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Psychopathology Prior to Surgery in the Longitudinal Assessment of Bariatric Surgery-3 (LABS-3) Psychosocial Study

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Abstract

Background—Current and prior psychopathology in bariatric surgery candidates is believed to be common. Accurate prevalence estimates, however, are difficult to obtain given that bariatric surgery candidates often wish to appear psychiatrically healthy when they are undergoing psychiatric evaluation prior to being approved for the surgery. Also, structured diagnostic assessments have been utilized infrequently.

Methods—This report concerns the 199 patients who were enrolled in the Longitudinal Assessment of Bariatric Surgery (LABS) study who also participated in the LABS-3 Psychopathology sub-study. All were interviewed independent of the usual preoperative psychosocial evaluation process. Patients were explicitly told that the data would not be shared with the surgical team unless certain high risk behaviors such as suicidality that could lead to adverse peri-operative outcomes were reported.

Results—The majority of the sample was female (82.9%) and Caucasian (non-white 7.6%, Hispanic 5.0%). The median age was 46.0 years with a median body mass index (BMI) of 44.9 kg/m²; 33.7% had at least one current Axis I disorder and 68.8% at least one lifetime Axis I disorder. Of note, 38.7% had a lifetime history of major depressive disorder, and 33.2% had a lifetime diagnosis of alcohol abuse or dependence, all much higher than population-based prevalence rates obtained for this age group in the National Comorbidity Survey--Replication Study. With respect to binge eating disorder, 13.1% had a lifetime diagnosis, while 10.1% had a current diagnosis.

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Conclusion—Current and lifetime rates of psychopathology are high in bariatric surgery candidates, and lifetime rates of affective disorder and alcohol use disorders are particularly prominent. Binge eating disorder is present in approximately 1 in 10 bariatric surgery candidates.

Keywords

Psychopathology; Eating Disorders; Binge Eating Disorder

Bariatric surgery has been shown to be the most effective treatment to achieve significant and sustained weight loss for people with severe obesity⁽¹⁾. Rates of psychopathology have generally been found to be substantial in bariatric surgery candidates. Despite the fact that numerous reports have indicated high pre-surgical rates of psychopathology, structured diagnostic interviews to establish psychiatric diagnoses, which is the state-of-the-art method for rigorous assessment of psychopathology, have rarely been employed. Given the potential impact of psychopathology on the outcome of bariatric surgery, the establishment of accurate prevalence rates is a priority, particularly given some of the findings supporting a significant impact for such psychopathology on various outcomes, including weight loss. The literature using structured interviews can be summarized succinctly. In the first such published study, among 174 bariatric surgery candidates consecutively evaluated using a structured interview at a single center, Rosenberger et al. found lifetime prevalence rates of 22% for affective disorders, 16% for anxiety disorders and 14% for eating disorders⁽²⁾. Mauri and colleagues found a lifetime prevalence rate for Axis I disorders of 38%, with affective disorders being the most common at 22%⁽³⁾. Kalarchian and colleagues found lifetime rates for any psychiatric disorder of 66.3%⁽⁴⁾, while Mühlhaus and colleagues found rates of 72.6%⁽⁵⁾, and Jones-Coneille et al. found rates of 50.5%⁽⁶⁾. Studies not using structured interviews have reported widely divergent results in terms of lifetime and current prevalence rates of various conditions^(7–9). The wide disparity among these rates is difficult to explain, but may involve differences in the samples being seen at different single centers, perhaps insurance reimbursement guidelines in certain geographic areas, and a variety of other variables including methodological and design differences. Also, the sample sizes, while meaningful, are not of a magnitude or a diversity that can be considered definitive.

Accurate prevalence estimates of psychopathology, however, are difficult to obtain in bariatric surgery candidates because candidates generally want to appear psychiatrically healthy during the pre-surgical evaluation in order to insure that they will not be denied surgery. Given this, patients may alter or withhold important information during the evaluation. Although psychopathology generally tends to improve postoperatively, often dramatically^(10–14), the presence of psychopathology preoperatively has been associated with significantly less weight loss after surgery compared to those not diagnosed with a psychological disorder. Kalarchian et al.⁽¹⁵⁾ reported that higher rates of lifetime mood and anxiety disorders at evaluation were associated with less weight loss at six months post-surgery. Also de Zwaan et al. recently reported that those with post-operative depression, which was predicted by preoperative depression, lost significantly less weight at a 24 and 36-month follow-up⁽¹⁶⁾. Other research also suggests that although psychopathology improves in the postoperative period, it may re-emerge 2 or 3 years, or more, after surgery^(17,18).

Another issue concerns eating disorders and aberrant eating behavior in bariatric surgery candidates. One finding of particular interest concerns binge eating behavior and the presence of binge eating disorder (BED). This literature consistently shows that post-surgery patients who develop problems with binge eating, or so called “loss of control” eating (since eating binges must be small in size after surgery because of the gastric pouch), experience less weight loss or more weight regain after surgery^(19–27).

The Kalarchian et al. cohort⁽⁴⁾ and the Mühlhaus et al. cohort⁽⁵⁾ are of particular relevance to the current study in that patients being evaluated in those studies were explicitly told that unless certain problems that posed a safety risk were reported the information would not be shared with the surgical team. Thus, the rates of psychopathology assessed in those studies may more accurately reflect the true prevalence of such problems. In the current study we used a similar methodology, in that subjects underwent a routine psychiatric evaluation as required by their insurance company and/or by their surgeon, but also underwent a research interview separately at a different site on a different day as part of the Longitudinal Assessment of Bariatric Surgery (LABS)-3 research protocol. Participants were informed that unless they reported certain high risk behaviors in the research interview, such as current suicidality or risk of substance induced withdrawal when hospitalized for surgery, the information would be kept confidential from the surgical team.

The purpose of the current study was to replicate prior pre-surgical research findings, and to present baseline findings in preparation for subsequent reports focusing on this sample longitudinally after surgery, as the cohort continues to be followed. This paper will present descriptive data on the sample, focusing on current and lifetime rates of psychopathology, quality of life and mood, as well as frequency of psychotropic drug usage.

Methods

This sub-study is part of the LABS consortium studies. The LABS consortium has been described in the literature previously⁽²⁸⁾. The LABS-1 protocol, which is now completed, involved approximately 5200 patients and examined the short-term safety (1-month follow-up) of bariatric surgery⁽³⁰⁾. LABS-2, which has also finished recruitment, continues to follow a cohort of approximately 2400 patients who underwent their first bariatric surgery and is examining the longer-term efficacy of bariatric surgery. There are also two LABS-3 studies, including this study to examine psychosocial issues before and after the operation, carried out in a subset of LABS-2 participants. The LABS-3 psychosocial study, which has also finished recruitment, was designed to examine psychopathology in depth, and subsequently to examine the impact of psychopathology and eating pathology on outcome after bariatric surgery, as well as the impact of the amount of weight loss and psychopathology.

Participants in the LABS-3 Psychosocial Study were evaluated at one of three of the LABS clinical centers for LABS-2 (Neuropsychiatric Research Institute in Fargo, North Dakota; Columbia-Weill Cornell Medical Centers in New York; and the University of Pittsburgh). Possible participants were approached after consenting to the LABS-2 study at both of these study sites and asked to participate in an additional more detailed study of psychopathology as part of LABS-3. Participants were offered monetary compensation for participation for this effort. They were not provided with information regarding the interview and questionnaire findings.

A total of 266 LABS-2 participants were approached for possible participation and 231 consented. We cannot further characterize the 35 potential subjects who declined participation in order to compare them to those who consented. However LABS-3 participants were not significantly different from LABS-2 participants who underwent Roux-en-Y gastric bypass (RYGB) or laparoscopic adjustable gastric banding (LAGB) and who did not participate in LABS-3 ($n = 975$) in terms of their body mass index (BMI), ethnicity or race. However, there was a trend for those in LABS-3 to be older (LABS-3 median age = 46.0; LABS-2 only patients median age = 44.0; $P = 0.07$), and the frequency of laparoscopic adjustable gastric banding was higher in the LABS-3 group. The proportion of bypass to LAGB patients is not representative of the LABS sample in general which has a

significantly higher percentage of RYGB recipients than the LABS-3 cohort. However, those undergoing adjustable LAGB were oversampled in LABS-3 in an attempt to create a more equal sample size between those two procedures for comparison purposes.

Of 231 participants enrolled; 29 participants were inactivated prior to surgery leaving 202 participants eligible for analysis. Of these 202, 119 intended to undergo RYGB and 80 intended to undergo an adjustable band, and the remaining 3 intended to undergo gastric sleeves. This analysis only includes the 199 participants who subsequently underwent a RYGB or adjustable band. There was no difference in planned surgical procedure by sex. Overall, patients who were considered likely candidates for RYGB and banding were not different in median age, ethnicity (a trend level of $p = 0.052$; more Hispanics were RYGB candidates), race or sex. However, banding candidates were less likely to have been smokers in the past year (8.8% vs. 21.8%, $p = 0.01$) and, as expected, to have a lower median BMI (43.6 vs. 46.6; $p < 0.001$). RYGB and band patient data are reported together because the patients had not undergone surgery at the time of the assessments reported here.

Patients were interviewed using the Eating Disorder Examination (EDE), a semi-structured interview designed to assess eating disorders and other eating problems⁽³⁰⁾, and the Structured Clinical Interview for DSM-IV to assess for Axis I psychiatric disorders (SCID)⁽³¹⁾. The EDE was modified to include questions addressing problems of particular interest in bariatric surgery patients, such as the development of dumping syndrome. This instrument is referred to as the EDE-Bariatric Surgery Version (EDE-BSV). The use of structured diagnostic interviews is considered the optimal method for diagnosing psychopathology. Such interviews each take about 1 to 1 ½ hours to administer, and ask detailed questions about all forms of psychopathology, allowing for the assignment of current and/or lifetime diagnoses. It must be remembered, however, that the instruments still rely on self-report. Psychopathology was based on these interviews, and additional records were not accessed. For the diagnosis of BED the SCID data were used in this analysis..

All raters were carefully trained in the use of the instruments including completing tape-monitored practice sessions and monthly supervision conference calls. Subjects also completed the Impact of Weight on Quality of Life Lite (IWQOL-Lite)^(32,33) and the SF-36⁽³⁴⁾ to assess obesity specific and general quality of life, respectively, and the Beck Depression Inventory (Version 1) to assess depressive symptom severity⁽³⁵⁾.

Statistical Analysis

For categorical data, counts and percentages are presented for the entire sample and by sex. Pearson's chi-square test with no continuity correction was used to test for significance by sex unless the expected cell count was less than 5 in at least one cell in which case Fisher's exact test was used. For continuous data the median, 25th and 75th percentiles are presented. The Wilcoxon-Mann-Whitney test was used to test for difference by sex. In this analysis, within each sex stratum, the distribution of the data was slightly skewed, so the medians and quartiles were thought to provide a more informative description of the data than the means and standard deviations.

Results

Characteristics of the entire sample and by sex are shown in Table 1. The majority were female Caucasian, as is true in most bariatric surgery samples, with a median BMI of 44.9 at baseline. The median BMI was significantly higher for males than females ($p = .04$).

Information about co-morbidities and medication usage is provided in Table 2. Males were more likely to present with sleep apnea (and usage of continuous positive airway pressure

[CPap] or bi-level positive airway pressure [BiPap]), a history of venous edema with ulcerations, and congestive heart failure. The only medical co-morbidity seen more commonly in women was asthma. The most common medication class used among this sample in the past 90 days was anti-depressant drugs (40.7%). There were trends towards sex differences in the usage of medications, with antidepressant medications (female = 43.6% vs. male = 26.5%; $p = 0.06$) and narcotic usage (female = 16.4% vs. male = 2.9%; $p = 0.054$) more common among women and beta blockers (female = 19.4%; male = 32.4%; $p = 0.09$) and therapeutic anticoagulation (female = 7.3%, male = 17.6%; $p = 0.09$) more common in men.

In Table 3 the current and lifetime disorders diagnosed by SCID-I are summarized. The majority of individuals at some point during their lifetime had merited a SCID Axis I diagnosis, and about a third currently had an Axis I psychiatric disorder prior to operation. The most common lifetime disorders were “any affective disorder”, “any anxiety disorder” and “alcohol abuse or dependence,” while the most common current psychiatric diagnoses were “any anxiety disorder”, “specific phobia”, “major depressive disorder”, “any affective disorder”, and “any eating disorder”, with 10.1% ($n = 20$) of the sample receiving a current diagnosis of BED.

Data on quality of life and depressive symptoms are shown in Table 4. In this sample there was evidence of significant impairment on various subscales of the IWQOL-Lite, including the total score, with more severe impairment seen among women (as indicated by a lower score) on the self-esteem score, sex-life score, work score and the total score. Women also reported a higher median BDI score. A sizeable subgroup of both males and females reported potentially clinically significant depressive symptoms (BDI scores of $>9 = 36.6\%$).

Discussion

The results of this study document that lifetime rates of psychopathology are substantial in bariatric surgery candidates. This rate can be compared to data from the National Comorbidity Survey--Replication Study (NCS-R), which (for the age group from 45–59) found lifetime prevalence rates for any psychiatric disorder of 46.5% (current sample = 68.6%), for any substance use disorder of 15.3% (current sample = 35.7%), and for any mood disorder of 22.9% (current sample = 44.2%)⁽³⁶⁾. Rates for any anxiety disorder were similar (NCS-R = 30.8%; current sample = 31.7%). However it must be remembered that the two studies were very different in terms of methodologies, assessment paradigms and BMIs. The reasons for the elevated rates for some disorders, without an elevation in rates of anxiety disorders, is unclear, but suggest that perhaps chronic problems with anxiety may be less weight dependent.

These results also should be considered in the context of the larger literature suggesting elevated rates of a variety of forms of psychopathology in severely obese individuals, including those who are bariatric surgery candidates^(37–39). The overall results relative to other published studies using structured instruments are summarized in Tables 5 and 6. Results have varied significantly across studies, perhaps partly attributed to the different samples utilized. Results of the current study can best be compared to the Kalarchian et al.⁽⁴⁾ baseline paper concerning 288 patients who were interviewed separately from the routine practice, again using the SCID interview, and the Mühlhaus et al. paper⁽⁵⁾, which used a similar methodology with 146 patients. The findings regarding overall Axis I psychopathology (current and lifetime) were roughly equivalent with comparable rates for mood disorders across these three studies. In considering the depression scores we obtained, the only other study using structured instruments presented BDI data on BED vs. non-BED

subjects, and found BDI scored of 12.7 vs. 8.3 in these subsamples, results that are not very different from our results⁽⁶⁾.

Lifetime risks of eating disorders were substantial (but there were no cases of anorexia nervosa in these samples)^(4,5). Prevalence rates for BED were somewhat higher in the Kalarchian sample (current = 16.0%; lifetime = 27.1%) and the Mühlhaus sample (current = 23.3%; lifetime = NA) than in the LABS-3 cohort (current = 10.1%; lifetime = 13.1%). This is a substantial rate for BED. Prior research has shown that BED is associated with elevated rates of psychopathology compared to non-BED obese, including in community samples^(37–39). This suggests that a significant subgroup is at risk for developing other problems, including “loss of control” eating after surgery, which might increase the risk for less weight loss or more weight regain. This clearly is a subpopulation that should be monitored.

Another issue of relevance is the utility of using structured instruments routinely in such populations. Although there are limited data, overall the literature indicates that the concordances between structured instruments and routine diagnostic interview are only low to moderate, again suggesting the utility of the structured interview approach^(40,41). As discussed this may reflect the fact that on routine assessments, in the usual clinical context patients, have a strong desire to appear healthy, a concept at times referred to as “impression management”⁽⁴²⁾. It is possible that that is less operative in the research setting. However, the development of an instrument that would target this population in particular would be useful. Also, the use of structured diagnostic instruments is expensive and time consuming, and requires trained staff, and therefore may not be appropriate for many clinical settings.

Many subjects had taken psychotropic medication, and nearly half of the females had taken antidepressants in the last 90 days. This raises the possibility that the low current rate of major depression may at least partially be attributed to the fact that many patients did not report depressive features meriting a diagnosis since they were being successfully treated with medication. Unfortunately the way the data were collected does not allow us to estimate the size of this effect, and to combine those with depressive symptoms with those taking antidepressants may be misleading, as antidepressants are prescribed for a variety of conditions including anxiety disorders.

Medical comorbidities were also substantial in this population as is true in other samples of bariatric surgery patients and the LABS sample overall⁽²⁸⁾. Although rates of current alcohol abuse or dependence were low - less than 1% - in the Kalarchian et al. sample⁽⁴⁾, the Mühlhaus et al. sample⁽⁵⁾ and the current sample, lifetime risks were much higher with a low of 11.1% in the Mühlhaus et al. sample and roughly equivalent rates of 30.9% and 33.2% in the Kalarchian et al. sample and the current sample, respectively. The reasons for this elevation relative to the rates of such problems in the general population is unclear, but is particularly noteworthy given the growing literature suggesting that there may be a risk for the development of alcohol abuse or dependence after bariatric surgery, although the data here are limited⁽⁴³⁾. This is a subgroup that may be at high risk group which needs to be tracked relative to the potentially negative outcome of recurrence of alcohol abuse or dependence. It is important for clinicians to remember that these alcohol use disorders imply social impairment and/or physical complications from use, and not simply a pattern of regular consumption.

As has been shown in other cohorts of bariatric surgery patients^(44–47), quality of life impairment is clearly an issue for many of these patients as demonstrated by the median scores on the aggregates in the SF-36 and total and subscale scores on the IWQOL-Lite. The

data again suggest that on some subscales and on the total IWQOL-Lite, scores indicate more obesity-related impairment among women.

The strengths of the current study include a substantial sample size, assessment across several clinical sites, the use of carefully trained assessors, the use of structured instruments, and the anonymity of the data collection. Because all subjects were drawn from centers in urban settings with well established, research-oriented bariatric surgery programs, the findings may not be generalizable to other populations. Also a BMI matched control sample would have been useful in interpreting the results.

This cohort is now being followed prospectively on a regular basis. The impact of pre-surgical psychopathology and eating problems on post-surgical outcomes, and the possible persistence, remission or reemergence of psychopathology post-operatively will be examined longitudinally.

Conclusions

Current lifetime rates of psychopathology in bariatric surgery sample are high. BED is present in about 10% of participants, as well as notably high rates for lifetime affective disorder and alcohol use disorder. Additional future reports on this sample will examine the relationship of psychosocial factors and psychopathology to weight and other outcomes after operation.

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Table 1

Participant Characteristics by Sex

	Total (n = 199)	Female (n = 165)	Male (n = 34)	P-value
Age (years)				
Median (Q1, Q3)	46.0 (37.5, 53.0)	46.0 (38.0, 52.0)	46.0 (37.2, 57.8)	0.61
Body mass index				
Median (Q1, Q3)	44.9 (41.9, 50.3)	44.5 (41.3, 50.1)	46.6 (44.1, 51.4)	0.04
Ethnicity-n (%)				>0.999
Hispanic	10 (5.0)	9 (5.5)	1 (2.9)	
Non-Hispanic	189 (95.0)	156 (94.5)	33 (97.1)	
Race-n (%)				0.19
(missing 1)				
White	183 (92.4)	149 (90.9)	33 (100.0)	
Black	13 (6.6)	13 (7.9)	0 (0.0)	
Other	2 (1.0)	2 (1.2)	0(0.0)	
Smoker within last year- (n; %)				0.75
No	166 (83.4)	137 (83.0)	29 (85.3)	
Yes	33 (16.6)	28 (17.0)	5 (14.7)	
Surgical procedure planned- (n; %)				0.52
Adjustable Band	80 (40.2)	68 (41.2)	12 (35.3)	
Gastric Bypass	119 (59.8)	97 (58.8)	22 (64.7)	

Table 2

Medical Comorbidities and Medication Usage (in the past 90 days) by Sex (n; %)

	Total (n = 199)	Female (n = 165)	Male (n = 34)	P- value
Hypertension	120 (60.3)	95 (57.6)	25 (73.5)	0.08
Sleep apnea	90 (45.2)	67 (40.6)	23 (67.6)	0.004
C-pap or Bi-pap usage	77 (38.7)	55 (33.3)	22 (64.7)	<0.001
Asthma	50 (25.1)	46 (27.9)	4 (11.8)	0.049
Diabetes	47 (23.6)	35 (21.2)	12 (35.3)	0.08
Ischemic heart disease	16 (8.0)	11 (6.7)	5 (14.7)	0.16
History of venous edema with ulcerations	9 (4.5)	3 (1.8)	6 (17.6)	<0.001
Congestive heart failure	8 (4.0)	4 (2.4)	4 (11.8)	0.03
Deep venous thrombosis or pulmonary embolism	7 (3.5)	5 (3.0)	2 (5.9)	0.34
Anti-depressants	81 (40.7)	72 (43.6)	9 (26.5)	0.06
Statin or other lipid lowering agents	55 (27.6)	42 (25.5)	13 (38.2)	0.13
Beta-blockers	43 (21.6)	32 (19.4)	11 (32.4)	0.09
Narcotics	28 (14.1)	27 (16.4)	1 (2.9)	0.054
Therapeutic anticoagulation	18 (9.0)	12 (7.3)	6 (17.6)	0.09

Table 3

Current and Lifetime Disorders by Sex (n, %)

	Current Disorders			Lifetime Disorders		
	Total (n = 199)	Female (n = 165)	Male (n = 34)	Total (n = 199)	Female (n = 165)	Male (n = 34)
Any psychiatric disorder	67 (33.7)	58 (35.2)	9 (26.5)	137 (68.6)	116 (70.3)	21 (62.8)
Any affective disorder	23 (11.6)	18 (10.9)	5 (14.7)	88 (44.2)	79 (47.9)	9 (26.5)
Major depressive disorder	14 (7.0)	11 (6.7)	3 (8.8)	77 (38.7)	68 (41.2)	9 (26.5)
Dysthymia	7 (3.5)	4 (2.4)	3 (8.8)	7 (3.5)	4 (2.4)	3 (8.8)
Any anxiety disorder	36 (18.1)	32 (19.4)	4 (11.8)	63 (31.7)	55 (33.3)	8 (23.5)
Social phobia	6 (3.0)	6 (3.6)	0 (0.0)	12 (6.0)	11 (6.7)	1 (2.9)
Specific phobia	22 (11.1)	20 (12.1)	2 (5.9)	25 (12.6)	23 (13.9)	2 (5.9)
Posttraumatic stress disorder	6 (3.0)	4 (2.4)	2 (5.9)	22 (11.1)	17 (10.3)	5 (14.7)
Any substance use disorder	2 (1.0)	2 (1.2)	0 (0.0)	71 (35.7)	59 (35.8)	12 (35.3)
Alcohol abuse or dependence	1 (0.5)	1 (0.6)	0 (0.0)	66 (33.2)	54 (32.7)	12 (35.3)
Other drug abuse or dependence	1 (0.5)	1 (0.6)	0 (0.0)	15 (7.5)	14 (8.5)	1 (2.9)
Any eating disorder (without EDNOS)	22 (11.1)	19 (11.5)	3 (8.8)	31 (15.6)	26 (15.8)	5 (14.7)
Any eating disorder (with EDNOS)				53 (26.6)	47 (28.5)	6 (17.6)
Binge eating disorder	20 (10.1)	17 (10.3)	3 (8.8)	26 (13.1)	22 (13.3)	4 (11.8)
Eating disorder not otherwise specified				26 (13.1)	25 (15.2)	1 (2.9)
Bulimia nervosa	2 (1.0)	2 (1.2)	0 (0.0)	5 (2.5)	5 (3.0)	0 (0.0)

Table 4**Quality of Life by Sex and Depression Ratings**

	Total (n = 199)	Female (n = 165)	Male (n = 34)	P- value
Short Form 36-item Health Survey (SF-36)				
Aggregate physical health score				
(Missing 9)				
Median (Q1, Q3)	35.7 (28.8, 43.9)	35.7 (28.9, 43.6)	36.0 (27.1, 44.6)	0.81
Range	13.4 to 65.7	13.4 to 65.7	17.0 to 54.4	
Aggregate mental health score				
(Missing 9)				
Median (Q1, Q3)	51.2 (42.8, 57.1)	50.9 (42.4, 55.7)	54.9 (44.7, 58.4)	0.06
Range	19.6 to 69.4	19.6 to 67.7	27.4 to 69.4	
Impact of Weight on Quality of Life-Lite (IWQOL-Lite)				
Total Score				
(Missing 9)				
Median (Q1, Q3)	44.4 (34.9, 58.7)	43.5 (34.1, 57.1)	53.6 (37.7, 65.1)	0.04
Range	4.8 to 95.2	4.8 to 95.2	14.5 to 91.1	
Work score				
(Missing 9)				
Median (Q1, Q3)	62.5 (43.8, 79.7)	62.5 (43.8, 75.0)	75.0 (62.5, 84.4)	0.045
Range	0.0 to 100.0	0.0 to 100.0	6.2 to 100.0	
Physical functioning score				
(Missing 9)				
Median (Q1, Q3)	38.6 (23.3, 56.8)	39.8 (25.0, 54.5)	38.6 (22.7, 61.9)	0.91
Range	0.0 to 100.0	0.0 to 100.0	4.5 to 81.8	
Public distress score				
(Missing 9)				
Median (Q1, Q3)	55.0 (35.0, 75.0)	55.0 (35.0, 75.0)	55.0 (33.8, 76.2)	0.81
Range	0.0 to 100.0	0.0 to 100.0	0.0 to 100.0	
Sex life score				
(Missing 13)				
Median (Q1, Q3)	50.0 (31.2, 75.0)	50.0 (26.6, 75.0)	75.0 (35.9, 90.6)	0.03
Range	0.0 to 100.0	0.0 to 100.0	0.0 to 100.0	
Self-esteem score				
(Missing 9)				
Median (Q1, Q3)	35.7 (14.3, 57.1)	32.1 (10.7, 53.6)	55.4 (38.4, 78.6)	<0.001
Range	0.0 to 100.0	0.0 to 96.4	0.0 to 100.0	
Beck Depression Inventory (BDI)				
Total score				
(Missing 12)				
Median (Q1, Q3)	8.0 (2.5, 12.0)	8.0 (3.0, 12.2)	3.0 (0.0, 8.5)	0.01
Range	0.0 to 33.0	0.0 to 33.0	0.0 to 23.0	

	Total (n = 199)	Female (n = 165)	Male (n = 34)	P- value
Classification – n (%)				0.47
(Missing 9)				
Not depressed (0–9)	127 (66.8)	102 (64.6)	24 (72.7)	
Mild-moderate (10–18)	49 (25.8)	44 (27.8)	7 (21.2)	
Moderate-severe (19–29)	13 (6.8)	11 (7.0)	2 (6.1)	
Severe (30–63)	1 (0.5)	1 (0.6)	0 (0.0)	

Table 5

Lifetime Psychiatric Diagnoses in Bariatric Surgery Sample

Authors Year	Rosenberger et al. 2006	Kalarchian et al. 2007	Mauri et al. 2008	Mühlhaus et al. 2009	Jones-Cornelle et al. 2010	Mitchell et al. (Current Report)
N	174	288	282	146	105	199
Diagnosis						
Any Psychiatric Disorder	36.8%	66.3%	37.6%	72.6%	50.5%	68.6%
Any Affective Disorder		45.5%	22.0%	54.8%	35.2%	44.2%
Major Depressive Disorder	14.9%	42.0%	19.1%	50.7%	33.3%	38.7%
Dysthymia	5.7%	0.0%	3.1%	8.2%	0.9%	3.5%
Any Anxiety Disorder	15.5%	37.5%	18.1%	21.2%	24.8%	31.7%
Social Phobia	NA	9.4%	3.2%	6.2%	2.9%	6.0%
Specific Phobia	5.7%	8.0%	5.3%	7.5%	4.8%	12.6%
Post Traumatic Stress Disorder	NA	11.8%	1.8%	8.9%	4.8%	11.1%
Any Substance Use Disorder	5.2%	32.6%	1.1%	15.1%	28.8%	35.7%
Alcohol Abuse/Dependence	4.0%	30.9%	0.7%	11.0%	10.5%	33.2%
Other Drug Abuse/Dependence	2.3%	16.0%	0.4%*	6.2%	NA	7.5%
Any Eating Disorder (without EDNOS*)	NA	29.5%	12.8%	NA	NA	15.6%
Any Eating Disorder (with EDNOS*)	13.8%	NA	NA	50.0%	NA	26.6%
Binge Eating Disorder	4.6%	27.1%	11.1%	NA	NA	13.1%
Bulimia Nervosa	0.0%	3.5%	1.8%	6.8%	NA	2.5%
EDNOS*	9.2%	NA	NA	NA	NA	13.1%
EDNOS* (with BED)	NA	NA	NA	50.0%	NA	25.6%

* Eating Disorders Not Otherwise Specified

Table 6

Current Psychiatric Diagnoses in Bariatric Surgery Sample

Authors Year	Rosenberger et al. 2006	Kalarchian et al. 2007	Mauri et al. 2008	Mühlhaus et al. 2009	Jones-Cornelle et al. 2010	Mitchell et al. (Current Report)
N	174	288	282	146	105	199
Diagnosis						
Any Psychiatric Disorder	24.1%	37.8%	20.9%	55.5%	29.5%	33.7%
Any Affective Disorder	10.9%	15.6%	6.4%	31.5%	14.3%	11.6%
Major Depressive Disorder	3.4%	10.4%	4.6%	25.3%	13.3%	7.0%
Dysthymia	5.7%	3.8%	1.1%	6.2%	0.9%	3.5%
Any Anxiety Disorder	11.5%	24.0%	12.4%	15.1%	16.2%	18.1%
Social Phobia	NA	9.0%	2.8%	6.2%	2.9%	3.0%
Specific Phobia	5.7%	7.3%	5.0%	6.8%	4.8%	11.1%
Post Traumatic Stress Disorder	NA	2.8%	1.1%	4.1%	2.9%	3.0%
Any Substance Use Disorder	0.6%	1.7% *	NA	1.4%	0.9%	1.0%
Alcohol Abuse/Dependence	0.6%	0.7% *	NA	0.7%	NA	0.5%
Other Drug Abuse/Dependence	0.0%	1.0% *	NA	0.7%	NA	0.5%
Any Eating Disorder (without EDNOS [*])	NA	16.3%	7.1%	NA	NA	11.1%
Any Eating Disorder (with EDNOS [*])	10.3%	NA	NA	37.7%	NA	NA
Binge Eating Disorder	3.4%	16.0%	6.7%	23.3%	41.9%	10.1%
Bulimia Nervosa	0.0%	0.3%	0.4%	0.0%	NA	1.0%
EDNOS [*]	6.9%	NA	NA	14.4%	NA	NA

* Eating Disorder Not Otherwise Specified