

Psychiatric Disorders Among Bariatric Surgery Candidates: Relationship to Obesity and Functional Health Status

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Objective: The present study was designed to document psychiatric disorders among candidates for weight loss surgery and to examine the relationship of psychopathology to degree of obesity and functional health status.

Method: The authors collected demographic and clinical information from 288 individuals seeking surgery. Assessments were administered independently of the preoperative screening and approval process. The study group was mostly female (83.3%) and white (88.2%). Mean body mass index (BMI) of the group was 52.2 kg/m² (SD=9.7), and the mean age was 46.2 years (SD=9.4).

Results: Approximately 66% of the participants had a lifetime history of at least one axis I disorder, and 38% met diagnostic cri-

teria at the time of preoperative evaluation. In addition, 29% met criteria for one or more axis II disorders. Axis I psychopathology, but not axis II, was positively related to BMI, and both axis I and axis II psychopathology were associated with lower scores on the Medical Outcomes Study 36-item Short-Form Health Survey.

Conclusions: Current and past DSM-IV psychiatric disorders are prevalent among bariatric surgery candidates and are associated with greater obesity and lower functional health status, highlighting the need to understand potential implications for surgery preparation and outcome. Future work also will focus on the course of psychiatric disorder during the post-surgery period and its relationship to weight loss and maintenance.

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A 1991 NIH Consensus Development Conference Panel recommended bariatric surgery for well-informed, motivated individuals with class 3 obesity (body mass index [BMI] ≥ 40 kg/m²) who have acceptable operative risks and for individuals with class 2 obesity (BMI=35–39.9 kg/m²) and high-risk comorbid conditions such as type 2 diabetes or cardiovascular disease (1). The panel advised careful selection of candidates after evaluation by a multidisciplinary team with medical, surgical, psychiatric, and nutritional expertise. Although a recent national survey indicated that 95% of bariatric surgeons now use a multidisciplinary team, procedures were inconsistent (2). For example, although more than 80% of programs require preoperative mental health evaluations (2–4), there is little consensus as to how results should be used in the context of surgical care. With increasing demands for surgery (5), there is a strong need for empirical data to inform preoperative screening practices.

The prevalence and clinical significance of psychiatric disorders among candidates for weight loss surgery are not fully understood. Evidence suggests high rates of psychosocial impairment, but reviews of the extant literature have highlighted methodological issues such as inadequate sample sizes, cross-sectional and retrospective designs, and use of nonstandardized measures (6, 7). Many reports have been narrowly focused on a limited range of

psychiatric disorders or symptoms such as binge eating, which may be associated with poorer long-term weight control after operation (8, 9). Most published studies have not included assessment of a full range of axis I and axis II psychopathology, yet there is increasing recognition that not only axis I disorders such as depression (10) but also axis II personality disorders (11, 12) may be associated with health outcomes.

Although the literature focusing on bariatric surgery has limitations, there are several other lines of research suggesting that candidates for weight loss surgery have high rates of psychiatric disorders. First, it has been well established that individuals presenting for treatment of obesity report more psychopathology than do obese individuals in the community (13). Furthermore, one study has suggested that individuals seeking medical treatment of obesity (surgery or pharmacotherapy) are more likely to have a history of depression and anxiety than those seeking community-based behavioral treatment of obesity, even after controlling for BMI (14). Second, individuals who qualify for surgery are extremely overweight, and several studies have linked severity of obesity to specific forms of psychopathology, especially depression (15, 16) and binge eating (17–19). Third, obesity is associated with numerous physical illnesses (20). In turn, physical illness has been associated with psychiatric disorders in both clinical and

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epidemiological studies (21). For example, high rates of depression have been observed among patients with obesity-related comorbid conditions such as cardiovascular disease (22) and type 2 diabetes (23).

Thus, it appears that bariatric surgery patients may have high rates of psychopathology by virtue of the severe obesity and related comorbid medical conditions that lead them to seek treatment. In this initial report—part of a larger, prospective study of behavioral and psychosocial factors in bariatric surgery—we document current and lifetime psychiatric disorders among candidates for weight loss surgery and examine the relationship of psychopathology to severity of obesity and functional health status. We sought to address previous research limitations by recruiting a large cohort of candidates for weight loss surgery and using standardized assessments of DSM-IV axis I and axis II psychopathology. We conducted assessments independently of the surgery approval process to enhance patients' willingness to disclose problems they perceived might lead to the denial of surgery. Thus, patients participated in a separate psychological screening as part of their preoperative medical evaluation.

Method

Participants

All patients who were at least 18 years of age and seeking bariatric surgery within a single surgical practice at a large, urban medical center were given a letter asking if they would be willing to be contacted about participation in research on factors associated with adjustment after operation. Patients seeking their second bariatric surgery were excluded. Prospective participants were assured that a decision to hear about research would not obligate them to participate, their medical care would be the same whether or not they agreed to participate, and information provided for research would have no bearing on their candidacy for surgery. Exceptions to confidentiality included information relating to imminent harm to self or others.

Of approximately 1,000 total patients who agreed to be contacted about participation in research, 359 signed written informed consent forms approved by the University of Pittsburgh Institutional Review Board. Of the 359 individuals who consented to participate, 288 (80%) completed the baseline assessment. BMI data from dropouts were available from the clinical records, thus we compared dropouts versus completers using clinical records for both and found that they did not differ significantly in BMI. The 288 participants were mostly women (83.3%), white (88.2%), and married (57.3%), and 30.3% had no more than a high school education. Mean BMI was 52.2 kg/m² (SD=9.7), and the mean age was 46.2 years (SD=9.4).

Procedure

In the parent study, patients complete a battery of questionnaires and interviews before and at regular intervals after bariatric surgery. To maximize study participation, self-report assessments were returned by mail, and interviews were conducted by telephone. Participants were also compensated for completing each assessment. Baseline data collection is now complete, and psychosocial measures are presented here. Follow-up assessments are ongoing.

Measures

Participants provided demographic information including sex, age, race, education, marital status, height, and weight. Severity of obesity was evaluated by BMI.

Current and lifetime DSM-IV axis I diagnoses were assessed with the Structured Clinical Interview for DSM-IV (SCID), and the SCID-II was used to assess DSM-IV axis II personality disorders. Interviewers were master's- and doctoral-level psychologists who received training with the SCID training tapes and ongoing supervision from a doctoral-level, licensed clinical psychologist. With respect to assessment of psychiatric disorders, telephone and face-to-face interviews have yielded no significant differences for axis I diagnoses (24) and have shown excellent agreement for "any personality disorder" and for cluster B personality disorders on axis II (25).

Functional health status was assessed with the Medical Outcomes Study 36-item Short-Form Health Survey, a widely used instrument with well-established validity and reliability, to allow comparison with studies of other medical samples. All items on this 36-item self-report questionnaire are rated so that a higher value represents a more favorable health state. Scoring yields eight subscales: four pertaining to physical health (physical functioning, role limitations due to physical health, pain, and general health perceptions) and four related to emotional health (role limitations due to emotional problems, energy/fatigue, emotional well-being, and social functioning).

Analytic Plan

We used descriptive statistics to characterize the prevalence of current and lifetime DSM-IV axis and axis II psychopathology. A chi-square analysis was used to determine whether rates of psychopathology differed by sex. To assess the relationship between axis I and II psychopathology, a chi-square analysis was used to compare the lifetime prevalence of one or more axis I disorders for patients with and without an axis II diagnosis.

Next, we conducted univariate analyses to identify factors associated with current and lifetime axis I and axis II psychopathology. We compared patients with and without psychopathology (any versus no disorder) on demographic variables (BMI, age, sex, race, marital status, and education) and SF-36 subscale scores using *t* tests and chi-square analyses for continuous and categorical variables, respectively. All tests were two-tailed with a cutoff for significance of *p*<0.05.

Finally, based on the results of the univariate analyses, to examine the joint contributions of BMI and physical health to psychopathology, we employed logistic regression with demographic characteristics and the physical health subscales (physical functioning, role limitations due to physical health, pain, and general health perceptions) as predictors of current and lifetime axis I psychopathology. Wald's statistic was used to determine which of the independent variables contributed significantly to the model, and factors were dropped from the model based on a cutoff of *p*<0.10.

Results

Prevalence of Psychopathology

Current and lifetime prevalence of individual axis I disorders and axis II disorders did not differ by sex, and thus results are reported for the entire cohort in Table 1 and Table 2.

The most common class of lifetime disorder was mood disorders (45.5%), whereas the most common class of disorder at the time of preoperative evaluation was anxiety disorders (24.0%). The discrepancy between lifetime and

TABLE 1. Lifetime and Current Axis I Disorders in Candidates for Weight Loss Surgery (N=288)

| Disorder | Lifetime (%) | Current (%) |
|---|--------------|-------------|
| Mood disorders | | |
| Major depressive disorder | 42.0 | 10.4 |
| Dysthymia (current only) | | 3.8 |
| Bipolar I or bipolar II disorder | 3.5 | 1.7 |
| Any mood disorder | 45.5 | 15.6 |
| Anxiety disorders | | |
| Panic disorder | 19.4 | 5.9 |
| Agoraphobia without panic | 3.5 | 1.0 |
| Social phobia | 9.4 | 9.0 |
| Specific phobia | 8.0 | 7.3 |
| OCD | 3.8 | 2.1 |
| PTSD | 11.8 | 2.8 |
| Generalized anxiety disorder (current only) | | 6.3 |
| Any anxiety disorder | 37.5 | 24.0 |
| Substance use disorder | | |
| Alcohol abuse | 17.7 | 0.0 |
| Alcohol dependence | 13.2 | 0.7 |
| Drug abuse | 6.6 | 0.0 |
| Drug dependence | 9.4 | 1.0 |
| Any substance disorder | 32.6 | 1.7 |
| Eating disorders | | |
| Anorexia nervosa | 0.0 | 0.0 |
| Bulimia nervosa | 3.5 | 0.3 |
| Binge eating disorder | 27.1 | 16.0 |
| Any eating disorder | 29.5 | 16.3 |
| At least one axis I disorder | 66.3 | 37.8 |
| At least two axis I disorders | 42.7 | 17.0 |
| At least three axis I disorders | 25.7 | 7.6 |

current substance use disorders was striking (32.6% versus 1.7%). With respect to eating disorders, 29.5% of the cohort reported a lifetime disorder, accounted for primarily by binge eating disorder, a provisional diagnosis in DSM-IV. That is, no patients reported anorexia nervosa, seven had bulimia nervosa, 75 had binge eating disorder; and three had a history of both binge eating disorder and bulimia nervosa. At preoperative evaluation, 16.3% met criteria for an eating disorder, including one with bulimia nervosa and 46 with binge eating disorder.

Twenty-nine percent of the cohort met diagnostic criteria for an axis II disorder. Twenty-five percent of participants had both an axis I and II diagnosis; 3.5% had axis II only; and 46% had axis I only. Results suggest a strong relationship between axis I and axis II diagnoses ($\chi^2=16$, $df=1$, $p<0.001$).

Factors Associated With Psychopathology

Participants with a current axis I disorder had a significantly higher BMI than those without (54.2 [SD=10.3] versus 51.0 [SD=9.2] kg/m², respectively; $t=-2.8$, $df=286$, $p=0.006$). Similarly, participants with a lifetime history of any axis I disorder had a significantly higher BMI than those without (53.3 [SD=10.0] versus 49.6 [SD=8.5] kg/m², respectively; $t=-3.0$, $df=286$, $p=0.003$). In contrast, patients with an axis II disorder did not differ in BMI. Moreover, there were no differences between the groups with and without a history of axis I and axis II psychopathology in age, sex, race, marital status, or education.

TABLE 2. Axis II Personality Disorders in Candidates for Weight Loss Surgery (N=288)

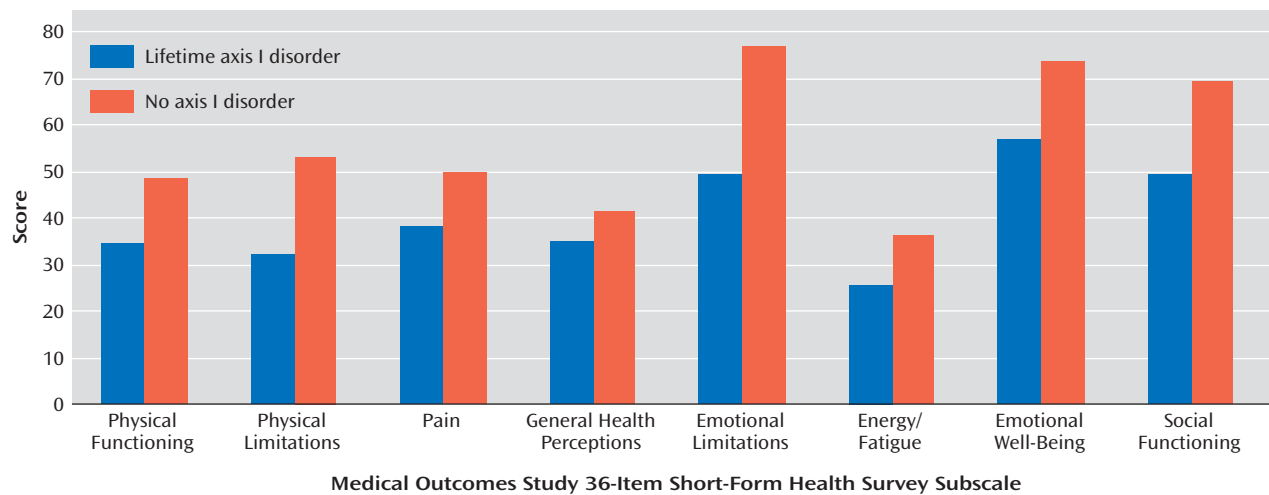
| Axis II Personality Disorder | % |
|------------------------------|------|
| Cluster A | |
| Paranoid | 5.6 |
| Schizoid | 2.1 |
| Schizotypal | 0.4 |
| Cluster B | |
| Antisocial | 2.8 |
| Borderline | 4.9 |
| Histrionic | 0 |
| Narcissistic | 0.7 |
| Cluster C | |
| Avoidant | 17.0 |
| Dependent | 1.7 |
| Obsessive-compulsive | 7.6 |
| Any personality disorder | 28.5 |

Each of the subscales of the Medical Outcomes Study 36-item Short-Form Health Survey was significantly lower among patients with a lifetime history of any axis I disorder compared with those without, as shown in Figure 1. Each of the eight subscales was also significantly lower among patients with axis II disorders compared with those without. Thus, both axis I and axis II psychopathology were associated with decreased functional health status, whereas axis I, but not axis II, was associated with increased BMI.

Finally, since BMI and functional health status were independently related to axis I psychopathology in univariate analyses, we used modeling to examine the joint contributions of severity of obesity and the physical health subscales to axis I psychopathology. We used logistic regression analysis with all demographic variables including BMI and the physical health subscales as predictors of axis I psychopathology entered into the initial model. As shown in Table 3, higher BMI, more pain, and greater role limitations due to physical health were associated with having at least one lifetime axis I diagnosis (analysis of current axis I psychopathology yielded a similar final result, with BMI, general health perceptions, and pain retained in the model). Thus, severity of obesity and certain aspects of physical health were jointly related to lifetime axis I psychopathology.

Discussion

Two recent surveys indicate that more than 80% (2–4) of programs require preoperative mental health evaluations for bariatric surgery, yet the prevalence and clinical significance of psychiatric disorders in this group is not well documented. The present study addresses one gap in the research literature by providing compelling evidence of high rates of psychiatric disorders among a large group of patients administered standardized assessments independently of the preoperative screening and approval process. Upon interview, 66.3% of participants reported a lifetime history of an axis I disorder, and 28.5% of the cohort met diagnostic criteria for an axis II disorder at the time of

FIGURE 1. Relationship Between Psychopathology and Functional Health Status Among Candidates for Weight Loss Surgery (N=288)^a

^a Each subscale score significantly lower ($p<0.01$) in subjects with a history of an axis I disorder.

evaluation. Overall findings are consistent with studies suggesting psychosocial impairment among bariatric surgery patients, although differences in methodology preclude direct comparison of results from previous reports.

The present study replicates and extends work suggesting that individuals seeking treatment of obesity report more psychopathology than do obese individuals in the community (13). For example, lifetime prevalence of mood, anxiety, and substance disorders of 45.5%, 37.5%, and 32.6% among bariatric surgery candidates may be compared with prevalence estimates of 20.8%, 28.8%, and 14.6%, respectively, reported in a nationally representative sample from the National Comorbidity Survey Replication (26). Consistent with a growing body of research linking mood, eating and weight problems, the most frequent individual diagnoses among individuals seeking weight loss surgery were major depressive disorder (42.0% lifetime and 10.4% current) and binge eating disorder (27.1% lifetime and 16.0% current). Studies to determine causal pathways between obesity and specific disorders, as well as mediators and moderators of the relationships between psychiatric disorder and obesity are clearly needed. Psychiatric disorders like major depressive disorder and binge eating disorder may contribute to the development of severe obesity in vulnerable individuals. For example, some individuals report overeating or binge eating when depressed, and as depression tends to be recurrent, it is easy to see how repeated episodes could contribute to weight gain over time. Indeed, some epidemiological studies suggest that mood problems antedate weight problems (27). However, psychiatric disorders may also be a consequence of severe obesity in a culture that stigmatizes obesity, or obesity and psychiatric disorder may have a shared diathesis.

TABLE 3. Axis I Psychopathology as a Function of BMI and Physical Health^a

| Factor | β | SE | Wald | p |
|---|---------|-------|-------|------|
| BMI | 0.036 | 0.015 | 5.389 | 0.02 |
| Role limitations due to physical health | -0.008 | 0.004 | 4.951 | 0.03 |
| Pain | -0.011 | 0.006 | 3.202 | 0.08 |
| Constant | -0.118 | 0.862 | 0.019 | 0.90 |

^a A backward logistic regression model was used; overall $\chi^2=25.3$, $df=3$, $p<0.001$.

Research to explicate the potential relationship between eating and substance disorders also may shed light on the pathogenesis of obesity. It is interesting that we documented a history of substance abuse or dependence in 32.6% of this group of patients seeking bariatric surgery. However, very few individuals met diagnostic criteria for a disorder at the time of evaluation. Although this discrepancy between lifetime and current diagnoses may reflect underreporting of current disorder, it is intriguing to speculate that substance and weight problems may also have a shared diathesis, and that substance abuse remits when eating behavior predominates. For example, it has been suggested that drugs and food may activate common reward circuitry in the brain (28). Clearly a more detailed examination of the history of substance use relative to the development of eating and weight problems in this group is warranted.

Anxiety disorders were the most prevalent class of disorder at the time of preoperative evaluation. That is, a patient seeking bariatric surgery was more likely to have a current anxiety disorder than a mood, substance, or eating disorder. In addition, cluster C personality disorders, characterized by anxious (avoidant) or fearful (obsessive-compulsive) behavior, were most common. These findings lead us to question whether social stigma, discrimination,

Patient Perspectives

“Marie” was a 45-year-old married white woman with two adult children. At presentation her BMI was 51.2. Her medical profile included a history of one spontaneous miscarriage and cholecystectomy. She presented with hypertension, gastroesophageal reflux disease, osteoarthritis, and stress incontinence. Her medication regimen included hydrochlorothiazide, 50 mg/day; famotidine, 20 mg/day; flurbiprofen, 100 mg t.i.d.; methocarbamol, 750 mg t.i.d.; gabapentin, 300 mg t.i.d.; and paroxetine, 40 mg/day. Having reached her lifetime high weight and experiencing a number of obesity-related comorbid conditions, she decided to pursue bariatric surgery at the suggestion of her primary care doctor.

Marie had been obese since childhood and reported sporadic eating binges with loss of control over eating throughout her life. She began dieting at age 18, including use of prescription diet medication, which resulted in losses of up to 50 pounds, each followed by weight regain. Her lowest adult weight was 130 pounds at age 20. At age 24, she experienced significant weight gain during pregnancy. At age 30, weighing 200 pounds, Marie experienced the onset of depressive and anxious symptoms. At age 39, Marie began taking paroxetine, prescribed by her primary care doctor for “mild anxiety, depression, and insomnia.”

Although compliant with her psychotropic medication, Marie continued to experience frequent crying spells, restlessness, fatigue, difficulty concentrating, muscle tension, difficulty sleeping through the night, and worrying about many different issues, symptoms that were interfering with her performance as a home nurse. At the time of her research evaluation, Marie met diagnostic criteria for generalized anxiety disorder. As per protocol, the research interview results were not shared with her surgical team. However, Marie’s insurance provider required a preoperative psychological evaluation, which was conducted separately.

“Jim” was a 51-year-old, unemployed divorced white man with joint custody of two children, aged 12 and 19. At the presurgical evaluation his BMI was 43.8. He was a former smoker with borderline hypertension, obstructive sleep apnea, and type 2 diabetes for which he was taking metformin hydrochloride, 850 mg t.i.d. Jim hoped that weight loss surgery would allow him to resume work, be a better parent, and start dating again.

Jim reported feeling “chronically depressed” and lonely since childhood. He began smoking and drinking in his 20s, with nightly drinking binges. At age 25, he initiated his first diet at 250 pounds, resulting in a 37-pound weight loss. He reported dieting occasionally and having tried prescription weight loss medications, but he had continued to gain weight steadily since then. Jim stopped drinking and experienced his first major depressive episode at age 43 when he was divorcing, which was associated with significant weight gain. He saw a psychiatrist, who prescribed sertraline, 50 mg/day, and recommended weekly psychotherapy. However, Jim reported adhering to treatment for less than a year.

At the time of preoperative evaluation, Jim had been unemployed for the past year due to physical and emotional health issues. He reported persistent low mood, feelings of inadequacy, and inhibition in social situations. Jim met diagnostic criteria for past major depressive disorder in partial remission and past alcohol dependence in full, sustained remission. He was also diagnosed with avoidant personality disorder on axis II. Jim’s insurance provider required a psychological evaluation and 6-month physician supervised diet, and these were conducted independently of the confidential research evaluation.

and fears of negative social evaluation may exacerbate anxious or avoidant behaviors in extremely obese individuals. It has also been suggested that childhood trauma may increase risk for psychiatric disorders (29, 30) and obesity (31, 32). Given that 11.8% of our cohort met lifetime criteria for posttraumatic stress disorder, a more detailed evaluation of trauma history may be indicated in future studies. With respect to sexual trauma in particular, obesity may serve an adaptive function for some by reducing sexual advances, or decreasing sexual impulse, in a societal milieu that stigmatizes obesity. Thus, the possibility that a history of sexual abuse could interfere with postoperative weight loss, as has been suggested in one study (33), warrants further evaluation.

We also examined factors previously associated with psychopathology in the obesity literature, namely severity of obesity (17–19) and health impairment (21–23), both thought to be especially relevant to this group of individuals with class 3 obesity, or class 2 obesity with serious comorbid medical conditions. We found that having at least one axis I disorder, current or lifetime, was positively asso-

ciated with BMI, and both axis I and axis II disorders were associated with decreased functional health status, including not only emotional health, but also physical health. We followed up this finding by using statistical modeling to examine the joint contributions of obesity and physical health to current and lifetime axis I psychopathology. Results suggest that both BMI and certain aspects of physical health are uniquely related to axis I disorders. Indeed, there is increasing appreciation of the relationships between obesity and quality of life, and measures of obesity-specific quality of life are now available (34, 35). Including measures of both general and obesity-specific quality of life, and evaluating postoperative changes, is likely to provide new information in future studies.

In summary, this investigation provides compelling evidence that psychiatric disorders are a major concern for this patient population, not only because they are relatively common but also because they are associated with severity of obesity and decreased functional health status, even within a group of extremely overweight individuals seeking bariatric surgery. Although we conducted assess-

ments independently of the preoperative screening and surgery approval process, it remains possible that patients did not disclose problems they feared might lead to the denial of surgery, leading to underestimates of psychiatric disorders. It is also possible that the group of patients who enrolled in this study at a large, urban medical center is not fully representative of the population of individuals seeking weight loss surgery. Nonetheless, this study provides the best available information on the prevalence of psychiatric disorders and their relationship to severity of obesity and functional health status.

Bariatric surgery is a powerful probe for understanding the complex cascade of events associated with the regulation of body weight. Bariatric surgery has a positive impact on obesity and related comorbid conditions (20) as well as psychosocial functioning (6, 7). However, 20% of patients fail to achieve significant weight loss or experience significant weight regain (36). Although no robust predictors of outcome have emerged from the research literature, preliminary data suggest that the onset or recurrence of binge eating at longer-term follow-up may be associated with weight regain (8, 9). Hypothesis-driven prospective studies of bariatric surgery patients who vary in their demographic, medical, and psychiatric status are needed in order to identify factors associated with outcomes in bariatric surgery and to identify targets for clinical intervention. In light of the sharply increasing number of patients who opt for surgical treatment of obesity (5), targeted interventions to help patients achieve optimal surgery preparation and outcome will have a strong public health impact.

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