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## Prevalence and degree of sexual dysfunction in a sample of women seeking bariatric surgery

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### Abstract

**Background**—Sexual functioning is shown to be impaired in women who are obese, particularly those seeking bariatric surgery. However, most prior studies evaluating sexual function in these populations have not used validated measures. We used the validated Female Sexual Function Index (FSFI) to assess prevalence of female sexual dysfunction (FSD) in a sample of over 100 women evaluated for bariatric surgery.

**Methods**—The FSFI was administered to reportedly sexually active women during their preoperative evaluation. Scores for individual FSFI domains (desire, arousal, lubrication, orgasm, satisfaction, and pain) ranging from 0 (or 1.2) to 6 were summed to produce a FSFI-total score (range = 2–36). A FSFI-total cut-off score of  $\leq 26.55$  was used to identify participants with FSD. Participants' FSFI-total and domain scores were compared to previously published norms available for women diagnosed with female sexual arousal disorder (FSAD) and healthy controls.

**Results**—Sixty-one of the 102 participants (59.8%) had FSFI-total scores  $\leq 26.55$ , indicative of FSD. Older age and menopause were associated with FSD. Compared to published norms, bariatric surgery candidates had FSFI domain scores that were lower than the control group ( $ps < 0.0001$ ) but higher than the FSAD group ( $ps < 0.0001$ ), except for desire where scores were similar.

**Conclusion**—Women seeking bariatric surgery are clearly a population with substantial sexual function impairment, with 60% of participants reporting FSD. These findings highlight the need to initiate routine assessment of sexual functioning in this population and examine whether weight loss following bariatric surgery contributes to reversal of FSD.

### Keywords

obesity; sexual dysfunction; women; bariatric surgery; Female Sexual Function Index

## Introduction

Female sexual dysfunction (FSD) encompasses a range of problems including diminished sexual desire, difficulty becoming aroused, inhibited orgasm, and feelings of pain during intercourse [1]. Epidemiological estimates indicate that FSD is prevalent, with approximately 43% of women in the U.S. reporting that they have at least one sexual problem [2]. Sexual dysfunctions in women are influenced by a wide array of physiological, medical, psychological and sociodemographic factors [1], and are accompanied by feelings of distress [2,3], depressive symptoms [2,4], poor self-reported health status [2,3], and sexual incompatibility with one's partner [5].

A recent growing literature suggests that women who are overweight and obese have lower sexual function than normal-weight women [6,7]. Additionally, studies indicate that increasing severity of obesity is associated with greater impairment in sexual quality of life, and that obese women experience greater sexual difficulties than obese men [8,9]. Furthermore, the degree of impairment in female sexual quality of life is shown to vary by obesity-treatment seeking status, with women seeking bariatric surgery reporting higher levels of impairment than those in a residential obesity treatment program [8] and non-treatment seeking equally overweight controls [8,10]. Taken together, these findings suggest that women with severe obesity, particularly those seeking bariatric surgery, are at considerable risk for having problems with sexual function.

However, most prior studies have not used validated measures to assess sexual function difficulties among bariatric surgery candidates and no study has examined the extent to which sexual problems in this population are indicative of clinical dysfunction (i.e. FSD). Only one study [11], to our knowledge, has used a validated measure of sexual function in female bariatric surgery patients preoperatively. In this study conducted in Greece, 60 bariatric surgery candidates and 50 healthy controls were administered the Female Sexual Function Index (FSFI).

The FSFI [12], the most widely used measure of female sexual function, is a brief, self-report instrument that provides scores on six functional domains, as well as a total score that can be used to differentiate women with and without FSD [13]. Findings revealed that the bariatric surgery candidates reported significantly lower overall sexual function and greater impairment on 5 of the 6 domains (i.e. sexual desire, arousal, lubrication, orgasm, satisfaction), compared to controls. However, the investigators did not employ the developed diagnostic cut-off score to distinguish participants with and without FSD.

Given that FSD has not been previously assessed in bariatric surgery candidates and use of validated measures to assess sexual function in this population has been limited, additional study is warranted. Therefore, using the FSFI, the objectives of this study were to: 1) assess sexual function and prevalence of FSD in a sample of women seeking bariatric surgery; 2) explore potential factors associated with FSD; and 3) evaluate participants' overall and domain-specific sexual function within the context of norms available for women with female sexual arousal disorder (FSAD) and healthy controls [12].

## Methods

The procedures for this study were approved by The Miriam Hospital Institutional Review Board, Providence, RI, USA.

## Participants and procedures

The sample for the present study was recruited from three clinic sites in Providence, Rhode Island between January 2008 and April 2009. Obese ( $\text{BMI} \geq 35 \text{ kg/m}^2$ ) women evaluated for either Roux-en-Y gastric bypass or laparoscopic adjustable gastric banding at a preoperative visit were briefly informed by a surgeon about a prospective study of changes in sexual function following bariatric surgery. Patients who expressed interest were taken to an office where they met with research personnel who conducted an initial screening, explained the study in greater detail, and obtained informed consent. To be eligible for the study, participants had to be between the ages of 21 and 70 and answer “yes” in response to the question “Are you currently involved in a stable and sexually active partner relationship?” Patients who consented to participate completed the questionnaire and provided data regarding demographics, health history, and current medication usage. Participants' height and weight was measured in the clinic using standard procedures. Individuals who expressed interest in participating but did not have the time to complete the questionnaires at the clinic were asked to complete the questionnaires at home and return them in a postage-paid envelope addressed to research personnel. Participants whose returned questionnaires contained omissions were contacted by research personnel in an attempt to obtain complete information. Of 212 patients screened for the study, 89 were either ineligible or declined to participate, leaving 123 participants. Of these participants, 21 reported being sexually inactive during the past 4 weeks on the FSFI and thus were excluded from analyses. This resulted in a total sample of 102 participants.

## Measures

**Sexual function**—Sexual function was measured using the previously described Female Sexual Function Index (FSFI) [12], a 19-item self-report measure that assesses multiple domains of sexual function over the past 4 weeks. These domains include *sexual desire* (assessed as frequency and desire level), *sexual arousal* (assessed as frequency, level, confidence and satisfaction), *lubrication* (assessed as frequency, difficulty, frequency of maintaining and difficulty in maintaining), *orgasm* (assessed as frequency, difficulty, and satisfaction), *sexual satisfaction* (assessed as the amount of closeness with partner, sexual relationship and overall sex life), and *sexual pain* (assessed as pain frequency during vaginal penetration and pain frequency following vaginal penetration). The measure provides scores for each domain as well an overall score, with higher scores indicating greater levels of sexual function (sexual desire: 1.2-6; sexual satisfaction: 0.8-6; sexual arousal, lubrication, orgasm, and sexual pain: 0-6; total: 2-36). The FSFI was first validated in a study of 128 women (age range 21-69 years) clinically diagnosed with sexual arousal disorder and 131 age-matched normal controls [12]. Results demonstrated high test-retest reliability for each of the individual domains ( $r = 0.79-0.86$ ), a high degree of internal consistency (*Chronbach's*  $\alpha \geq 0.82$ ), and good discriminant validity as evidenced by significant differences between the patient and controls groups on all of the domains ( $p < 0.001$ ). In a more recent FSFI validation study [13] which included 307 women with a variety of sexual dysfunctions (e.g., sexual arousal disorder, hypoactive sexual disorder, female sexual orgasm disorder dyspareunia/vaginismus) and 261 controls, a FSFI total score of 26.55 was shown to be the optimal cut-off for differentiating women with and without FSD.

### Demographic characteristics, health history and current medication usage—

Demographic data (i.e. age, race/ethnicity, marital status, and educational level) was collected via questionnaire. Participants' health history was assessed using a questionnaire that asked participants to check “yes” or “no” to whether: 1) they had ever received a doctor diagnosis for certain health conditions (e.g., hypertension, diabetes, depression, etc.), and 2) they experienced certain gynecological health conditions/events (i.e. menopause, gynecological surgery, urinary tract symptoms, polycystic ovary syndrome). Finally, participants were asked to list the names and dosages of medications that they were currently taking.

## Statistical analyses

Statistical analyses were conducted using the Statistical Package for Social Sciences, version 14.0 (SPSS for Windows, SPSS, Chicago, IL). Descriptive statistics were generated for all variables. A FSFI-total score cut-off score (i.e.  $\leq 26.55$ ) was used to distinguish participants with and without FSD [14]. Examination of differences between participants with and without SD was performed using  $\chi^2$  analyses for categorical variables and independent *t*-tests for continuous variables. Comparisons of participants' FSFI-total and domain scores with published norms available for women with female sexual arousal disorder and controls [12] were conducted using *t*-tests. All tests were two-tailed and statistical significance was set at  $p < 0.05$ .

## Results

### Participants

Table 1 provides the sociodemographic, weight, and health history profile of the sample. The mean age of participants was 42 years (range = 21 to 62 years). Nearly 80% of participants were Caucasian and 70% were married. Almost half (47.1%) of the participants had at least a college/university degree. Participants were severely obese ( $BMI = 46.1 \pm 7.6 \text{ kg/m}^2$ ; range = 35-71  $\text{kg/m}^2$ ). With respect to reportedly diagnosed health conditions, 42% of participants had hypertension and approximately 20% had diabetes. Forty-five percent of participants reported depression diagnosis, and 32% reported diagnosis of an anxiety disorder. Regarding reported gynecological health conditions/events, approximately 27% of participants had experienced menopause and 31% had gynecological surgery. Thirteen percent of participants reported being on contraceptives and 3% reported being on hormone replacement therapy. Medications most commonly taken were those to treat depression (40%), gastroesophageal reflux disease (28%), hypercholesterolemia (18%), hypertension and other cardiovascular conditions [e.g., diuretics (15%) beta-blockers (13%)], diabetes (13%) and abnormal thyroid (13%)

### Female sexual dysfunction (FSD)

Figure 1 shows the distribution of total-FSFI scores for the sample. The average total score on the FSFI was  $24.6 \pm 6.4$  out of a maximum total score of 36. Using the established cutoff score of 26.55, 61 of 102 (59.8%) participants were classified as having FSD.

Analyses examining differences between participants reporting and not reporting FSD revealed that FSD participants were significantly older ( $43.9 \pm 9.5$  vs  $38.2 \pm 10.4$  years;  $p = 0.005$ ) and more likely to have experienced menopause (34.4% vs 14.6%,  $p = 0.02$ ). The groups did not differ significantly on other variables, including demographics, weight, health conditions and medication usage.

### Female Sexual Function Index (FSFI) scores

FSFI-total and domain scores of the bariatric surgery candidates were compared with published norms available for women with female sexual arousal disorder (FSAD) and healthy women controls [13]. FSFI-total scores of bariatric surgery candidates ( $26.4 \pm 6.3$ ) were lower relative to the control group ( $30.5 \pm 5.3$ ) and higher compared to the FSAD group ( $19.2 \pm 6.6$ ) ( $ps < 0.0001$ ). FSFI domain scores for these three groups are shown in Figure 2. Bariatric surgery candidates scored significantly lower than controls across all of the domains ( $ps < 0.0001$ ). When compared to the FSAD group, participants scored significantly higher on all domains ( $ps < 0.0001$ ), except desire where scores were similar ( $p > 0.30$ ).

## Discussion

This study assessed female sexual dysfunction (FSD) in a sample of severely obese women evaluated for bariatric surgery using a validated measure. Approximately 60% of participants had scores below the cut-off, indicating presence of FSD. These findings support prior research showing marked impairment in sexual function in women who are obese [6,7], and particularly those seeking bariatric surgery [8-11].

To place these data in context, we compared our findings to other studies which utilized the FSFI cut-off score of  $\geq 26.55$  to distinguish women with and without FSD. As shown in Figure 3, the percentage (59.8) of participants who reported FSD in the current study is markedly higher than that reported in two large Finnish population samples, one composed of 2,081 participants aged 33-43 years (32.6%) [3] and the other composed of 5,463 participants aged 18-49 years (34%) [5]. The FSD rate shown in bariatric surgery candidates is also somewhat higher than that reported among women attending general outpatient clinics (42%-56%) [4, 14-16]. Relative to various targeted patient and non-patient populations, FSD prevalence among bariatric surgery candidates was higher than that found in female partners of infertile couples (26%) [17] and women with hypertension (42%) [18], similar to that found among female medical residents (60%) [19], and lower than that shown in women with urogynecological problems (64%-68%) [20,21].

We also compared participants in the present sample who reported FSD with those who did not report such problems. Findings showed that aging and menopause were associated with FSD, consistent with previous studies [4,16]. Physiological and psychological changes brought on by aging and menopause may contribute to FSD. Age-related issues including health problems (e.g., hypertension, diabetes, lower urinary tract symptoms, depression, etc.) and medications to treat such problems [22], partner's sexual dysfunction (e.g., erectile dysfunction) [23], and challenges inherent to longer relationships (e.g., compatibility, faithfulness, and changing sexual needs and preferences) [5,18] can influence the association between age and FSD. In addition, loss of estrogen and concomitant decline in circulating androgens during the menopausal transition can adversely impact the structure and integrity of reproductive structures, thereby elevating risk of FSD [24].

We also evaluated FSFI-total and domain-specific sexual function in the entire sample within the context of published norms available for women with female sexual arousal disorder (FSAD) and healthy controls [12]. Participants reported a level of global sexual function that was lower than healthy controls and higher than women with FSAD. This same pattern of findings was observed across every domain with the exception of desire, where participants and the FSAD group scored similarly. These findings suggest that women seeking bariatric surgery have worse sexual function than healthy control women but better sexual function in most areas compared to women diagnosed with FSAD. Although this is a cross-study comparison, the three groups did not differ in age and were similar on other demographic characteristics (e.g., race, education, and marital status).

Compared to bariatric surgery candidates in the only other study that utilized the FSFI [11], participants in the present study scored higher on total sexual function ( $24.6 \pm 6.3$  vs  $21.3 \pm 11.9$ ) and on every domain [arousal ( $3.8 \pm 1.4$  vs  $3.2 \pm 2.1$ ), lubrication ( $4.6 \pm 1.5$  vs  $3.7 \pm 2.3$ ), orgasm ( $4.1 \pm 1.6$  vs  $3.6 \pm 2.3$ ), satisfaction ( $4.0 \pm 1.5$  vs  $3.8 \pm 2.2$ ), and pain ( $5.1 \pm 1.5$  vs  $3.8 \pm 2.6$ )], except desire ( $3.0 \pm 1.0$  vs  $3.3 \pm 1.4$ ). The reasons for the higher scores among our sample are not clear. The present sample included only those women who reported being sexually active during the measurement period so as to obtain accurate full scale scores. Whether this was also the case for the prior study is unknown. FSFI domain scores (with the



exception of desire) for participants who are sexually inactive during the measurement period will be zero, thereby artificially reducing average scores for a given sample [12].

This study has several limitations. The study sample was comprised of 58% of the total number of patients approached to participate. Thus, participants who felt comfortable in completing the FSFI may have been different from those who were ineligible or declined to participate for various reasons (e.g., feelings of embarrassment). We did not assess level of sexual distress caused by FSD. Sexual distress, characterized by negative feelings and anxiety about one's sexuality or sexual activities, is considered to be an important aspect of sexual disorders [5]. Similarly, our study did not include validated measures of depression or anxiety. While previous research utilizing the FSFI suggests that depression and anxiety contribute to elevated risk of FSD [4,16], we did not find higher FSD prevalence in participants with prior diagnosis of depression or anxiety or those who used medications to treat these problems. Although, the high rate (40%) of antidepressants use among our sample may have contributed to lower sexual function scores in general. A common side effect of antidepressants is sexual problems related to desire, arousal and orgasmic function [22]. Future research should consider to what extent any changes in sexual function after bariatric surgery are associated with discontinued use of antidepressants. Another limitation is that we did not ask participants to identify their sexual orientation. In a recent study [25], FSFI-measured sexual functioning of lesbian women (FSFI-total score = 29.5) was similar to published norms for healthy controls (FSFI-total score = 30.5) [12]. Consequently, future research should consider sexual orientation when assessing FSD in bariatric surgery patients. Finally, while the FSFI is a widely used measure of sexual function with excellent psychometric properties, suggestions were recently provided to strengthen its utility and validity [26].

The present study focused on sexual dysfunction in women seeking bariatric surgery. However, other aspects of psychosocial functioning are also of concern in these patients. Prior studies have documented high rates of psychopathology, particularly mood and anxiety disorders, in these women as well as reduced health-related quality of life and body image dissatisfaction [8,11,27]. Bariatric surgery is associated with improvements in each of these areas, although positive changes are not universal and may be seen primarily in the first postoperative years [27].

It will be important for future studies to assess whether impairment in sexual function among severely obese women resolves after weight loss. Kolotkin et al. [28] found that sexual quality of life improved with weight loss in women undergoing non-surgical treatment. In another study [29], weight losses achieved through an 8-week combination of sibutramine and behavioral intervention yielded improvements in FSFI total score and domain scores relating to arousal and lubrication. More recently, Kolotkin and colleagues [30] found improvements in sexual quality of life in female gastric bypass surgery patients at 2 years postoperatively. Thus, while it appears that weight loss achieved through both non-surgical and surgical means improves sexual function, further research is needed to determine whether weight loss following bariatric surgery contributes to normalization of sexual function in women with preoperative sexual dysfunction.

## Summary

The present study found that severely obese women seeking bariatric surgery are clearly a population with diminished sexual function, with approximately 60% of participants reporting FSD. This finding supports the use of validated measures to assess sexual function in women evaluated for bariatric surgery and to identify patients with FSD for whom further treatment may be necessary. Additional research is needed to examine whether weight loss following bariatric surgery contributes to resolution of FSD.

## Acknowledgments

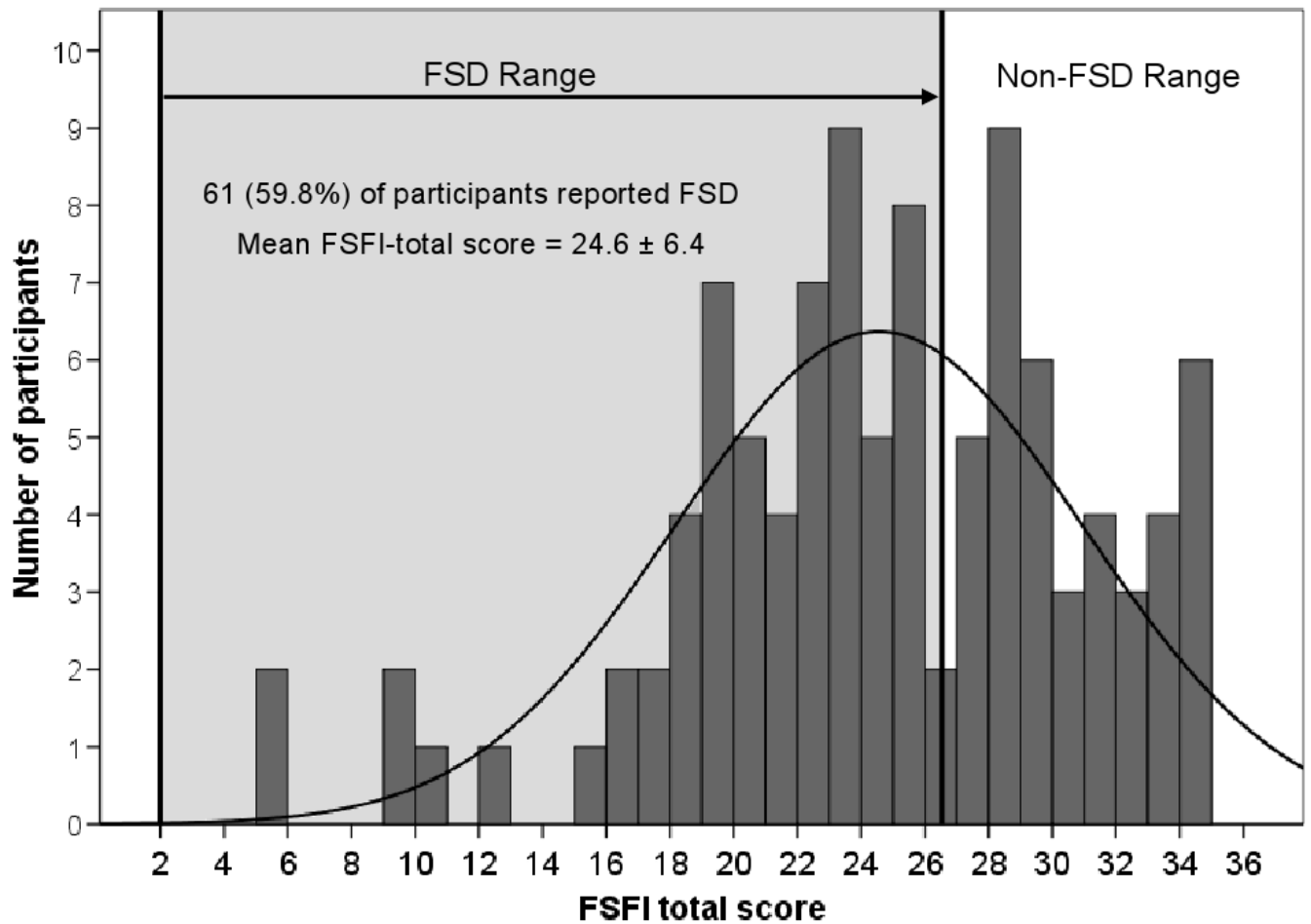
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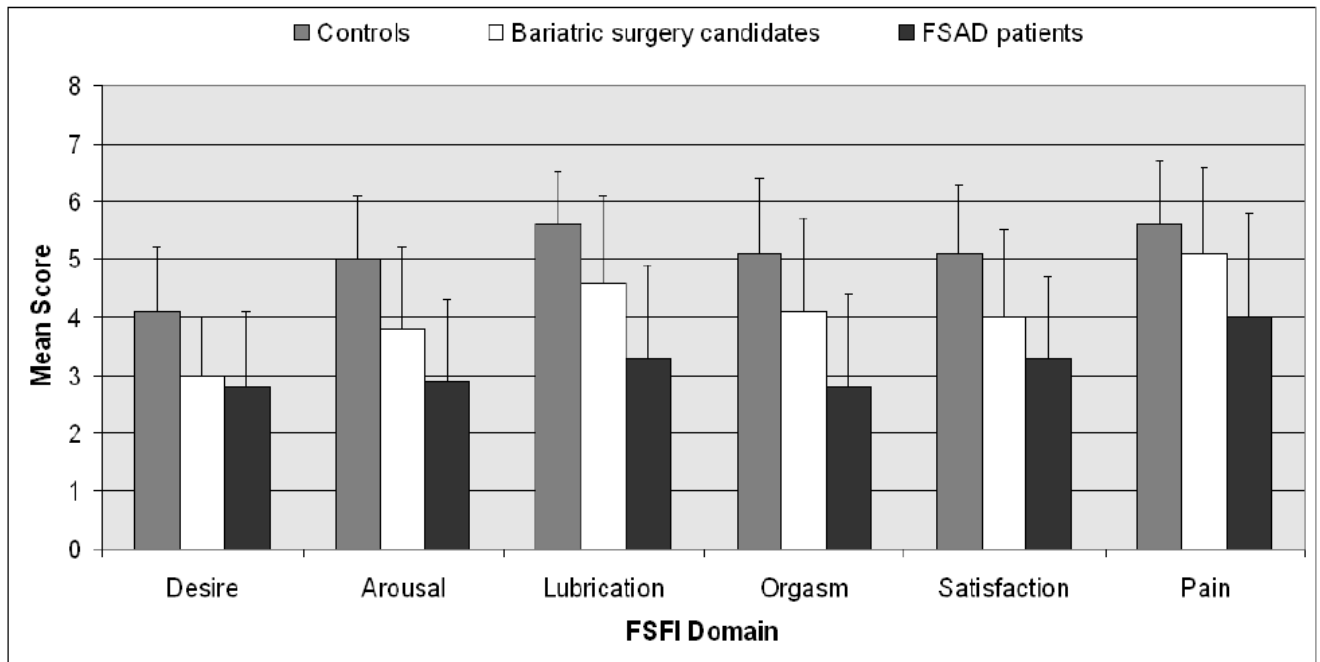




**Figure 1.**

Distribution of Female Sexual Function Index (FSFI) total scores

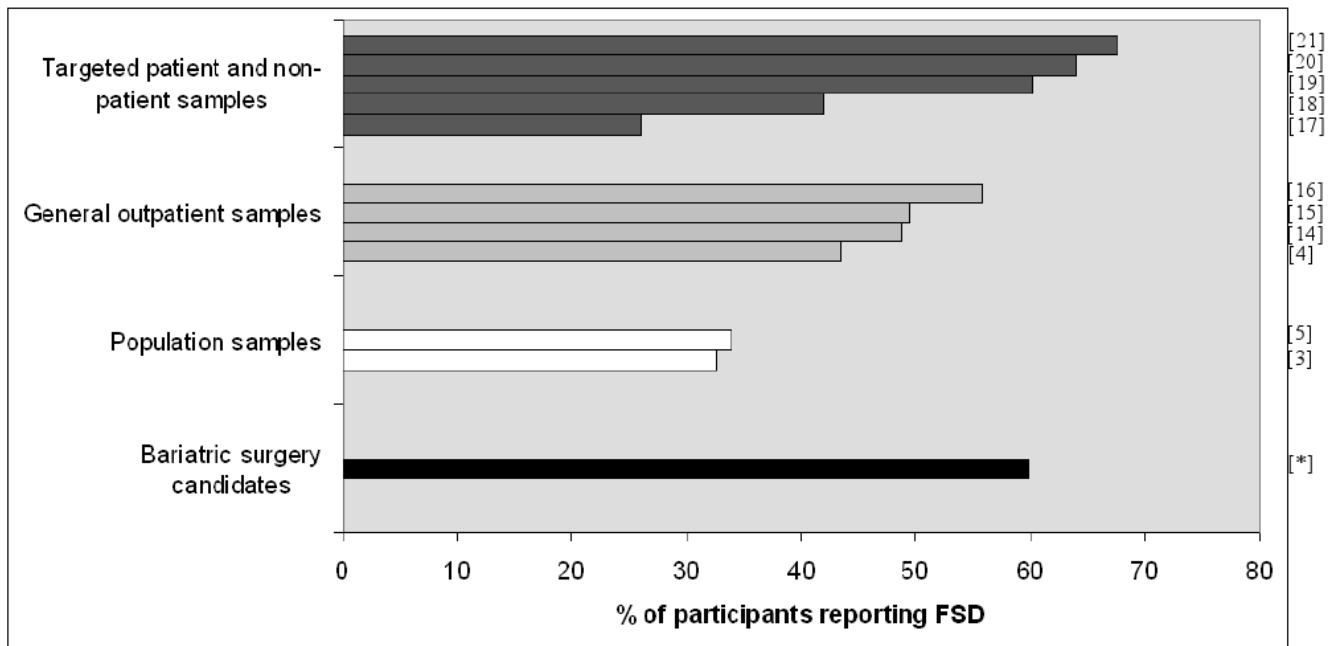
**Note.** Sexual function scores range from 2-36. Based on a cut-off score of  $\leq 26.55$  [13], 59.8% of participants were classified as having female sexual dysfunction (FSD).



**Figure 2.**

Comparison of Female Sexual Function Index (FSFI) domain scores ( $M \pm SD$ ) in bariatric surgery candidate with norms of women with female sexual arousal disorder (FSAD) and controls

Note. Bariatric surgery candidates and the FSAD group are different on all domains ( $p < 0.0001$ ) except desire. The bariatric surgery candidates and controls are different on all domains ( $p < 0.0001$ ). Means and standard deviations for controls and FSAD groups are derived from Rosen et al., 2000 [12].



**Figure 3.**

Percentage (%) of bariatric surgery candidates reporting female sexual dysfunction (FSD) compared to percentages reported in previous studies utilizing the Female Sexual Function Index (FSFI).

Note. Numbers in brackets to the right of the bars indicate the order in which the corresponding study is listed as a reference; \* = current study; Studies selected for inclusion in the figure were based on the following criteria: 1) used FSFI-total score of 26.55 as a cut-off to define FSD; 2) sample size  $\geq 50$ ; 3) assessment of a single population; and 4) published in print within past 5 years.

**Table 1**

## Characteristics of participants

Age ( $M \pm SD$ years)	41.6 $\pm$ 10.2
Race (%)	
Caucasian	79.4
African American	8.8
Hispanic	11.8
Marital status (%)	
Single	17.7
Married	69.6
Divorced	11.8
Widowed	1.0
Education (%)	
< High school	1.0
High school	14.7
< 4 years college	37.2
4 years college	30.4
Graduate school	16.7
Weight ( $M \pm SD$ kg)	122.2 $\pm$ 19.6
BMI ( $M \pm SD$ kg/m <sup>2</sup> )	46.1 $\pm$ 7.6
Gynecological health events/conditions (%)	
Menopause	26.5
Gynecological surgery	31.4
Urinary tract symptoms	19.6
Polycystic ovarian syndrome	10.8
Most commonly reported diagnosed health conditions (%)	
Depression	45.1
Hypertension	42.2
Anxiety disorder	32.4
Diabetes	19.6
Abnormal thyroid function	15.7
Most commonly reported medications (%)	
Antidepressants	40.2
Anti-reflux	28.4
Cholesterol-lowering agents	17.6
Diuretics	14.7
Beta-blockers	12.7
Oral diabetes medications	12.7
Thyroid hormone replacement	12.7