Published in final edited form as:

Surg Obes Relat Dis. 2008 ; 4(5): 651–659. doi:10.1016/j.soard.2008.04.012.

Health and Health-Related Quality of Life: Differences between Men and Women Who Seek Gastric Bypass Surgery

Ronette L. Kolotkin, Ph.D.^{a,b}, Ross D. Crosby, Ph.D.^{c,d}, Richard E. Gress, M.A.^e, Steven C. Hunt, Ph.D.^e, Scott G. Engel, Ph.D.^c, and Ted D. Adams, Ph.D.^e

^aObesity and Quality of Life Consulting, Durham, NC

^bDepartment of Community and Family Medicine, Duke University Health System, Durham, NC

^cNeuropsychiatric Research Institute, Fargo, ND

^dDepartment of Neuroscience, University of North Dakota School of Medicine, Fargo, ND

^eDepartment of Cardiovascular Genetics, University of Utah School of Medicine, Salt Lake City, UT

Abstract

Background—The aim of this study was to examine differences between male and female bariatric surgery candidates with respect to health-related quality of life (HRQOL), health, sociodemographic variables, and interactions among these variables in a bariatric surgery practice in the United States. Women seek bariatric surgery five times more than men. Research on gender differences in HRQOL is limited and results are conflicting.

Methods—A total of 794 surgery candidates (mean age 42.2 y; body mass index 46.9 kg/m²; 84.8% women) completed both a weight-related (Impact of Weight on Quality of Life-Lite questionnaire) and a generic (Medical Outcomes Study Short-Form-36) measure of HRQOL. Health was evaluated by questionnaire and clinical interviews.

Results—Compared to men, women reported reduced HRQOL on 3 of the 5 scales assessing obesity-specific HRQOL and also the physical aspects of general HRQOL. Women also had double the rate of depression (48.5% versus 22.5%), and men had double the rate of sleep apnea (80.3% versus 40.2%). Women were younger, less obese, and were less likely to be married. No gender differences were found in the association between HRQOL and co-morbidities. However, an increasing number of co-morbidities was associated with decreasing physical and mental HRQOL. Additionally, depression was associated with decreased mental HRQOL, and coronary heart disease was associated with decreased physical HRQOL.

Conclusion—Women's reduced HRQOL, particularly in self-esteem, sexual life, and physical functioning, and their greater rates of depression, might play a role in their decision to seek bariatric surgery. Although we could not determine causality, this study is a first step toward understanding why women seek surgery 5 times more often than men.

Keywords

Health-related quality of life; Gender; Co-morbid conditions; Gastric bypass surgery

In 2007, an estimated 205,000 people in the United States underwent a bariatric surgery procedure¹. Recent data from U.S. and international samples indicate that women are >5 times more likely than men to seek bariatric surgery^{2,3}. The U.S. Nationwide Inpatient Sample reported an upward trend in the proportion of women bariatric surgery patients from 1998 to 2002 (from 81% to 84%)³. Data collected from 137 bariatric surgeons and >41,000 patients internationally from 1987 to 2004 indicated that 85% of patients were women². The reasons women are >5 times more likely than men to seek bariatric surgery are poorly understood.

Studies of bariatric surgery patients consistently report impaired general health-related quality of life (HRQOL) relative to population samples⁴⁻⁷. Similarly, bariatric surgery patients report more impairment in obesity-specific quality of life (QOL) than community samples^{6,8}. Few studies have examined HRQOL in bariatric surgery patients with respect to gender. In the Swedish Obese Subjects study,⁹ a controlled clinical trial of surgically versus conventionally-treated obese persons where 33% of the sample was men, surgically-treated women (as well as conventionally-treated women) reported greater psychosocial problems in everyday life at baseline on an obesity-specific measure of HRQOL. However, there were no gender differences at baseline in the Swedish Obesity Subjects study on a generic measure of HRQOL. In a sample of gastric bypass surgery patients with extreme obesity (mean BMI 53.3 kg/m²; 18% men), differences in obesity-specific HRQOL were found for both gender and race, with white women reporting the greatest HRQOL impairments and African-American men reporting the least¹⁰. Two other studies examining gender differences in HRQOL in bariatric surgery patients found no differences between men and women^{11,12}. Using an obesity-specific measure of quality of life, Stout et al. found no differences in HRQOL between male and female bariatric surgery patients (16% men). Using 3 of the 4 physical domains of a general HRQOL instrument (physical functioning, physical role limitations, and bodily pain), Fabricatore et al also found no differences between men and women who sought bariatric surgery (19% men). Thus, there is limited research on the HRQOL of bariatric surgery patients by gender, with studies reporting conflicting findings.

Studies of bariatric surgery patients have also reported gender differences with respect to presurgical comorbid conditions. In 300 US patients presenting for bariatric surgery (86.8% women) the prevalence of cardiac disease was much greater for men than women (10.5% vs. 1.9%), as was the prevalence of sleep apnea (57.8% vs. 24.9%)¹³. However, women had a greater prevalence of depression than men (52.5% vs. 31.5%). Similar differences in the prevalence of sleep apnea and cardiac disease for men versus women were found in a recent study by Tymitz and colleagues¹⁴. No differences were found between men and women with respect to the prevalence of diabetes, hypertension, asthma, gastroesophageal reflux disease, or arthritis.

The purpose of the present study was to better understand differences between male and female bariatric surgery candidates with respect to general and obesity-specific HRQOL, comorbid conditions, sociodemographic characteristics, and the interactions of these variables. To our knowledge there are no studies that examine the relationship between HRQOL and comorbid conditions by gender in bariatric surgery patients. Specifically, we

attempted to answer the following questions. First, do male and female gastric bypass candidates differ in terms of sociodemographic and weight characteristics, presurgical medical comorbidities, and presurgical HRQOL? Secondly, is HRQOL influenced by the number of presurgical comorbid conditions? Additionally, how do specific presurgical comorbid conditions influence HRQOL, and do these influences differ by gender? Although these data do not allow us to answer the question of why women are over five times more likely to seek bariatric surgery than men, we see this as an important first step in exploring this question.

Methods

Participants

The sample for the current study consisted of 794 gastric bypass surgery patients recruited from a bariatric surgery practice in Utah for a two-year prospective study¹⁵. The exclusion criteria for the study were as follows: previous weight loss surgery, gastric or duodenal ulcers within 6 months, active cancer (with exception of non-melanoma skin cancer), alcohol or narcotic abuse, and myocardial infarction within 6 months.

Procedures

The University of Utah institutional review board approved this study, and all participants provided written informed consent. At the initial evaluation, the participants' height and weight were obtained by the study personnel. The body mass index (BMI) was calculated as weight in kilograms divided by the height in meters squared. Before surgery, the participants completed 2 measures of HRQOL (described in the next section, "Measures").

Additionally, during the participant's visit to the general clinical research center or the Cardiovascular Genetics Clinic, a medical history was obtained using an extensive disease endpoints questionnaire. This included a reported medical history of sociodemographic information, coronary heart disease, angina, clinically diagnosed depression with treatment, hypothyroidism, acid reflux, cancer, and gout. In addition, complete documentation of current medications was obtained from the prescription bottles brought in by the participants. Finally, clinical measurements (blood pressure, blood lipids, glucose, hemoglobin A1c, and sleep apnea screening) were used to diagnose previously undiagnosed conditions. Coronary heart disease was defined as a myocardial infarction, coronary bypass surgery, or percutaneous transluminal coronary angioplasty. Hypertension was defined as a blood pressure of $\geq 140/90$ mmHg (average of 3 measurements with the patient sitting) or the use of antihypertensive medications. Diabetes was defined as a fasting glucose level of ≥ 126 mg/dl or greater or use of antidiabetic medication. Sleep apnea diagnoses were based upon results from limited polysomnographic screening [Apnea-Hypopnea (AHI) Index] or reported CPAP use, and thus was recorded for only a subset of the sample ($n = 424$). Additional details about the design and rationale of the primary study can be found in the report by Adams and et al.¹⁵.

Measures

Two questionnaires were used: the Impact of Weight on Quality of Life-Lite (IWQOL-Lite) questionnaire and a generic questionnaire, the Medical Outcomes Study Short-Form-36 (SF-36).

The IWQOL-Lite¹⁶ is a measure of weight-related quality of life, consisting of 31 items that begin with the phrase, “Because of my weight...” Each item has five response options, ranging from (1) “Never true” to (5) “Always true”. The IWQOL-Lite provides scores in five domains (Physical Function, Self-Esteem, Sexual Life, Public Distress and Work) along with a total score. Scores range from 0–100, with lower scores indicating greater impairment. In non-psychiatric samples the IWQOL-Lite has demonstrated excellent reliability, with alpha coefficients ranging from 0.90 to 0.94 for individual scales and 0.96 for total score¹⁶, and test-retest reliability ranging from 0.81 to 0.88 for scales and 0.94 for total score¹⁷. Scores on the IWQOL-Lite have been shown to correlate consistently with BMI^{16, 17} and other measures of health-related quality of life¹⁷, change with weight loss/gain^{18, 19}, and differentiate obese subgroups on the basis of treatment seeking status⁸.

The SF-36²⁰, a 36-item self-report instrument, is a widely used measure of general health-related quality of life. The SF-36 consists of eight subscales (physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health) and two summary scores (Physical Component Summary (PCS) and Mental Component Summary (MCS)). The two summary scores represent relatively independent (i.e., orthogonal) indices based on factor analysis of subscale scores using the Medical Outcomes Study data²⁰. Estimates of internal consistency for the SF-36 typically have exceeded 0.80 for all subscales across diverse patient groups^{21, 22}.

Statistical Analyses

Male and female gastric bypass patients were compared on sociodemographic and weight characteristics using independent samples t-tests (BMI, age, years of education) and chi-square tests (ethnicity, marital status) based upon an alpha of .05. Logistic regression analyses were then performed to determine whether men and women differed in rates of nine separate comorbid conditions. Analyses were performed with and without covariates differing significantly by gender (BMI, age, marital status) based upon an alpha of .01. This approach was taken to determine whether differences in rates of comorbidities observed between men and women could be accounted for by differences in sociodemographic and weight characteristics. Significant effects were determined based upon both the unadjusted and adjusted analyses. A series of 2 (male vs. female gender) by 4 (0, 1, 2, 3+ comorbidities) general linear models were then performed to evaluate differences in HRQOL by gender and comorbidities. Dependent variables for these analyses included all scales and total score from the IWQOL-Lite, and the Physical Component (PCS) and Mental Component (MCS) scores from the SF-36. As above, analyses were performed with and without covariates differing significantly by gender (BMI, age, marital status) based upon an alpha of .01. Finally, a series of general linear models were performed using individual comorbidities and gender to predict HRQOL. For simplicity, only the IWQOL-Lite total score and the

component scores from the SF-36 (PCS, MCS) were included as dependent variables in these analyses. The primary tests of interest were the main effect for comorbidity, which evaluates whether the presence of a specific comorbidity influences HRQOL, and the comorbidity by gender interaction, which evaluates whether this influence of comorbidities on HRQOL differs by gender. Consistent with above, analyses were performed with and without covariates differing significantly by gender (BMI, age, marital status) based upon an alpha of .01.

Results

Sociodemographic and Weight Characteristics

The present sample consisted of 674 women (mean age 41.7 y, range 19–70) and 120 men (mean age 45.1 y, range 18–71). Sociodemographic and weight characteristics by gender are presented in Table 1. Women had significantly lower BMI ($p = .013$), were on average younger ($p < .001$), and were less likely than men to be married (69% vs. 56%, respectively). Men and women did not differ significantly in terms of education or ethnicity.

Presurgical Comorbid Conditions

Table 2 lists the rates of comorbidities by gender. Women had significantly higher rates of depression (48.5% vs. 22.5%), while men had significantly higher rates of sleep apnea (80.3% vs. 40.2%), hypertension (52.5% vs. 32.0%), and gout (10.0% vs. 0.7%). Although men also had significantly higher rates of diabetes (28.3% vs. 16.8%) and coronary heart disease (5.8% vs. 1.2%) in the unadjusted analyses, when covariates were included, these differences approached but did not reach the significance level of .01, suggesting that these covariates (BMI, age, marital status) account for some of the observed differences between genders in rates of diabetes and coronary artery disease.

HRQOL Differences

Table 3 lists IWQOL-Lite and SF-36 component scores by gender and number of presurgical comorbidities. Women reported significantly more impairment on the IWQOL-Lite Self-Esteem, Sexual Life, and Work scales, as well as the IWQOL-Lite total score and the PCS from the SF-36. Significantly greater impairments in HRQOL with increasing number of presurgical comorbidities were found for the PCS and MCS component scores from the SF-36. Although increasing presurgical comorbidities were also significantly associated with greater impairments for the Physical Function and Sexual Life scales from the IWQOL-Lite in unadjusted analyses, these differences approached but did not reach the significance level of .01 when covariates were included. None of the comorbidity-by-gender interactions were significant, suggesting that the influence of number of comorbidities on HRQOL does not differ by gender.

Individual Comorbidities and HRQOL

Table 4 lists logistic regression analyses examining the influence of individual comorbidities on HRQOL scores. Overall, few individual comorbidities were associated with greater impairments in HRQOL. The presence of acid reflux was significantly associated with greater impairments in both IWQOL-Lite total and MCS. Coronary heart disease was

associated with greater impairments in PCS, and depression with significantly greater impairments in MCS. As above, none of the comorbidity-by-gender interactions were significant.

Discussion

Consistent with the published bariatric surgery literature ², this sample of individuals seeking gastric bypass surgery was predominantly women (84.8%). A key aim of this research was to add to our understanding of why women are 5 times more likely to participate in bariatric surgery. From the results of this study, several differences were observed between men and women with respect to HRQOL, health, and sociodemographic variables. Specifically, women had reduced HRQOL compared to men on 3 of the 5 scales assessing obesity-specific HRQOL and also the physical aspects of general HRQOL. Although some significant associations were found between comorbid conditions and HRQOL, these associations did not differ by gender. Women also had double the rate of depression, but men had double the rate of sleep apnea, even after controlling for BMI, age, and marital status. Men also had higher rates of hypertension and gout compared to women. With respect to sociodemographic variables, women were younger, less obese, and less likely to be married.

Previous research on HRQOL differences between male and female bariatric surgery patients has been limited, and findings have been inconsistent ^{9, 10, 12}. Unlike the study by Stout et al. ¹², which found no differences between men and women on the IWQOL-Lite, the present study found gender differences in Self-Esteem, Sexual Life, and Work, as well as total score. Although the study by White et al. reported gender differences on IWQOL-Lite scales, these differences occurred on Physical Function, Self-Esteem, Sexual Life and total score. Thus, two of the three studies assessing HRQOL with the IWQOL-Lite reported gender differences in self-esteem and sexual life, suggesting that these areas may be particularly salient for women who seek bariatric surgery.

In the study by Karlsson et al. ⁹, the single-domain Obesity-Related Psychosocial Problems (OP) scale ²³ was used to assess obesity-specific HRQOL. These investigators found that female bariatric surgery patients reported more psychosocial problems in everyday life due to weight than men. The current study's findings, using a different obesity-specific instrument, are consistent with their results. However, unlike the Karlsson et al. study ⁹, which found no gender differences on general HRQOL, women in the present study were more impaired on the physical aspects of general HRQOL than men.

It has been suggested that the effect of obesity on HRQOL might be one of the primary reasons individuals seek treatment ^{24, 25}. The greater degree of HRQOL impairment in seekers of bariatric surgery compared to obese individuals who seek other treatment alternatives ⁸ suggests that HRQOL impairment may be an important determinant of who seeks bariatric surgery. Although we can't determine causality from this study, it is likely that women's greater HRQOL impairments may play a role in their preponderance as bariatric surgery patients. Many of the impairments found in women seeking bariatric surgery were psychosocial in nature (i.e. high rates of depression and reduced self-esteem

and sexual life), and it is possible that these psychosocial concerns are the driving force behind their decision to seek bariatric surgery. However, the presence of reduced physical HRQOL in women also suggests that physical conditions as well as psychosocial concerns are relevant in the decision to seek bariatric surgery. After identifying 187 items related to extreme obesity, Duval and colleagues²⁶ asked bariatric surgery candidates to find the items most significant for them and to rate each item's importance. Men and women identified similar areas of significance; however, women reported greater overall impact of obesity and they rated dissatisfaction with physical appearance as second in importance, whereas this was rated seventh in importance for men. Thus, the impact of weight on quality of life and life satisfaction appears to be much stronger for women than for men, and women place greater importance on physical appearance than men. Previous research has shown that women are more likely to have weight and body image concerns²⁷, and men more likely to identify themselves as light regardless of actual weight^{28, 29}. Additionally, the preponderance of women as bariatric surgery patients may also be understood within the context of women's general health-seeking behavior. Women are much more likely to seek out medical services compared to men³⁰.

The present study found gender differences in the rates of co-morbid conditions that were similar to those reported by Residori et al., in which the sample was also predominantly female¹³. Residori et al. reported a higher prevalence of sleep apnea in men (57.8% men vs. 24.9% women) and depression in women (52.5% women vs. 31.5% men). Another study¹¹, using an inventory to assess the presence of depressive symptoms rather than clinical diagnoses of depression, found no gender differences in bariatric surgery patients with respect to depressive symptoms, suggesting that method of assessment must be considered when comparing results across studies.

One of the important contributions of this paper is its availability of data on both HRQOL and comorbid conditions –and thus the opportunity to study the interrelationships of these variables. With respect to general HRQOL, it was observed that as the number of comorbid conditions increased HRQOL decreased in both the physical and mental (i.e. psychosocial) domains. These differences remained even after controlling for BMI, age, and marital status. For obesity-specific quality of life, both Physical Function and Sexual Life diminished as the number of comorbid conditions increased. However, these differences did not remain statistically significant after controlling for the above covariates. Several of the individual comorbid conditions were associated with decreased HRQOL. As might be expected, the presence of depression was associated with decreased mental (i.e. psychosocial) HRQOL. Unlike the study by Fabricatore et al.¹¹, we did not find an association between depression and the physical aspects of HRQOL. However, methodological differences between these studies may explain this discrepancy. Whereas Fabricatore used an inventory to assess symptoms of depression, we used documented evidence of diagnosed clinical depression. Another not unexpected finding was the presence of coronary heart disease being associated with decreased physical HRQOL. Although the presence of acid reflux was also associated with decreased mental HRQOL and decreased overall obesity-specific HRQOL, it is difficult to interpret these unexpected findings.

One of the limitations of this study is the lack of geographic heterogeneity in the sample, which may limit generalizability of the results. Another limitation is that data did not include all comorbid conditions associated with obesity. Most noteworthy is the absence of prevalence rates of arthritis. Ninety-one percent of the bariatric surgery patients in the study by Residori and colleagues¹³ and 27.3% of the patients in the study by Livingston et al.³¹ had arthritis.

Conclusion

The results of this study of bariatric surgery patients found important differences between men and women with respect to preoperative HRQOL, health, and sociodemographic variables. Women's HRQOL was impaired relative to men's, particularly in the areas of self-esteem, sexual life, work, and general physical HRQOL. Women also experienced double the rate of depression, whereas men experienced double the rate of sleep apnea. Women in this study also tended to be younger, less obese, and less likely to be married. Thus, gender differences in HRQOL show promise as a potential explanation for the reason 5 times more women than men seek bariatric surgery.

References

1. American Society for Metabolic and Bariatric Surgery. [Accessed January 24] Bariatric Surgery Fact Sheet. http://www.asbs.org/Newsite07/media/fact-sheet1_bariatric-surgery.pdf.
2. Samuel I, Mason EE, Renquist KE, Huang YH, Zimmerman MB, Jamal M. Bariatric surgery trends: an 18-year report from the International Bariatric Surgery Registry. *Am J Surg*. 2006; 192:657–662. [PubMed: 17071202]
3. Santry HP, Gillen DL, Lauderdale DS. Trends in Bariatric Surgical Procedures. *JAMA*. 2005; 294:1909–1917. [PubMed: 16234497]
4. Choban PS, Onyejekwe J, Burge JC, Flancbaum L. 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]
5. Dixon JB, Dixon ME, O'Brien PE. Quality of life after lap-band placement: influence of time, weight loss, and comorbidities. *Obes Res*. 2001; 9:713–721. [PubMed: 11707538]
6. Sullivan M, Karlsson J, Sjostrom 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 of Obes*. 1993; 1743:503–512.
7. Schok M, Geenen R, van Antwerpen T, de Wit P, Brand N, van Ramshorst B. Quality of life after laparoscopic adjustable gastric banding for severe obesity: postoperative and retrospective preoperative evaluations. *Obes Surg*. 2000; 10:502–508. [PubMed: 11175956]
8. Kolotkin RL, Crosby RD, Williams GR. Health-related quality of life varies among obese subgroups. *Obes Res*. 2002; 10:748–756. [PubMed: 12181383]
9. Karlsson J, Sjostrom L, Sullivan M. Swedish obese subjects (SOS)--an intervention study of obesity. Two-year follow-up of health-related quality of life (HRQL) and eating behavior after gastric surgery for severe obesity. *Int J Obes Relat Metab Disord*. 1998; 22:113–126. [PubMed: 9504319]
10. White MA, O'Neil PM, Kolotkin RL, Byrne TK. Gender, race, and obesity-related quality of life at extreme levels of obesity. *Obes Res*. 2004; 12:949–955. [PubMed: 15229334]
11. Fabricatore AN, Wadden TA, Sarwer DB, Faith MS. Health-related quality of life and symptoms of depression in extremely obese persons seeking bariatric surgery. *Obes Surg*. 2005; 15:304–309. [PubMed: 15826461]

12. Stout AL, Applegate KL, Friedman KE, Grant JP, Musante GJ. Psychological correlates of obese patients seeking surgical or residential behavioral weight loss treatment. *Surg Obes Relat Dis*. 2007; 3:369–375. [PubMed: 17533101]
13. Residori L, Garcia-Lorda P, Flancbaum L, Pi-Sunyer FX, Laferrere B. Prevalence of co-morbidities in obese patients before bariatric surgery: effect of race. *Obes Surg*. 2003; 13:333–340. [PubMed: 12841889]
14. Tymitz K, Kerlakian G, Engel A, Bollmer C. Gender Differences in Early Outcomes Following Hand-Assisted Laparoscopic Roux-en-Y Gastric Bypass Surgery : Gender Differences in Bariatric Surgery. *Obes Surg*. 2007; 17:1588–1591. [PubMed: 18049842]
15. Adams TD, Avelar E, Cloward T, Crosby RD, Farney RJ, Gress R, et al. Design and rationale of the Utah obesity study. A study to assess morbidity following gastric bypass surgery. *Contemp Clin Trials*. 2005; 26:534–551. [PubMed: 16046191]
16. Kolotkin RL, Crosby RD, Kosloski KD, Williams GR. Development of a brief measure to assess quality of life in obesity. *Obes Res*. 2001; 9:102–111. [PubMed: 11316344]
17. Kolotkin RL, Crosby RD. Psychometric evaluation of the Impact Of Weight On Quality Of Life-Lite Questionnaire (IWQOL-Lite) in a community sample. *Qual Life Res*. 2002; 11:157–171. [PubMed: 12018739]
18. Kolotkin RL, Crosby RD, Williams GR, Hartley GG, Nicol S. The relationship between health-related quality of life and weight loss. *Obes Res*. 2001; 9:564–571. [PubMed: 11557837]
19. Engel SG, Crosby RD, Kolotkin RL, Hartley GG, Williams GR, Wonderlich SA, et al. The impact of weight loss and regain on obesity-specific quality of life: mirror image or differential effect. *Obes Res*. 2003; 11:1207–1213. [PubMed: 14569046]
20. Ware, J.; Snow, K.; Kosinski, M.; Gandek, B. SF-36 Health Survey: Manual and Interpretation Guide. Boston: The Health Institute, New England Medical Center; 1993.
21. McHorney CA, Ware JE Jr, Lu JF, Sherbourne CD. The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care*. 1994; 32:40–66. [PubMed: 8277801]
22. McHorney CA, Ware JE Jr, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care*. 1993; 31:247–263. [PubMed: 8450681]
23. Karlsson J, Taft C, Sjostrom L, Torgerson JS, Sullivan M. Psychosocial functioning in the obese before and after weight reduction: construct validity and responsiveness of the Obesity-related Problems scale. *Int J Obes Relat Metab Disord*. 2003; 27:617–630. [PubMed: 12704406]
24. Fontaine, KR.; Bartlett, SJ. Health-Related Quality of Life in Obese Individuals. In: Andersen, RE., editor. *Obesity: Etiology, Assessment, Treatment and Prevention*. Champaign, IL: Human Kinetics Publishers, Inc.; 2003. p. 59-72.
25. Wadden TA, Sarwer DB, Fabricatore AN, Jones L, Stack R, Williams NS. Psychosocial and behavioral status of patients undergoing bariatric surgery: what to expect before and after surgery. *Med Clin North Am*. 2007; 91:451–469. xi–xii. [PubMed: 17509389]
26. Duval K, Marceau P, Lescelleur O, Hould FS, Marceau S, Biron S, et al. Health-related quality of life in morbid obesity. *Obes Surg*. 2006; 16:574–579. [PubMed: 16687024]
27. Pilner P, Chaiken S, Flett G. Gender differences in concern with body weight and physical appearance over the life span. *Personality & Social Psychology Bulletin*. 1990; 16:263–273.
28. Grover VP, Keel PK, Mitchell JP. Gender differences in implicit weight identity. *Int J Eat Disord*. 2003; 34:125–135. [PubMed: 12772177]
29. Kuchler F, Variyam JN. Mistakes were made: misperception as a barrier to reducing overweight. *Int J Obes Relat Metab Disord*. 2003; 27:856–861. [PubMed: 12821973]
30. Green CA, Pope CR. Gender, psychosocial factors and the use of medical services: a longitudinal analysis. *Soc Sci Med*. 1999; 48:1363–1372. [PubMed: 10369437]
31. Livingston EH. Procedure incidence and in-hospital complication rates of bariatric surgery in the United States. *Am J Surg*. 2004; 188:105–110. [PubMed: 15249233]

Table 1

Sociodemographic and weight characteristics by gender.

	Women (n = 674)	Men (n = 120)	Significance
BMI (mean, SD)	46.3 (14.0)	50.3 (25.5)	$t_{(792)} = 2.48, p = .013$
Age (mean, SD)	41.7 (10.9)	45.1 (11.1)	$t_{(792)} = 3.22, p < .001$
Education (mean, SD)	13.5 (3.1)	13.8 (4.4)	$t_{(767)} = 0.61, p = .544$
Ethnicity (n, %)			$\chi^2_{(6)} = 4.77; p = .573$
Caucasian	601 (89.2%)	112 (93.3%)	
Hispanic	39 (5.8%)	3 (2.5%)	
American Indian	10 (1.5%)	1 (0.8%)	
Asian/Pacific Islander	2 (0.3%)	0 (0.0%)	
African American	7 (1.0%)	0 (0.0%)	
Other	12 (1.8%)	3 (2.5%)	
Not Reported	3 (0.4%)	1 (0.8%)	
Marital Status (n, %)			$\chi^2_{(4)} = 26.10; p < .001$
Married	377 (55.9%)	83 (69.2%)	
Single	125 (18.5%)	18 (15.0%)	
Divorced	122 (18.1%)	3 (2.5%)	
Widowed	14 (2.1%)	2 (1.7%)	
Not Reported	36 (5.3%)	14 (11.7%)	

Table 2

Comorbid conditions by gender.

Comorbid Condition (n, %)	Women (n = 674)	Men (n = 120)	Unadjusted Odds Ratio (p)	Adjusted Odds Ratio ^I (p)
Depression	327 (48.5%)	27 (22.5%)	3.25 (<.001)	3.29 (<.001)
Hypothyroidism	121 (18.0%)	15 (12.5%)	1.53 (.147)	1.79 (.054)
Acid Reflux	175 (26.0%)	19 (15.8%)	1.86 (.019)	1.80 (.029)
Sleep Apnea ²	144 (40.2%)	53 (80.3%)	.165 (<.001)	.184 (<.001)
Hypertension	216 (32.0%)	63 (52.5%)	.427 (<.001)	.508 (.002)
Diabetes	113 (16.8%)	34 (28.3%)	.509 (.003)	.553 (.012)
Gout	5 (0.7%)	12 (10.0%)	.067 (<.001)	.081 (<.001)
Coronary Heart Disease	8 (1.2%)	7 (5.8%)	.194 (.002)	.249 (.013)
Cancer	20 (3.0%)	3 (2.5%)	1.19 (.779)	1.76 (.384)

^I Adjusted for BMI, age and marital status² Sleep apnea data collected on only 358 women and 66 men

Shaded areas represent statistical significance (p < .01)

Table 3

IWQOL-Lite and SF-36 Scores by gender and number of comorbidities.

HRQOL Scale	Gender	Comorbid Conditions				Unadjusted Sig			Adjusted Sig [/]		
		0	1	2	3+	Gender	Cond	Int	Gender	Cond	Int
Physical Function	Women	36.2 ± 21.4 (124)	30.7 ± 18.8 (203)	27.2 ± 18.5 (184)	21.6 ± 17.5 (162)	.089	<.001	.307	.010	.019	.329
	Men	39.8 ± 23.3 (15)	31.1 ± 18.4 (34)	28.0 ± 22.2 (34)	30.4 ± 20.1 (37)						
Self-Esteem	Women	21.3 ± 20.9 (124)	23.4 ± 21.9 (204)	20.4 ± 18.1 (184)	19.1 ± 20.6 (162)	<.001	.359	.039	<.001	.761	.018
	Men	26.9 ± 19.7 (15)	32.8 ± 22.1 (34)	35.7 ± 23.2 (34)	41.3 ± 24.5 (37)						
Sexual Life	Women	47.5 ± 32.0 (114)	45.5 ± 32.2 (190)	41.3 ± 29.8 (160)	31.7 ± 31.1 (144)	.002	.006	.404	.001	.018	.400
	Men	53.8 ± 31.8 (15)	51.0 ± 30.5 (32)	60.0 ± 29.0 (33)	43.4 ± 27.9 (36)						
Public Distress	Women	40.7 ± 23.5 (124)	37.6 ± 23.0 (204)	38.3 ± 24.6 (184)	32.0 ± 24.3 (162)	.034	.524	.522	.073	.263	.404
	Men	43.3 ± 20.1 (15)	39.7 ± 22.0 (33)	44.1 ± 24.2 (34)	42.8 ± 28.1 (37)						
Work	Women	51.9 ± 26.2 (123)	48.1 ± 27.8 (200)	44.4 ± 25.0 (183)	39.3 ± 28.0 (161)	.004	.267	.270	.004	.299	.310
	Men	58.8 ± 17.8 (15)	49.4 ± 24.3 (34)	53.1 ± 27.4 (34)	54.2 ± 23.4 (37)						
IWQOL-Lite Total	Women	36.9 ± 18.1 (124)	34.2 ± 17.6 (204)	31.3 ± 15.5 (184)	26.2 ± 16.8 (162)	<.001	.132	.161	<.001	.175	.188
	Men	41.7 ± 16.8 (15)	38.1 ± 17.7 (34)	39.6 ± 17.2 (34)	39.6 ± 18.6 (37)						
PCS	Women	37.2 ± 5.9 (124)	35.6 ± 5.9 (204)	33.9 ± 6.0 (184)	33.1 ± 5.9 (162)	.010	.000	.955	.002	.005	.959
	Men	38.3 ± 7.0 (15)	37.4 ± 5.7 (34)	35.4 ± 7.1 (34)	35.3 ± 7.3 (37)						
MCS	Women	40.7 ± 6.7 (124)	40.8 ± 7.0 (204)	41.0 ± 6.6 (184)	39.2 ± 7.2 (162)	.015	.007	.034	.087	.003	.019
	Men	42.0 ± 3.6 (15)	39.9 ± 5.3 (34)	45.3 ± 8.8 (34)	41.7 ± 6.9 (37)						

[/] Adjusted for BMI, age and marital status; Sig = significance; Cond = Comorbid Condition; Int = Interaction Shaded areas represent statistical significance (p < .01)

Table 4

Association between individual comorbidities and HRQOL

Comorbid Condition	Effect	IWQOL-Lite Total		PCS		MCS	
		Unadjusted Sig	Adjusted [/] Sig	Unadjusted Sig	Adjusted [/] Sig	Unadjusted Sig	Adjusted [/] Sig
Depression	Main	.053	.043	.062	.08	.001	<.001
	by Gender	.946	.963	.858	.846	.420	.359
Hypothyroidism	Main	.602	.596	.574	.653	.903	.819
	by Gender	.050	.011	.011	.048	.493	.245
Acid Reflux	Main	.003	.002	.338	.208	.003	.005
	by Gender	.533	.494	.151	.217	.027	.047
Sleep Apnea	Main	.740	.685	.335	.544	.411	.598
	by Gender	.610	.618	.815	.780	.941	.981
Hypertension	Main	.289	.540	.008	.126	.541	.708
	by Gender	.257	.210	.522	.622	.780	.659
Diabetes	Main	.616	.776	.026	.104	.949	.642
	by Gender	.435	.424	.834	.755	.293	.204
Gout	Main	.784	.845	.203	.341	.390	.236
	by Gender	.480	.523	.242	.171	.167	.123
Coronary Heart Disease	Main	.811	.933	.001	.006	.967	.643
	by Gender	.888	.700	.313	.568	.447	.651
Cancer	Main	.084	.097	.071	.184	.608	.941
	by Gender	.297	.267	.210	.184	.917	.900

[/] Adjusted for BMI, age and marital status

Sig = significance

Shaded areas represent statistical significance (p < .01)