidence from several studies with bariatric surgery candidates suggest that prevalence of eating disorder behavior may serve as a marker of variety of other psychiatric disturbances that may have significant scientific and clinical implications [73, 74, 75].

Prevalence of Axis II psychopathology in bariatric surgery candidates

The studies of Kalarchian et al. [29] and Mauri et al. [31] provided an examination of comorbid personality disorders in addition to other Axis I psychiatric disturbances in bariatric surgery candidates. These studies used the Structured Clinical Interview for DSM-IV Axis II disorders (SCID II). In the study of Kalarchian et al. [29], 28.5% of the cohort met diagnostic criteria for an Axis II disorder. That 28.5% included 25% of the participants had both an Axis I and II diagnosis, and 3.5% had an Axis II only. The overall prevalence of personality disorders in the sample of Mauri et al. [30] was 19.5%, which was lower than that reported by Kalarchian et al. [29] (Table 5). Cluster C disorders, including avoidant, dependent, and obsessive-compulsive personality disorders were most common in both of the studies. These findings suggest the possibility that social stigma, discrimination, and fears of negative social evaluation may exacerbate anxious or avoidant traits in extremely obese individuals which might result in higher rates of personality disorders. However, it is also possible that avoidant and obsessive-compulsive personality disorder may result in a greater likelihood of engaging in binge-eating behavior [76], but the relationship of personality and eating disorders in bariatric surgery cases is generally not well understood, although Mauri et al. [30] also found a significant association between avoidant personality disorder and eating disorders.

Quality of Life and Functional Impairment

Health Related Quality of Life (HRQOL) in bariatric surgery candidates has been studied extensively and found to be poorer among those subjects than among normative samples [77, 78]. Morbidly obese individuals are faced with multiple obstacles in their daily living that can have a devastating effect on functional health status [70]. Various scales are available to assess HRQOL and functional impairment. For example, the Medical Outcomes Study 36-item Short Form Health Survey (SF-36), a widely used instrument with well-established validity and reliability, measures functional impairment using eight subscales: four pertaining to physical health (physical functioning, physical role, bodily pain, general health) and four related to emotional health (vitality, social functioning, emotional role and mental health) [70, 79, 80]. Using the SF-36, Fontaine et al. [81, 82] compared the functional impairment of 312 consecutively admitted obese persons and reported substantial decrements among them. Kolotkin et al. have published extensively on the Impact of Weight on Quality of Life (IWQOL) and the results indicated that the impact of weight on quality of life generally worsens as the severity of obesity (BMI) increases [83–85].

Among the studies on bariatric surgery candidates reviewed here, Mitchell et al. [32] used both the SF-36 and IWQOL-Lite to assess functional impairment and HRQOL whereas Kalarchian et al. [29] used SF-36 to assess functional impairment in their samples. Evidence of significant Quality of LIfe impairment on various subscales and the total scores were found in these studies, with more significant impairment seen among women [32]. Both Axis I and Axis II psychopathology were associated with decreased functional health status, with higher BMI further worsening the quality of life in these patients [29]. Mauri et al. [30] analyzed satisfaction with quality of life in relation to Axis I and II psychopathology, BMI and gender using the short-form Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q), an instrument originally developed by Endicott et al. [86]. Higher age and the

presence of both axis I and II disorders were found to be significantly associated with poorer quality of life whereas, gender or having only having an Axis I or II disorder were not predictive of quality of life scores. Moreover, these authors did not find any association between BMI class and quality of life. Regardless of the instrument used, quality of life impairment is clearly an issue in bariatric surgery candidates, affecting not only emotional health, but also physical health.

Strengths and limitations of the studies on bariatric surgery candidates

The studies reviewed [28–32] assessed the prevalence rates of psychopathology in bariatric surgery candidates avoiding many key methodological flaws. A notable strength of all the studies is the relatively large sample size, providing better estimates than previous studies with generally smaller samples. Other strengths include the fact that the assessments were conducted across several clinical sites, the use of carefully trained assessors, and the use of Structured Clinical interviews for DSM-IV (SCID) which can provide reliable and valid psychiatric diagnoses [87–90]. Thus, these studies provide valuable information to professionals working with bariatric surgery candidates.

However, none of the studies had included a BMI-matched control group, which would have been useful in interpreting the results. Not all the psychopathology studies were independent of the evaluation process for surgery [28, 30], which might have led severely obese candidates to minimize current level of distress and symptom status in order to present themselves as psychologically healthy candidates. Information about medical co-morbidities and medication usage was not provided in most of the studies, which could be important confounding factors. The only study reviewed here that somewhat addressed this was the study of Mitchell et al. [32], who reported that the most common medication class used among their sample in the previous 90 days was antidepressant drugs (40.7%). Another study on bariatric surgery candidates which addressed medication usage was that of Sarwer et al. [5], who reported that more than half of their sample was receiving some form of psychiatric treatment during evaluation, with antidepressants being the most common class of drugs used in these patients. The current use of antidepressants should be considered during evaluation because it raises the possibility that the low current rate of major depression in these subjects could be because they were being successfully treated with medication. The health care systems also differ between countries included in the studies: in Germany, about 0.3% of all citizens are without a health care insurance [91]; in the US, about 16% are without it. It can be assumed that virtually all people without health care insurance do not qualify for bariatric surgery [92]; this might be a confounding factor for the selection of patients in these studies.

Impact of psychopathology on outcomes of bariatric surgery

Assessment of prevalence of psychopathology in bariatric surgery candidates is important, due to the possibility of significant effects of these disorders on various outcomes of bariatric surgery, particularly weight loss [93]. However the literature here is limited. Patients with psychiatric disorders are thought to have greater risk for somatic and psychological complications after bariatric surgery. However, various studies provide conflicting results and no clear predictors [94, 95]. Some studies have found poor weight

loss postoperatively in the presence of preoperative personality disorders [96], mood disorders [97–99], or eating disorders [100–103]. However, there are also many studies that could not find any relationship between the presence or absence of preoperative psychiatric disturbances and weight loss after surgery [57, 104–108]. In 2008, Kalarchian et al. [109] conducted a study to document the relationship of preoperative psychiatric disorders, assessed using SCID, to the 6-month outcomes after gastric bypass. They found that the presence of a lifetime Axis I disorder, especially mood or anxiety disorder was associated with poorer weight outcomes up to six months after surgery. However, current Axis I disorders and Axis II personality disorders were unrelated to outcomes at six months.

De Zwaan et al. [110] investigated the prognostic significance of preoperative and postoperative anxiety and depressive disorders in bariatric surgery patients, again using the SCID, conducted prior to the surgery and postoperatively after 6-12 months and 24-36 months. They reported that the point prevalence of depressive disorders but not of anxiety disorders decreased significantly after surgery. Preoperative depressive disorders predicted depressive disorders at 24-36 months following surgery, but not 6-12 months after surgery, whereas preoperative anxiety predicted postoperative anxiety disorders at both follow-up time points. Only preoperative current anxiety disorders were of negative prognostic value for postoperative weight loss. Thus, presence of psychological disorders cannot be taken as a criterion for exclusion of candidates for obesity surgery [111]. Only a few absolute psychiatric contraindications of bariatric surgery have been reported, including active psychosis, dementia and active alcohol or other substance use disorders. Interestingly, bariatric surgery has been found to exert a favorable effect on the course and outcome of some psychiatric conditions, such as, bipolar disorder [112], schizophrenia [113], and Prader-Willi Syndrome [114, 115], all of which are associated with obesity.

There are several limitations to the finding. First, at times the comparator groups are not necessarily directly comparable on all variables. Second, the description information we were able to obtain about many of these samples was quite limited. Third, we could not obtain data on, or assess, the influence of several other important variables, such as comorbidities and concomitant modifications.

Summary

Given the increasing population of bariatric surgery patients, evaluation of patients' preoperative psychiatric status may play an important role in maximizing successful postoperative outcomes. Systematic diagnostic assessment can be done using a structured diagnostic interview (SCID) for determining the full spectrum of Axis I disorders. Although obesity surgery is not contraindicated based on most psychiatric disorders, adequate preoperative treatment and postoperative psychological support should be provided to increase the long-term success of these operations and reduce the risk of complications.

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References

1. Wooley SC, Wooley OW, Dyrenforth SR. Theoretical, practical, and social issues in behavioral treatments of obesity. J App Behav Anal. 1979; 12:3–25.
2. Stunkard AJ, Stinnett JL, Smoller JW. Psychological and social aspects of the surgical treatment of obesity. Am J Psychiatry. 1986; 143:417–429. [PubMed: 3513632]
3. Friedman MA, Brownell KD. Psychological correlates of obesity: moving to the next research generation. Psychol Bull. 1995; 117:3–20. [PubMed: 7870862]
4. Stunkard AJ, Wadden TA. Psychological aspects of severe obesity. Am J Clin Nutr. 1992; 55:524S–532S. [PubMed: 1733121]
5. Sarwer DB, Cohn NI, Gibbons LM, Magee L, Crerand CE, Raper SE, et al. Psychiatric diagnoses and psychiatric treatment among bariatric surgery candidates. Obes Surg. 2004; 14:1148–1156. [PubMed: 15527626]
6. Black DW, Goldstein RB, Mason EE. Prevalence of mental disorder in 88 morbidly obese bariatric clinic patients. Am J Psychiatry. 1992; 149:227–234. [PubMed: 1734744]
7. Adami GF, Gandolfo P, Bauer B, Scopinaro N. Binge eating in massively obese patients undergoing bariatric surgery. Int J Eat Disord. 1995; 17:45–50. [PubMed: 7894452]
8. de Zwaan M, Mitchell JE, Howell LM, Monson N, Swan-Kremeier L, Crosby RD, et al. Characteristics of morbidly obese patients before gastric bypass surgery. Compr Psychiatry. 2003; 44:428–434. [PubMed: 14505305]
9. Sánchez-Román S, López-Avarenga JC, Vargas-Martinez A, Téllez-Zenteno JF, Vázquez-Velázquez V, Arcila-Martinez D, et al. Prevalence of psychiatric disorders in patients with severe obesity waiting for bariatric surgery. Rev Invest Clin. 2003; 55:400–406. [PubMed: 14635603]
10. Wadden TA, Sarwer DB, Womble LG, Foster GD, McGuckin BG, Schimmel A. Psychosocial aspects of obesity and obesity surgery. Surg Clin North Am. 2001; 81:1001–1024. [PubMed: 11589242]
11. Prather RC, Williamson DA. Psychopathology associated with bulimia, binge eating, and obesity. Int J Eating Disord. 1988; 7:177–184.
12. Fitzgibbon ML, Stolley MR, Kischenbaum DS. Obese people who seek treatment have different characteristics than obese people who do not seek treatment. Health Psychol. 1993; 12:342–345. [PubMed: 8223357]
13. Higgs ML, Wade T, Cescato M, Atchison M, Slavotinek A, Higgins B. Differences between treatment seekers in an obese population: medical intervention vs. dietary restriction. J Behav Med. 1997; 20:391–405. [PubMed: 9298437]
14. Sullivan M, Karlsson J, Sjöström L, Backman L, Bengtsson C, Bouchard C, et al. Swedish obese subjects (SOS)—an intervention study of obesity. Baseline evaluation of health and psychosocial functioning in the first 1743 subjects examined. Int J Obes Relat Metab Disord. 1993; 17:503–512. [PubMed: 8220652]
15. Onyike CU, Crum RM, Lee HB, Lyketsos CG, Eaton WW. Is obesity associated with major depression? Results from the Third National Health and Nutrition Examination Survey. Am J Epidemiol. 2003; 158:1139–1147. [PubMed: 14652298]
16. Telch CF, Agras WS, Rossiter EM. Binge eating increases with increasing adiposity. Int J Eat Disord. 1988; 7:115–119.
17. Yanovski SZ. Binge eating disorder and obesity in 2003: could treating an eating disorder have a positive effect on the obesity epidemic? Int J Eat Disord. 2003; 34:S117–S120. [PubMed: 12900992]
18. Grissett NI, Fitzgibbon ML. The clinical significance of binge eating in an obese population: support for BED and questions regarding its criteria. Addic Behav. 1996; 21:57–66.
19. Telch CF, Stice E. Psychiatric comorbidity in women with binge eating disorder: prevalence rates from a non-treatment-seeking sample. J Consult Clin Psychol. 1998; 66:768–776. [PubMed: 9803695]
20. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K. Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004; 292:1724–1737. [PubMed: 15479938]

21. Wells KB, Golding JM, Burnam MA. Psychiatric disorder in a sample of the general population with and without chronic medical conditions. Am J Psychiatry. 1988; 145:976–981. [PubMed: 2969199]
22. Dew, MA. Psychiatric disorder in the context of physical illness, in Adversity, Stress, and Psychopathology. New York: Oxford University Press; 1998.
23. Schleifer SJ, Macari-Hinson MM, Coyle DA, Slater WR, Kahn M, Gorlin R, et al. The nature and course of depression following myocardial infarction. Arch Intern Med. 1989; 149:1785–1789. [PubMed: 2788396]
24. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. Diabetes Care. 2001; 24:1069–1078. [PubMed: 11375373]
25. Scott KM, Oakley Browne MA, McGee MA, Wells JE. New Zealand Mental Health Survey Research Team. Mental-physical comorbidity in Te Rau Hinengaro: the New Zealand Mental Health Survey. Aust N Z J Psychiatry. 2006; 40:882–888. [PubMed: 16959014]
26. Rohde P, Lewinsohn PM, Seeley JR. Comparability of telephone and face-to-face interviews in assessing axis I and II disorders. Am J Psychiatry. 1997; 154:1593–1598. [PubMed: 9356570]
27. Beck SM, Perry JC. The definition and function of interview structure in psychiatric and psychotherapeutic interviews. Psychiatry. 2008; 71:1–12. [PubMed: 18377202]
28. Rosenberger PH, Henderson KE, Grilo CM. Psychiatric disorder comorbidity and association with eating disorders in bariatric surgery patients: A cross-sectional study using structured interview-based diagnosis. J Clin Psychiatry. 2006; 67:1080–1085. [PubMed: 16889451]
29. Kalarchian MA, Marcus MD, Levine MD, Courcoulas AP, Pilkonis PA, Ringham RM, et al. Psychaitric disorders among bariatric surgery candidates: Relationship to obesity and functional health status. Am J Psychaitry. 2007; 164:328–334.
30. Mauri M, Rucci P, Calderone A, Santini F, Oppo A, Romano A, et al. Axis I and II disorders and quality of life in bariatric surgery candidates. J Clin Psychiatry. 2008; 69:295–301. [PubMed: 18251626]
31. Mühlhans B, Horbach T, de Zwaan M. Psychiatric disorders in bariatric surgery candidates: a review of the literature and results of a German prebariatric surgery sample. Gen Hosp Psychiatry. 2009; 31:414–421. [PubMed: 19703634]
32. Mitchell JE, Selzer F, Kalarchain MA, Devlin MJ, Strain GW, Elder KA, et al. Psychopathology before surgery in the longitudinal assessment of bariatric surgery-3 (LABS*-3)psychosocial study. Surg Obes Relat Dis. 2012; 8:533–541. [PubMed: 22920965]
33. Grilo CM, Masheb RM, Brody M, Toth C, Burke-Martindale CH, Rothschild BS. Childhood maltreatment in extremely obese male and female bariatric surgery candidates. Obes Res. 2005; 13:123–130. [PubMed: 15761171]
34. Gustafson TB, Sarwer DB. Childhood sexual abuse and obesity. Obes Rev. 2004; 5:129–135. [PubMed: 15245381]
35. Williamson DF, Thompson TJ, Anda RF, Dietz WH, Felitti V. Body weight and obesity in adults and self-reported abuse in childhood. Int J Obes Relat Metab Disord. 2002; 26:1075–1082. [PubMed: 12119573]
36. Wonderlich SA, Crosby RD, Mitchell JE, Thompson KM, Redlin J, Demuth G, et al. Eating disturbance and sexual trauma in childhood and adulthood. Int J Eat Disord. 2001; 30:410–412.
37. Kleiner KD, Gold MS, Frost-Pineda K, Lenz-Brunsman B, Perri MG, Jacobs WS. Body mass index and alcohol use. J Addict Dis. 2004; 23:105–118. [PubMed: 15256347]
38. Simon GE, Von Kroff M, Saunders K, Miglioretti DL, Crane PK, van Belle G, et al. Association between obesity and psychiatric disorders in the US adult population. Arch Gen Psychiatry. 2006; 63:824–830. [PubMed: 16818872]
39. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005; 62:593–602. [PubMed: 15939837]
40. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005; 62:617–627. [PubMed: 15939839]

41. Herpertz S, Burgmer R, Stang A, de Zwaan M, Wolf AM, Chen-Stute A, et al. Prevalence of mental disorders in normal-weight and obese individuals with and without weight loss treatment in a German urban population. J Psychosom Res. 2006; 61:95–103. [PubMed: 16813851]
42. de Girolamo G, Polidori G, Morosini P, Scarpino V, Reda V, Serra G. Prevalence of common mental disorders in Italy: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD). Soc Psychiatry Psychiatr Epidemiol. 2006; 41:853–861. [PubMed: 16915360]
43. Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP, et al. Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. JAMA. 2004; 291:2581–2590. [PubMed: 15173149]
44. Scott KM, Bruffaerts R, Simon GE, Alonso J, Angermeyer M, de Girolamo G, et al. Obesity and mental disorders in the general population: results from the world mental health surveys. Int J obes (Lond). 2008; 32:192–200. [PubMed: 17712309]
45. Wadden TA, Stunkard AJ. Psychopathology and obesity. Ann N Y Acad Sci. 1987; 499:55–65. [PubMed: 3300493]
46. Mitchell JE, Steffen KJ, de Zwaan M, Ertelt TW, Mrino JM, Mueller A. Congruence between clinical and research-based psychiatric assessment in bariatric surgery candidates. Surg Obes Relat Dis. 2010; 6:628–634. [PubMed: 20727837]
47. Haro JM, Arbabzadeh-Bouchez S, Brugha TS, de Girolamo G, Guyer ME, Jin R, et al. Concordance of the Composite International Diagnostic Interview Version 3.0 with standardized clinical assessments in the WHO World Mental Health Surveys. Int J Methods Psychiatr Res. 2006; 15:167–180. [PubMed: 17266013]
48. Keel PK, Crow S, Davis TL, Mitchell JE. Assessment of eating disorders: comparison of interview and questionnaire data from a long-term follow-up study of bulimia nervosa. J Psychosom Res. 2002; 53:1043–1047. [PubMed: 12445594]
49. Weeks MF, Kulka RA, Lessler JT, Whitmore RW. Personal versus telephone surveys for collecting household health data at the local level. Am J Public Health. 1983; 73:1389–1394. [PubMed: 6638234]
50. Fenig S, Levav I, Kohn R, Yelin N. Telephone vs face-to-face interviewing in a community psychiatric survey. Am J Public Health. 1993; 83:896–898. [PubMed: 8498632]
51. Paulsen AS, Crowe RR, Noves R, Pfohl B. Reliability of the telephone interview in diagnosing anxiety disorders. Arch Gen Psychiatry. 1998; 45:62–63. [PubMed: 3337610]
52. Wells KB, Burnam MA, Leake B, Robins LN. Agreement between face-to-face and telephone-administered versions of the depression section of the NIMH Diagnostic Interview Schedule. J Psychiatr Res. 1988; 22:207–220. [PubMed: 3225790]
53. Fabricatore AN, Sarwer DB, Wadden TA, Combs CJ, Krasucki JL. Impression management or real change? Reports of depressive symptoms before and after the preoperative psychological evaluation for bariatric surgery. Obes Surg. 2007; 17:1213–1219. [PubMed: 18074497]
54. Machado PP, Machado BC, Goncalves S, Hoek HW. The prevalence of eating disorders not otherwise specified. Int J Eat Disord. 2007; 40:212–217. [PubMed: 17173324]
55. Carpenter KM, Hasin DS, Allison DB, Faith MS. Relationships between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: results from a general population study. Am J Public Health. 2000; 90:251–257. [PubMed: 10667187]
56. Palinkas LA, Wingard DL, Barrett-Connor E. Depressive symptoms in overweight and obese older adults: a test of the"jolly fat" hypothesis. J Psychosom Res. 1996; 40:59–66. [PubMed: 8730645]
57. Powers PS, Rosemurgy A, Boyd F, Perez A. Outcome of gastric restriction procedures: weight, psychiatric diagnoses, and satisfaction. Obes Surg. 1997; 7:471–477. [PubMed: 9730503]
58. Halmi KA, Long M, Stunkard AJ, Mason E. Psychiatric diagnosis of morbidly obese gastric bypass patients. Am J Psychiatry. 1980; 137:470–472. [PubMed: 7361935]
59. Bebbington, PE. The social epidemiology of clinical depression. In: Henderson, AS.; Burrows, G., editors. Handbook of social psychiatry. Elsevier; 1988. p. 87-102.
60. Heo M, Pietrobelli A, Fontaine KR, Sirey JA, Faith MS. Depressive mood and obesity in US adults: comparison and moderation by age, sex, and race. Int J Obes (Lond). 2006; 30:513–519. [PubMed: 16302017]

61. McLaren L. Socioeconomic status and obesity. Epidemiol Rev. 2007; 29:29–48. [PubMed: 17478442]
62. Snyder, TD.; Dillow, SA.; Hoffman, CM. Digest of Education Statistics 2006. Washington DC: U.S. Government Printing Office; 2007.
63. Pickering RP, Grant BF, Chou SP, Compton WM. Are overweight, obesity, and extreme obesity associated with psychopathology? Results from the national epidemiologic survey on alcohol and related conditions. J Clin Psychiatry. 2007; 68:998–1009. [PubMed: 17685734]
64. Faith MS, Matz PE, Jorge MA. Obesity-depression associations in the population. J Psychosom Res. 2002; 53:935–942. [PubMed: 12377306]
65. Yanovski SZ, Nelson JE, Dubbert BK, Spitzer RL. Association of binge eating disorder and psychiatric comorbidity in obese subjects. Am J Psychiatry. 1993; 150:1472–1479. [PubMed: 8379549]
66. Specker S, de Zwaan M, Raymond N, Mitchell J. Psychopathology in subgroups of obese women with and without binge eating disorder. Compr Psychiatry. 1994; 35:185–190. [PubMed: 8045108]
67. de Zwaan M. Binge eating disorder and obesity. Int J Obes Relat Metab Disord. 2001; 25:S51–S55. [PubMed: 11466589]
68. Javaras KN, Pope HG, Lalonde JK, Roberts JL, Nillni YI, Laird NM, et al. J Clin Psychiatry. 2008; 69:266–273. [PubMed: 18348600]
69. Grucza RA, Przybeck TR, Cloninger CR. Prevalence and correlates of binge eating disorder in a community sample. Compr Psychiatry. 2007; 48:124–131. [PubMed: 17292702]
70. Bocchieri LE, Meana M, Fisher BL. A review of psychosocial outcomes of surgery for morbid obesity. J Psychosom Res. 2002; 52:155–165. [PubMed: 11897234]
71. Hsu LK, Mulliken B, McDonagh B, Krupa Das S, Rand W, Fairburn CG, et al. Binge eating disorder in extreme obesity. Int J Obes Relat Metab Disord. 2002; 26:1398–1403. [PubMed: 12355338]
72. Jones-Corneille LR, Wadden TA, Sarwer DB, Faulconbridge LF, Fabricatore AN, Stack RM. Axis I psychopathology in bariatric surgery candidates with and without binge eating disorder: results of structured clinical interviews. Obes Surg. 2012; 22:389–397. [PubMed: 21088923]
73. Telch CF, Stice E. Psychiatric comorbidity in women with binge eating disorder: prevalence rates from a non-treatment-seeking sample. J Consult Clin Psychol. 1998; 66:768–776. [PubMed: 9803695]
74. White MA, Grilo CM. Psychiatric comorbidity in binge-eating disorder as a function of smoking history. J Clin Psychiatry. 2006; 67:594–599. [PubMed: 16669724]
75. Stunkard AJ, Allison KC. Binge eating disorder: disorder or marker? Int J Eat Disord. 2003; 34:S107–S116. [PubMed: 12900991]
76. Picot AK, Lilenfeld LR. The relationship among binge severity, personality psychopathology,, and body mass index. Int J Eat Disord. 2003; 34:98–107. [PubMed: 12772174]
77. Choban PS, Onyejekwe J, Burge JC. A health status assessment of the impact of weight loss following Roux-en-Y gastric bypass for clinically severe obesity. J Am Coll Surg. 1999; 188:491–497. [PubMed: 10235576]
78. Schok M, Greenen R, van Antwerpen T. Quality of life after laparoscopic adjustable gastric banding for severe obesity: postoperative and retrospective preoperative evaluations. Obes Surg. 2000; 10:502–508. [PubMed: 11175956]
79. Corica F, Corsonello A, Apolone G, Lucchetti M, Melchionda N, Marchesini G, et al. Construct validity of the Short Form-36 Health Survey and its relationship with BMI in obese outpatients. Obesity (Silver Spring). 2006; 14:1429–1437. [PubMed: 16988086]
80. Larson JS. The MOS 36-item short form health survey. A conceptual analysis. Eval Health Prof. 1997; 20:14–27. [PubMed: 10183310]
81. Fontaine KR, Cheskin LJ, Barofsky I. Health-related quality of life in obese persons seeking treatment. J Fam Pract. 1996; 43:265–270. [PubMed: 8797754]
82. Fontaine KR, Bartlett SJ, Barofsky I. Health-related quality of life among obese persons seeking and not currently seeking treatment. Int J Eat.

85. Kolotkin RL, Crosby RD, Pendleton R, Strong M, Gress RE, Adams T. Health-related quality of life in patients seeking gastric bypass surgery vs non-treatment-seeking controls. Obes Surg. 2003; 13:371–377. [PubMed: 12841896]

86. Endicott J, Nee J, Harrison W, Blumenthal R. Quality of Life Enjoyment and Satisfaction Questionnaire: a new measure. Psychopharmacol Bull. 1993; 29:321–326. [PubMed: 8290681]

87. Kranzler HR, Kadden RM, Babor TF, Tennen H, Rounsaville BJ. Validity of the SCID in substance abuse patients. Addiction. 1996; 91:859–868. [PubMed: 8696248]

88. Lobbestael J, Leurgans M, Arntz A. Inter-rater reliability of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID I) and Axis II Disorders (SCID II). Clin Psychol Psychother. 2011; 18:75–79. [PubMed: 20309842]

89. Zanarini MC, Skodol AE, Bender D, Dolan R, Sanislow C, Schaefer E, et al. The Collaborative Longitudinal Personality Disorders Study: reliability of axis I and II diagnoses. J Pers Disord. 2000; 14:291–299. [PubMed: 11213787]

90. Nordgaard J, Revsbech R, Sæbye D, Parnas J. Assessing the diagnostic validity of a structured diagnostic interview in a first-admission hospital sample. World Psychiatry. 2012; 11:181–185. [PubMed: 23024678]

91. Statistisches Bundesamt. 1. Quartal 2007: Meher als 200 000 Menschen waren nicht krankenversichert Pressemitteilung – Ergebnisse des Mikrozensus Statistisches Bundesamt Deutschland. 2008.

92. DeNavas-Walt, C.; Proctor, BD.; Smith, J. Income, Poverty, and Health Insurance Coverage in the United States: 2006. Washington, DC: US. Census Bureau; 2007.

93. Lier HO, Biringer E, Stubhaug B, Tangen T. Prevalence of psychiatric disorders before and 1 year after bariatric surgery: The role of shame in maintenance of psychiatric disorders in patients undergoing bariatric surgery. Nord J Psychiatry. 2012

94. Livhitis M, Mercado C, Yermilov I, Parikh J, Dutson E, Mehran A, et al. Preoperative predictors of weight loss following bariatric surgery: systematic review. Obes Surg. 2012; 22:70–89. [PubMed: 21833817]

95. Herpertz S, Kielmann R, Wolf AM, Hebebrand J, Senf W. Do psychosocial variables predict weight loss or mental health after obesity surgery? A systematic review. Obes Surg. 2004; 12:1554–1569.

96. Guisado JA, Vaz FJ. Personality profiles of the morbidly obese after vertical banded gastroplasty. Obes Surg. 2003; 13:394–398. [PubMed: 12841900]

97. Semanscin-Doerr DA, Windover A, Ashton K, Heinberg LJ. Mood disorders in laparoscopic sleeve gastrectomy patients: does it affect early weight loss? Surg Obes Relat Dis. 2010; 6:191–196. [PubMed: 20189470]

98. Rydén A, Karlsson J, Sullivan M, Torgerson JS, Taft C. Coping and distress: what happens after intervention? A 2-year follow-up from the Swedish Obese Subjects (SOS) study. Psychosom Med. 2003; 65:435–442. [PubMed: 12764217]

99. Delin CR, Watts JM, Bassett DL. An Exploration of the Outcomes of Gastric Bypass Surgery for Morbid Obesity: Patient Characteristics and Indeces of Success. Obes Surg. 1995; 5:159–170. [PubMed: 10733806]

100. Hsu LK, Sullivan SP, Benotti PN. Eating disturbances and outcome of gastric bypass surgery: a pilot study. Int J Eat Disord. 1997; 21:385–390. [PubMed: 9138051]

101. Hsu LK, Benotti PN, Dwyer J, Roberts SB, Saltzman E, Shikora S, et al. Nonsurgical factors that influence the outcome of bariatric surgery: a review. Psychosom Med. 1998; 60:338–346. [PubMed: 9625222]

102. Sallet PC, Sallet JA, Dixon JB, Collis E, Piscani CE, Levy A, et al. Eating behavior as a prognostic factor for weight loss after gastric bypass. Obes Surg. 2007; 17:445–451. [PubMed: 17608254]

103. Green AE, Dymek-Valentine M, Pytluk S, Le Grange D, Alverdy J. Psychosocial outcome of gastric bypass surgery for patients with and without binge eating. Obes Surg. 2004; 14:975–985. [PubMed: 15329189]

104. Colles SL, Dixon JB, O'Brien PE. Hunger control and regular physical activity facilitate weight loss after laparoscopic adjustable gastric banding. Obes Surg. 2008; 18:833–840. [PubMed: 18408982]

105. Wolfe BL, Terry ML. Expectations and outcomes with gastric bypass surgery. Obes Surg. 2006; 16:1622–1629. [PubMed: 17217639]

106. Dixon JB, Dixon ME, O'Brien PE. Pre-operative predictors of weight loss at 1-year after Lap-Band surgery. Obes Surg. 2001; 11:200–207. [PubMed: 11355027]

107. Bussetto L, Segato G, De Marchi F, Foletto M, De Lucia M, Caniato D, et al. Outcome predictors in morbidly obese recipients of an adjustable gastric band. Obes Surg. 2002; 12:83–92. [PubMed: 11868305]

108. Black DW, Goldstein RB, Mason EE. Psychiatric diagnosis and weight loss following gastric surgery for obesity. Obes Surg. 2003; 13:746–751. [PubMed: 14627470]

109. Kalarchian MA, Marcus MD, Levine MD, Soulakova JN, Courcoulas AP, Wisinski MS. Relationship of psychiatric disorders to 6-month outcomes after gastric bypass. Surg Obes Relat Dis. 2008; 4:544–549. [PubMed: 18514586]

110. de Zwaan M, Enderle J, Wagner S, Mühlhans B, Ditzen B, Gefeller O, et al. Anxiety and depression in bariatric surgery patients: a prospective, follow up study using structured clinical interviews. J Affect Disord. 2011; 133:61–68. [PubMed: 21501874]

111. van Hout GC, Verschure SK, van Heck GL. Psychosocial predictors of success following bariatric surgery. Obes Surg. 2005; 15:552–560. [PubMed: 15946437]

112. Ahmed AT, Blair TR, McIntyre RS. Surgical treatment of morbid obesity among patients with bipolar disorder: a research agenda. Adv Ther. 2011; 28:389–400. [PubMed: 21479752]

113. Hamoui N, Kingsbury S, Anthone GJ, Crookes PF. Surgical treatment of morbid obesity in schizophrenic patients. Obes Surg. 2004; 14:349–352. [PubMed: 15072656]

114. Fong AK, Wong SK, Lam CC, Ng EK. Ghrelin level and weight loss after laparoscopic sleeve gastrectomy and gastric mini-bypass for Prader-Willi syndrome in Chinese. Obes Surg. 2012; 22:1742–1745. [PubMed: 22923339]

115. Braghetto I, Rodriguez A, Debandi A, Brunet L, Papapietro K, Pineda P, et al. Prader-Willi Syndrome (PSW) associated to morbid obesity: a surgical treatment. Rev Med Chil. 2003; 131:427–431. [PubMed: 12870238]

Table 1

Rates of lifetime Axis I psychiatric disorders in bariatric surgery candidates assessed using SCID interviews

Authors (year)	Rosenberger et al. [28] (2006)		Kalarchian et al. [29] (2007)		Mauri et al. [30] (2008)		Mühlhans et al. [31] (2009)		Mitchell et al. [32] (2012)	
Location	**USA**		**USA**		**Italy**		**Germany**		**USA**	
Sample size (N)	**174**		**288**		**282**		**146**		**199**	
	Lifetime	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**
Any Axis I disorder (%)	36.8	24.1	66.3	37.8	37.6	20.9	72.6	55.5	68.6	33.7
Any affective disorder (%)	22.4	10.9	45.5	15.6	22	6.4	54.8	31.5	44.2	11.6
Major depressive disorder	14.9	3.4	42.0	10.4	19.1	4.6	50.7	25.3	38.7	7.0
Dysthymia	5.7	5.7	0.0	3.8	3.1	1.1	8.2	6.2	3.5	3.5
Bipolar I	NA	NA	3.5	1.7	1.1	0.4	NA	NA	NA	NA
Any anxiety disorder (%)	15.5	11.5	37.5	24	18.1	12.4	21.2	15.1	31.7	18.1
Social phobia	NA	NA	9.4	9.0	3.2	2.8	6.2	6.2	6.0	3.0
Specific phobia	5.7	5.7	8.0	7.3	5.3	5.0	7.5	6.8	12.6	11.1
Posttraumatic stress disorder	NA	NA	11.8	2.8	1.8	1.1	8.9	4.1	11.1	3.0
Obsessive-compulsive	NA	NA	3.8	2.1	2.8	2.1	NA	NA	NA	NA
Panic disorder	NA	NA	19.4	5.9	8.5	4.6	NA	NA	NA	NA
Generalized anxiety disorder	NA	NA	0.0	6.3	1.1	1.1	NA	NA	NA	NA
Anxiety disorder, not otherwise specified	NA	NA	NA	NA	0.4	NA	NA	NA	NA	NA
Any substance use disorder (%)	5.2	0.6	32.6	1.7	1.1	NA	15.1	1.4	35.7	1.0
Alcohol abuse/dependence	4.0	0.6	30.9	0.7	0.7	NA	11.0	0.7	33.2	0.5
Other drug abuse/dependence	2.3	0.0	16.0	1.0	0.4	NA	6.2	0.7	7.5	0.5
Any eating disorder (%)	13.8	10.3	29.5	16.3	12.8	7.1	50.0	37.7	26.6	11.1
Binge eating disorder (BED)	4.6	3.4	27.1	16.0	11.0	6.7	NA	23.3	13.1	10.1
Bulimia nervosa	0.0	0.0	3.5	0.3	1.8	0.4	6.8	0.0	2.5	1.0
EDNOS*	9.2	6.9	NA	NA	NA	NA	NA	14.4	13.1	NA

Authors (year)	Rosenberger et al. [28] (2006)		Kalarchian et al. [29] (2007)		Mauri et al. [30] (2008)		Mühlhans et al. [31] (2009)		Mitchell et al. [32] (2012)	
Location	**USA**		**USA**		**Italy**		**Germany**		**USA**	
Sample size (N)	**174**		**288**		**282**		**146**		**199**	
	Lifetime	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**	**Lifetime**	**Current**
Adjustment disorder (%)	1.1	1.1	NA	NA	NA	NA	NA	NA	NA	NA
Any somatoform disorder (%)	NA	NA	NA	NA	NA	NA	3.4	3.4	NA	NA

*EDNOS= eating disorder, not otherwise specified

Table 2

Cross-national comparison of lifetime prevalences of psychiatric disorders in different population groups

	General population sample			Obese individuals not seeking treatment			Obese individuals seeking bariatric surgery		
Geographical Location	**US**	**Germany**	**Italy**	**US**	**Germany**	**Italy**	**US**	**Germany**	**Italy**
Authors (sample size, N)	**Kessler et al. [39] (2005) (N=9280)**	**Herpertz et al. [41] (2005) (N=174)**	**Girolamo et al. [42] (2006) (N=4712)**	**Simon et al. [38] (2006) (N=2330)**	**Herpertz et al. [41] (2005) (N=128)**		**Rosenberger et al. [28] (2006) (N=174); Kalarchian et al. [29] (2007) (N=288); Mitchell et al. [32] (2012) (N=199)**	**Mühlhans et al. [31] (2009) (N=146)**	**Mauri et al. [30] (2008) (N=282)**
Instrument Used	**CIDI***	**CIDI**	**CIDI**	**CIDI**	**CIDI**		**SCID****	**SCID**	**SCID**
Any psychiatric disorder (%)	46.4	38.5	18.3	-	48.4		57.2 (Range=36.8–68.6)	72.6	37.6
Any mood disorder (%)	20.8	16.1	11.2	22.0	14.8		37.4 (Range=22.4–5.5)	54.8	22
Major Dep. Dis.	16.6	15.0	10.1	18.6	11.7		31.9 (Range=14.9–42.0)	50.7	19.1
Dysthymia	2.5	0.6	3.4	-	3.1		3.1 (Range=0.0–5.7)	8.2	3.1
Any anxiety disorder (%)	28.8	8.6	11.1	12.3	16.4		28.2 (Range=15.5–37.5)	21.2	18.1
Social phobia	12.1	2.3	2.1	-	2.4		7.7 (Range=6.0–9.4)	6.2	3.2
Specific phobia	12.5	5.2	5.7	-	12.5		8.8 (Range=5.7–12.6)	7.5	5.3
Panic disorder	4.7	0.6	1.6	7.1	0.8		19.4	-	8.5
Post-Traumatic Stress Dis.	6.8	2.3	2.3	-	3.9		11.5 (Range=11.1–11.8)	8.9	1.8
General Anxiety Dis.	5.7	1.2	1.9	6.5	1.6		0.45 (Range=0.0–0.9)	-	1.1
Any substance use disorder(%)	14.5	19.0	1.0	12.8	29.7		24.5 (Range=5.2–35.7)	15.1	1.1
Alcohol abuse/dependency	18.6	4.6	1.1	-	4.7		26.0 (Range=4.0–40.7)	11.0	0.7
Other drug abuse/dependency	10.9	20.7	-	-	25.8		8.6 (Range=2.3–16.0)	6.2	0.4
Any Eating Disorder (%)	-	5.7	-	-	7.04		19.6 (Range=13.1–29.5)	50	12.8

Data for non-treatment seeking obese group was not found for Italian population

*CIDI: Composite International Diagnostic Interviews

** SCID: Structured Clinical Interview of DSM-IV

Table 3

Cross-national comparison of current prevalences of psychiatric disorders in different population groups

	General population sample					Obese individuals not seeking treatment			Obese individuals seeking bariatric surgery		
Geographical location	**US**	**Germany**		**Italy**		**US**	**Germany**	**Italy**	**US**	**Germany**	**Italy**
Authors (sample size, N)	**Kessler et al. [40] (2005) (N=9282); Demyttenaere et al. [43] (2004) (N=9282)**	**Herpertz et al. [41] (2005) (N=174); Demyttenaere et al. [43] (2004) (N=3555)**		**Girolamo et al. (2006) [42] (N=4712); Demyttenaere et al. [43] (2004) (N=4712)**		**Simon et al. [38] (2006) (N=2330); Scott et al. [44] (2008) (N=2330)**	**Herpertz et al. [41] (2005) (N=128); Scott et al. [44] (2008) (N=450)**	**Scott et al. [44] (2008) (N=478)**	**Rosenberger et al. [28] (2006) (N=174); Kalarchian et al. [29] (2007) (N=288); Mitchell et al. [32] (2012) (N=199)**	**Mühlhans et al. [31] (2009) (N=146)**	**Mauri et al. [30] (2008) (N=282)**
Instrument used	**CIDI***	**CIDI**		**CIDI**		**CIDI**	**CIDI**	**CIDI**	**SCID****	**SCID**	**SCID**
	12 month	Current	12 month	Current	12 month	12 month	12 month	12 month	Current	Current	Current
Any psychiatric disorder (%)	26.2	15.4	9.1	7.3	3.2	-	27.3	-	31.9 (Range=24.1–37.8)	55.5	20.9
Any mood disorder (%)	9.5	2.3	3.6	3.5	1.5	9.6	12.1	3.0	12.7(Range=10.9–15.6)	31.5	6.4
Major Dep. Dis.	6.7	4.2	-	3.0	1.4	7.2	4.7	-	6.9 (Range=3.4–10.4)	25.3	4.6
Dysthymia	1.5	0.6	-	1.0	0.5	-	1.6	-	4.3(Range=3.5–5.7)	6.2	1.1
Any anxiety disorder	18.1	4.6	6.2	5.1	2.2	18.1	11.6	2.4	17.9 (Range=11.5–24)	15.1	12.4
Social phobia	6.8	0.6		1.0	0.2	-	1.6		6.0 (Range=3.0–9.0)	6.2	2.8
Specific phobia	8.7	2.9		2.7	1.3	-	10.2		8.0 (Range=5.7–11.1)	6.8	5
Panic disorder	2.7	0		0.6	0.3	4.6	0		5.9	-	4.6
Post -Traumatic Stress Dis.	3.5	0		0.8	0.4	-	0		2.9 (Range=2.8–3.0)	4.1	1.1
Gen. Anx. Dis.	3.1	0		0.5	0.2	2.9	2.4		6.3	-	1.1
Any substance use disorder(%)	3.8	8.6	1.1	0.1	0.1	2.9	10.9		1.1 (Range=0.6–1.7)	0.9	-
Alcohol abuse/dependency	4.4	0		0.1	0.1	-	0.8		0.6 (Range=0.5–0.7)	-	
Other drug abuse/dependency	1.8	8.6		-		-	10.2		0.5 (Range=0.0–1.0)	0.9	
Any eating disorder (%)	-	-	-	-	-	-	-	-	12.6 (Range=10.3–16.3)	37.7	7.1

* CIDI: Composite International Diagnostic Interviews

** SCID: Structured Clinical Interview of DSM-IV

Table 4

Demographic characteristics of pre-bariatric surgery samples

	Rosenberger et al. [28] (2006) (N=174)	Kalarchian et al. [29](2007) (N=288)	Mauri et al. [30](2008) (N=282)	Mühlhans et al. [31](2009) (N=146)	Mitchell et al. [32] (2012) (N=199)
Gender (female) (%)	75.3	83.3	79.8	71.9	82.9
Ethnicity (white) (%)	68.4	88.2	-	-	92.4
Mean age, years (SD)	42.9 (11.1)	46.2 (9.4)	42.1 (11.4)	38.7(10.0)	Median age= 46
Mean BMI, kg/m^2 (SD)	50.2 (8.5)	52.2 (9.7)	43.5 (7.0)	49.3(7.8)	Median BMI=44.9
Marital status (married) (%)	59.8	57.3	69.5	51.4	-
Education (high school or less) (%)	25.9	30.3	-	86.9	-
Procedure planned	RYGB	-	-	-	RYGB (N=119) Adjustable band (N=80)

Table 5

Rates of Axis II personality disorders in bariatric surgery candidates

Authors	Kalarchian et al. [28] (2007) (N=288)	Mauri et al. [30] (2008) (N=282)
Any Axis II personality disorder	28.5%	19.5%
Cluster A		
Paranoid	5.6%	0.7%
Schizoid	2.1%	NA
Schizotypal	0.4%	NA
Cluster B		
Antisocial	2.8%	NA
Borderline	4.9%	1.8%
Histrionic	0	NA
Narcissistic	0.7%	0.4%
Cluster C		
Avoidant	17.0%	6.8%
Dependent	1.7%	0.4%
Obsessive-compulsive	7.6%	13.9%