Psychiatric Disorder Comorbidity and Association With Eating Disorders in Bariatric Surgery Patients: A Cross-Sectional Study Using Structured Interview–Based Diagnosis

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Objective: This study examined the prevalence of DSM-IV Axis I psychiatric disorders in severely obese bariatric surgery candidates and explored whether eating disorders were associated with psychiatric comorbidity.

Method: The Structured Clinical Interview for DSM-IV Axis I Disorders was administered to a study group of 174 consecutively evaluated bariatric surgery candidates. All evaluations were completed between September 2002 and November 2004.

Results: Overall, 36.8% of the participants met criteria for at least one lifetime psychiatric disorder, with 24.1% meeting criteria for a current disorder. The most commonly observed lifetime psychiatric diagnoses were affective disorders (22.4%), anxiety disorders (15.5%), and eating disorders (13.8%). Participants with eating disorders were significantly more likely than those without eating disorders to meet criteria for psychiatric disorders overall (66.7% vs. 26.7%) and specifically for anxiety disorders (45.8% vs. 10.7%).

Conclusions: Psychiatric disorders are not uncommon among severely obese patients who present for bariatric surgery. The observed prevalence rates based on structured diagnostic interviews are lower than previously reported based on questionnaire, clinical, and chart review methods but are similar to those reported for nationally representative samples. Among bariatric surgery candidates, the presence of eating disorders is associated with higher rates of other psychiatric disorders. The findings highlight the importance of systematic diagnostic assessment using a structured diagnostic interview for determining the full spectrum of Axis I disorders.

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ates of psychiatric disorders and psychological functioning in obese individuals are similar to rates in nonobese individuals.¹⁻³ In contrast, studies of extremely obese bariatric surgery candidates frequently have reported higher prevalence rates of psychiatric disorder than similar studies with mildly or moderately obese patients, although estimates have ranged widely. For example, Sarwer and colleagues⁴ noted that estimates of lifetime psychiatric disorder have ranged from 20% to 70% across studies for bariatric surgery candidates. Diagnostic studies have generally reported that affective, anxiety, eating, and substance use disorders are, in descending order, the most commonly diagnosed disorders in bariatric surgery candidates.⁴ Studies that have employed structured diagnostic interviews with formal diagnostic criteria have reported lower prevalence estimates of most psychiatric disorders than studies that relied on questionnaires, clinical interviews, and chart reviews using informal diagnostic criteria.^{4–7}

Early diagnostic studies were based on earlier versions of the DSM,^{6,8,9} which has been revised considerably and now also includes binge-eating disorder (BED) as a research category. Binge-eating disorder, which is characterized by binge eating in the absence of weightcompensatory behaviors, is associated with obesity and is now thought to be a common and clinically meaningful problem in extremely obese bariatric surgery patients.^{10–13} Bariatric surgery candidates who report binge eating have higher depression scores,^{13,14} have greater body image distress and lower self-esteem,¹⁴ and may be at risk for poorer outcome than candidates who did not report binge eating,^{10,11} although the latter finding requires additional empirical demonstration. Because of the interest in BED and its association with extreme obesity, recent studies have focused primarily on eating disorder diagnoses, neglecting the full range of Axis I psychiatric problems. Most such studies have relied on either questionnaires or clinical interviews and have reported wildly discrepant prevalence rates of BED. For example, de Zwaan and colleagues¹⁰ noted in a recent review that BED rates across studies have ranged from 1.4% to 49%, while Elder and colleagues¹⁴ have demonstrated that different instruments can generate different estimates within the same patient group.

In addition to the changes in the diagnostic system and assessment methods over time, an additional notable shift reflected in the literature is the marked increase in the frequency of bariatric surgery. It is certainly possible that there has also been a shift in the psychological profile characterizing individuals seeking bariatric surgery. Recent years have witnessed marked increases in the prevalence of bariatric surgery based on both the increases in extreme obesity and impressive safety and outcome data that now characterize the surgical procedures.¹⁵ The estimated number of bariatric surgical procedures was 72,177 in 2002, compared to 13,365 in 1998.¹⁶ Thus, whereas bariatric surgery may have been viewed as an option of last resort 20 years ago, it is now seen as a safe and effective intervention for extreme obesity. The high rates of psychiatric problems reported in earlier studies may not characterize the current bariatric surgery population.

Sarwer and colleagues⁴ recently investigated Axis I psychiatric diagnoses based on clinical interviews in 90 bariatric surgery patients. They reported that 62.2% of patients received at least one psychiatric diagnosis; major depression and BED were the 2 most frequently assigned diagnoses (28% and 24%, respectively).⁴ While this study suggests that bariatric surgery patients continue to be characterized by high rates of psychiatric disorder, the investigators' reliance on clinical interviews to assign diagnoses without the benefit of a standardized research structured diagnostic interview represents a significant methodological limitation. The convergence between clinical diagnoses and research-based diagnoses derived with standardized instruments has been found repeatedly to be poor.^{17,18}

Thus, the prevalence of psychiatric disorders and extent of psychiatric comorbidity in the current generation of bariatric surgery patients are uncertain. Determining psychiatric disorder comorbidity in extremely obese bariatric surgery candidates has significant clinical implications both preoperatively and postoperatively. Assessment of psychopathology may be relevant for treatment formulation and recommendation for the surgical candidates.^{4,11} Devlin and colleagues,¹¹ in a review of current practice, noted much variation in how surgical groups assessed and used mental health information in their treatment planning. At present, there are limited empirical data and no consensus regarding the optimal management of bariatric surgery patients with psychiatric comorbidities. Furthermore, the association between psychiatric functioning and surgical outcome remains unclear. While some studies have found that psychosocial or psychiatric variables do predict outcome, some have not found this relationship to hold.¹⁹⁻²¹ These mixed findings likely reflect, in part, the variable diagnostic methods used across studies. Reliable data on prevalence and comorbidity of psychiatric disorders derived from rigorous structured interview represent a pressing need for clinical research. The present study aimed to examine the prevalence of DSM-IV Axis I psychiatric disorders using a structured psychiatric diagnostic interview in a large series of bariatric surgery patients. In addition, this study explored the specific association of eating disorders with psychiatric disorder comorbidity.

METHOD

Patients

The study group included 174 severely obese individuals considering Roux-en-Y gastric bypass surgery at the Yale Gastrointestinal Surgery Clinic. The 174 individuals were a consecutive series of patients presenting to the Yale Center for Eating and Weight Disorders for psychological evaluations required as part of the bariatric surgery candidacy process. All evaluations were completed between September 2002 and November 2004. Evaluations were typically conducted approximately 3 to 8 months before surgery was scheduled. Patients provided written informed consent to have the information used as part of the psychological evaluation used for clinical purposes as well as to use the clinical data for research purposes. Institutional Review Board approval was given to use the information obtained in the psychological evaluations for research purposes.

Assessment

Patients were scheduled for a 2- to 3-hour psychological evaluation that included a structured psychiatric diagnostic interview and an additional semistructured interview consisting of items documenting general psychosocial history as well as items to address surgery readiness. Patients were asked to arrive at the interview having completed a battery of self-report questionnaires assessing dietary and eating pattern history, current psychiatric symptom status, self-esteem, and other psychosocial factors relevant to the patient's comprehensive presurgical evaluation. The evaluations used in this study were conducted by research clinicians who were trained and received ongoing supervision by the investigators. Patients were told that the goals of the evaluation were to gather information in order to optimize outcome should they elect to have surgery and to provide them with information. In addition, patients were told that very few psychological contraindications for surgery have been identified and that this would be clearly stated in the report.

The Structured Clinical Interview for DSM-IV (SCID-I/P²² was used to determine subject lifetime and current diagnostic status. The SCID-I/P is widely considered to be the standard structured diagnostic interview in the field and has well-established reliability.²³ This structured interview systematically rules in or out all DSM-IV Axis I disorders, including eating disorders, and allows for the determination of psychiatric comorbidity. Interviewers conducting the SCID-I/P on the bariatric surgery candidates were research clinicians who received intensive training in the administration of the instruments before beginning to perform them for the current study. Standard training procedures were followed, including thorough review of diagnostic systems, review of the SCID-I/P materials, and viewing of videotaped interviews that were discussed in detail with the clinical-research supervisors. Interviewers then observed experienced research clinicians conduct SCID-I/P interviews with bariatric surgery candidates. This was followed by interviewers conducting interviews while being observed by a clinical supervisor to allow for live and subsequent in-depth feedback. Ongoing supervision and review of the SCID-I/P interviews continued throughout the course of the study in an attempt to maintain adherence and prevent drift. This method of interview training and monitoring has been used previously, resulting in good interrater reliability in clinical studies with diverse obese and eating-disordered²⁴ and psychiatric²⁵ patient groups.

In assessing eating disorder diagnoses, the SCID-I/P²² and DSM-IV²⁶ criteria and principles were strictly adhered to. The SCID-I/P assesses BED, a specific example of eating disorder not otherwise specified (NOS), following the exact research criteria for BED contained in Appendix B of the DSM-IV. A diagnosis of eating disorder NOS was assigned if eating disorder features were present and resulted in a clinically meaningful degree of impairment although failing to fulfill full diagnostic criteria for the formal eating disorders and BED. This approach, following the DSM-IV principles, is the same as used in other recent studies of eating disorders that have considered eating disorder NOS.^{27,28} Eating disorder NOS-diagnosed patients were included in the analyses because research has recently demonstrated that this NOS category reflects a meaningful clinical entity rather than just "subclinical" or "soft" diagnoses.^{27,29} Furthermore, the eating disorder NOS category is the most frequently assigned eating disorder diagnosis at non-research-based clinics.³⁰

Table 1. Demographic and Clinical Characteristics of 174	
Gastric Bypass Surgery Candidates	

Characteristic	N (%)
Sex	
Female	131 (75.3)
Race/ethnicity	
White	119 (68.4)
African American	31 (17.8)
Hispanic	13 (7.5)
Other or unknown	11 (6.3)
Marital status ^a	
Never married	41 (23.6)
Divorced or widowed	25 (14.3)
Married	104 (59.8)
Education ^a	
High school or less	45 (25.9)
Partial college or college graduate	89 (51.1)
Graduate or professional school	37 (21.3)
	Mean (SD)
Age, y	42.9 (11.1)
Women	41.8 (10.9)
Men	46.4 (11.0)
Body mass index, kg/m ²	50.2 (8.5)
Women	50.0 (8.1)
Men	51.0 (9.7)

N = 174, except for marital status (N = 170) and education (N = 171) due to missing data.

RESULTS

Description of Sample

Table 1 summarizes the basic demographic characteristics of the study group of 174 bariatric surgery patients. One hundred thirty-one patients (75%) were women. Mean age was 42.9 years, and the mean body mass index was 50.2. Women were significantly younger than men (t = 2.4, df = 170, p = .02). Of the 174 patients, 68.4% (N = 119) were white, 73.7% (N = 126) received education beyond high school, and 59.8% (N = 104) were married.

Prevalence of Axis I Psychiatric Disorders

Table 2 summarizes the lifetime rates of psychiatric disorders overall and separately by sex. Of the 174 patients, 36.8% (N = 64) met criteria for at least one lifetime psychiatric diagnosis. Women were significantly more likely than men to meet criteria for psychiatric disorder (41.2% vs. 23.3%). A lifetime eating disorder was diagnosed in 13.8% (N = 24) of the patients, including 4.6% (N = 8) for BED, 9.2% (N = 16) for eating disorder NOS, and no patients reporting histories of anorexia or bulimia. A lifetime affective disorder was reported in 22.4% (N = 39) of patients, and 15.5% (N = 27) of patients reported lifetime anxiety disorder. Women were significantly more likely than men to have a history of affective disorders, particularly major depressive disorder. In addition, women were significantly more likely to have a history of anxiety disorders than men. Lifetime substance use disorder was infrequently diagnosed, with 4% (N = 7)

Table 2.	Rates of	Lifetime	Psychiatric	Diagnoses	in	Bariatric
Surgery	Candida	tes ^a				

	All			
	Subjects	Women	Men	
	(N = 174),	(N = 131),	(N = 43),	
Psychiatric Diagnosis	N (%)	N (%)	N (%)	χ^2
Any psychiatric disorder	64 (36.8)	54 (41.2)	10 (23.3)	4.5*
Any eating disorder	24 (13.8)	17 (13.0)	7 (16.3)	0.3
Binge-eating disorder	8 (4.6)	6 (4.6)	2 (4.7)	0.0
Eating disorder NOS	16 (9.2)	11 (8.4)	5 (11.6)	0.4
Any affective disorder	39 (22.4)	36 (27.5)	3 (7.0)	7.8**
Major depressive disorder	26 (14.9)	25 (19.1)	1 (2.3)	7.2**
Dysthymic disorder	10 (5.7)	9 (6.9)	1 (2.3)	1.2
Any anxiety disorder	27 (15.5)	25 (19.1)	2 (4.7)	5.1*
Specific phobia	10 (5.7)	10 (7.6)	0	3.5
Any substance use disorder	9 (5.2)	8 (6.1)	1 (2.3)	0.9
Alcohol use disorder	7 (4.0)	6 (4.6)	1 (2.3)	0.4
Any drug use disorder	4 (2.3)	4 (3.1)	0	1.3
Adjustment disorder	2 (1.1)	2 (1.5)	0	0.7

^adf = 1 for each statistical comparison.

*p < .05 for the comparison of women versus men.

 $*\hat{*}p < .01$ for the comparison of women versus men.

Abbreviation: NOS = not otherwise specified.

Table 3.	Rates of Current	Psychiatric	Diagnoses	in	Bariatric	2
Surgery	Candidates ^a	-	-			

	All			
	Subjects	Women	Men	
	(N = 174),	(N = 131),	(N = 43),	
Psychiatric Diagnosis	N (%)	N (%)	N (%)	χ^2
Any psychiatric disorder	42 (24.1)	35 (26.7)	7 (16.3)	1.9
Any eating disorder	18 (10.3)	12 (9.2)	6 (14.0)	0.8
Binge-eating disorder	6 (3.4)	5 (3.8)	1 (2.3)	0.6
Eating disorder NOS	12 (6.9)	7 (5.3)	5 (11.6)	2.0
Any affective disorder	19 (10.9)	17 (13.0)	2 (4.7)	2.3
Major depressive disorder	6 (3.4)	5 (3.8)	1 (2.3)	0.6
Dysthymic disorder	10 (5.7)	9 (6.9)	1 (2.3)	1.2
Any anxiety disorder	20 (11.5)	19 (14.5)	1 (2.3)	4.7*
Specific phobia	10 (5.7)	10 (7.6)	0	3.5
Any substance use disorder	1 (0.6)	1 (0.8)	0	0.3
Alcohol use disorder	1 (0.6)	1 (0.8)	0	0.3
Any drug use disorder	0	0	0	
Adjustment disorder	2 (1.1)	2 (1.5)	0	0.7

 $^{a}df = 1$ for each statistical comparison.

*p < .05 for the comparison of women versus men.

Abbreviation: NOS = not otherwise specified.

of the patients reporting lifetime alcohol use disorder and 2.3% (N = 4) of the patients reporting lifetime drug use disorder. Two patients reported adjustment disorder; no other Axis I disorders (e.g., psychotic, somatoform) were diagnosed in the sample. Twenty-seven (42.2%) of the 64 patients who were diagnosed with any lifetime disorder received at least one additional diagnosis, indicating a high rate of psychiatric comorbidity.

Table 3 summarizes the rates of current psychiatric disorders overall and separately by sex. Of the 174 patients, 24.1% (N = 42) reported a current psychiatric disorder. This included 10.3% (N = 18) who reported a current eating disorder: 3.4% (N = 6) met full criteria for DSM-IV BED, and 6.9% (N = 12) met criteria for eating disorder NOS. Current affective disorder was diagnosed in 10.9%

Table 4. Rates of Lifetime Psychiatric Disorders in Gastric
Bypass Candidates: Eating Disorder Diagnosis Group vs. No
Eating Disorder Diagnosis Group ^a

	Eating Disorder $(N = 24)$	No Eating Disorder $(N = 150)$	
Psychiatric Diagnosis	N (%)	N (%)	χ^2
Any psychiatric disorder ^b	16 (66.7)	40 (26.7)	15.2**
Affective disorder	9 (37.5)	30 (20.0)	3.6
Anxiety disorder	11 (45.8)	16 (10.7)	19.1**
Alcohol use disorder	2 (8.3)	5 (3.3)	1.3
Drug use disorder	2 (8.3)	2 (1.3)	4.5*
Adjustment disorder	0	2 (1.3)	0.3

^adf = 1 for each statistical comparison.

^bFor the eating-disordered group, the results reflect any additionally diagnosed disorder.

*Fisher exact test was used due to low cell frequencies; p = .09. **p < .001.

(N = 19) of the patients. The most frequently diagnosed specific affective disorder in the patient group was dysthymia. A current anxiety disorder was diagnosed in 11.5% (N = 20) of the patients; the most frequently diagnosed anxiety disorder was specific phobia. In terms of sex differences in the distribution of current diagnoses, only anxiety disorders were differentially associated with higher rates observed for women than for men.

Comorbidity of Eating Disorders and Axis I Psychiatric Disorders

We examined lifetime and current psychiatric comorbidity in bariatric surgery patients diagnosed with an eating disorder. Table 4 summarizes the rates of psychiatric diagnosis in patient groups with and without a lifetime eating disorder diagnosis. While two thirds of the eating disorder patients (66.7%) reported a lifetime comorbid diagnosis, only 26.7% of the bariatric patients without a history of an eating disorder reported another lifetime disorder. In particular, patients with lifetime eating disorder diagnoses were significantly more likely than patients with no eating disorder to report lifetime anxiety disorder.

A higher rate of current psychiatric comorbidity was found in the patients with a current eating disorder diagnosis than in patients without a current eating disorder diagnosis, with 6 patients (33.3%) additionally meeting criteria for a current affective disorder ($\chi^2 = 10.4$, df = 1, p < .001). Similarly, 7 current eating disorder diagnosed patients (38.9%) additionally met criteria for current anxiety disorder ($\chi^2 = 14.8$, df = 1, p < .001). Female patients were no more likely to have an eating disorder than male patients and were no more likely to meet criteria for an additional disorder.

DISCUSSION

Using a structured psychiatric diagnostic interview and formal diagnostic criteria, the present study investigated rates of lifetime and current DSM-IV diagnoses in 174 bariatric surgery patients. The findings provide important clinical information regarding prevalence estimates of psychiatric disorders in severely obese patients seeking bariatric surgery when systematic diagnostic assessment and rigorous criteria are used. Overall, of the 174 patients, 36.8% reported at least one lifetime psychiatric disorder and 24.1% reported a current psychiatric disorder. These overall results suggest that prevalence rates of both lifetime and current disorders are lower than those reported in previous studies using questionnaire, clinical, or chartreview-based diagnoses⁴⁻⁷ but are similar to those reported in the early studies that relied on formal diagnostic criteria.^{8,9,13,31} Overall rates and rates of specific psychiatric categories observed in the present study are similar to the rates reported in the recent National Comorbidity Survey.³² This suggests that bariatric surgery patients do not have elevated risk of psychiatric disorders relative to the general population. Lastly, we observed relatively few overall differences in psychiatric comorbidity by sex, but the observed instances of differential patterning by sex are consistent with previous reports.^{8,9,13,31}

In addition to determining lifetime and current prevalence rates of psychiatric disorders, another goal of this study was to examine the prevalence of eating disorders and to determine their specific association with additional psychiatric disorders. Only 4.6% of the bariatric surgery patients reported a history of BED. This rate is slightly lower than prevalence estimates reported in previous studies using formal diagnostic criteria^{10,33,34} and substantially lower than estimates based on different self-report questionnaires.14 An additional 9.2% of the present study sample reported lifetime eating disorder NOS. Most patients with an eating disorder diagnosis (i.e., BED and eating disorder NOS) met current criteria. This might suggest that the current eating disorder symptoms represent a motivation to seek surgery in addition to the extreme obesity and its medical comorbidities. Alternatively, it could indicate that patients with past episodes of BED and eating disorder NOS minimize past history because of treatment-seeking status.

Furthermore, consistent with previous studies, we observed a high rate of psychiatric comorbidity in patients with eating disorder diagnoses,^{2,35,36} a finding that appears consistent regardless of sampling and assessment methods. In contrast to previous reports, however, anxiety disorder was more frequently diagnosed in our patient group than affective disorder. In addition, we observed a 5.2% rate of lifetime substance abuse disorders, but less than 1% had a current problem. These findings are lower than the substance abuse rates reported by the National Comorbidity Survey³² and previous studies of bariatric surgery patients as reviewed by Sarwer and colleagues.⁴ A recent study by Kleiner and colleagues³⁷ reported a significant inverse relationship between body mass index and alcohol use, and the authors propose that overeating and obesity may serve as protective factors that reduce the likelihood of substance abuse because food may successfully compete against substances for brain reward sites. Our data support the hypothesis that, in general, substance abuse is less prevalent in obese individuals seeking bariatric surgery than in the general population. However, whether risk for substance abuse increases in bariatric surgery patients presenting with additional psychiatric disorder warrants further investigation.

The relationship between preoperative psychiatric status and long-term outcome following bariatric surgery has not yet been established. The present study supports that rates of disorder are lower when using a structured diagnostic interview and using formal diagnostic criteria than when using either unstructured clinical interviews or self-report methods. Thus, studies using less rigorous methodology and diagnostic criteria and reporting higher rates of psychopathology may be limited in their ability to examine the relationship between psychiatric disorder and surgical outcome because of high false positive rates of diagnosis. Moreover, the prognostic significance of psychiatric disorders to surgical outcome is further complicated by comorbidity. Therefore, future prognostic studies must consider the full spectrum of and interactions among psychiatric disorders.

Limitations of the present study include the possibility that severely obese patients seeking evaluation for bariatric surgery might minimize current level of distress and symptom status in order to present themselves as psychologically healthy candidates. Furthermore, rates of disorder may be influenced by patients with more severe psychopathology seeking bariatric surgery programs not requiring an evaluation. However, other studies with bariatric surgery candidates have reported higher rates of psychopathology, suggesting that the rigorous method of diagnostic assessment employed in the present study was more likely to influence observed rates of diagnosis than minimizing symptom status or avoiding a presurgery psychological evaluation. Another limitation of the study is the low rate of BED and eating disorder NOS diagnoses in the present sample. In spite of the small number of persons with an eating disorder diagnosis, however, the rates of comorbidity between eating disorder and other psychiatric diagnoses are consistent with those reported in previous studies. Furthermore, a notable strength of the present study is the relatively large sample size, which perhaps capitalizes less on chance fluctuations than previous studies with smaller samples. Whether rates of psychiatric diagnoses in bariatric surgery candidates fluctuate across different geographic locations by varying ethnic and socioeconomic factors should be considered in future studies.

In summary, our findings based on standardized diagnostic methods suggest that, for bariatric surgery candidates, the prevalence rates of most psychiatric disorders are generally similar to those seen in nationally representative community studies. This suggests that bariatric surgery candidates, as a whole, do not have elevated rates of psychiatric problems. Importantly, the presence of an eating disorder was associated with increased risk of psychiatric comorbidity and may serve as a clinically meaningful marker of additional distress. Our findings suggest the utility of administering structured diagnostic interviews as a component of an overall comprehensive assessment of bariatric surgery candidates. In busy practices, it is likely that psychiatric evaluations may be briefer and less comprehensive than either unstructured clinical interviews or self-report methods, and, as a consequence, accurate diagnoses may not be established. It is generally believed that the use of structured diagnostic interviewing using formal criteria may not be cost effective or feasible for many practice settings. In this regard, we note the recent findings from a controlled study demonstrating that the addition of a trained diagnostic interview to a clinical team in a pediatric community health setting reduced physicians' evaluation time quite substantially while improving diagnostic reliability.38 This suggests that adopting the policy of routine psychiatric screening, with further diagnostic assessment for those thought to suffer from severe pathology that may signal the need for additional interventions, may benefit bariatric surgery candidates. These issues deserve systematic empirical consideration.

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