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Exploring gender, psychiatric symptoms, and eating behaviors as predictors of attrition to bariatric surgery

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ABSTRACT

Background: Only a small proportion of eligible individuals undergo bariatric surgery. The purpose was to examine attrition to surgery and whether psychiatric symptoms and eating behaviors differentially predicted attrition among men and women.

Method: Data was collected from a retrospective chart review of 313 patients who underwent a pre-surgical psychosocial evaluation.

Results: The overall attrition rate was 33.5%; 42.6% of men and 31.7% of women experienced attrition. In the multivariate analysis of the entire sample, White patients (OR = 2.33, CI: 1.33, 4.08) and those without a history of binge eating (OR = 2.71, CI: 1.23, 5.97) were more likely to undergo surgery. In a multivariate analysis of women only, race and binge eating independently predicted attrition; however, no factors significantly predicted attrition among men.

Conclusions: Factors identified at the pre-surgical psychosocial evaluation can identify patients at risk for attrition, and these factors may differ for men and women.

1. Introduction

Bariatric surgery, which is typically reserved for individuals with a body mass index (BMI) > 40 kg/m² or for individuals with BMI ≥ 35 kg/m² with one or more obesity-related comorbidities,¹ is the most effective intervention for obesity and obesity-related comorbidities.² Despite the growing number of surgeries performed,³ only 1% of eligible patients undergo surgery.⁴ The majority of those who pursue bariatric surgery are White, female, middle-aged, hold private insurance, and have comorbid psychiatric conditions such as depression and anxiety.⁵⁻⁹ There are a variety of reasons why many do not undergo surgery, including insurance coverage and financial constraints, lack of patient-provider discussion about bariatric surgery as a treatment option, negative thoughts about bariatric surgery by both patients and physicians, and cultural considerations (i.e., preference for body size).¹⁰⁻¹² However, less is known about those who experience attrition to bariatric surgery (i.e., start the pre-surgical evaluation process but do not undergo surgery). Higher attrition has been noted among Black patients.⁷

Inadequate health literacy and health numeracy, as well as probable cognitive impairment are also implicated.¹³ Additionally, individuals with poor social support networks, substance use, and severe psychiatric disorders are more likely to experience surgical attrition.¹⁴⁻¹⁹

One factor that might also contribute to attrition to bariatric surgery is disordered eating behaviors. Many patients pursuing bariatric surgery struggle with binge-eating disorder or other disordered eating behaviors.²⁰⁻²⁴ Patients who have concerns about changing eating behaviors are more likely to remove themselves from the surgical process,²⁵ therefore, it is possible that those with disordered eating behaviors are more likely to experience attrition. Emotional eating is reported to contribute to attrition in non-surgical weight loss interventions²⁶; thus pathologic eating behaviors (i.e., binge eating, purging, emotional eating, and symptoms of food addiction) could similarly contribute to surgical attrition; however, this has not been investigated. These are commonly endorsed behaviors by patients pursuing bariatric surgery and have also been associated with poorer weight loss outcomes^{21,22,27}; therefore, these may also be related to likelihood of undergoing surgery.

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In addition, gender disparities in utilization of bariatric surgery are well documented, with women undergoing bariatric surgery at much higher rates.^{9,28} Because some research suggests there are gender differences in psychiatric diagnoses and eating patterns,^{29,30} it is possible that these factors could differentially impact surgical attrition for men and women. Thus, there may not only be gender differences in who pursues surgery, but also among those who experience attrition to surgery. In order to better identify patients at risk for attrition to surgery, it is important to identify whether men and women have different factors associated with attrition.

Many of the aforementioned factors, including psychiatric history, substance use, cognitive functioning, developmental history, social support, weight history, and eating disorder and disordered eating symptoms, are assessed for in the preoperative psychological evaluation.³¹ The psychological evaluation is a vital component of the preoperative bariatric surgery process, as it derives information from a structured interview and psychometric tests to identify variables that may influence postoperative outcomes. The psychological evaluation can potentially be used not only to identify appropriate candidates but also to identify risk factors for attrition so that we can better support patients through the process. The purpose of this study was to use the psychological evaluation to compare characteristics of men and women pursuing bariatric surgery and to assess whether these characteristics predict who undergoes surgery.

2. Methods

2.1. Participants and procedure

All patients (N = 313) who underwent a routine psychosocial evaluation prior to bariatric surgery between July 2016 and January 2017 at a single health system were included. Retrospective chart reviews were conducted to gather information from the psychosocial evaluation and surgical status (i.e., whether a patient underwent bariatric surgery). The psychosocial evaluations were conducted by a licensed doctoral clinical psychologist, or a supervised psychology intern, and consisted of gathering demographic information, conducting a semi-structured diagnostic interview, and administering the measures described below. The psychologist provided recommendations to the patient based on findings from the evaluation, which may have included engaging in pre-surgical behavioral health services. Patients were considered to have attrition to surgery if at least 2 years had passed since completion of the psychosocial evaluation and no bariatric procedure was documented in the electronic health record. This study was approved by the health system's Institutional Review Board.

2.2. Measures

Semi-structured clinical interview. Data from the semi-structured interview was extracted from the note written by the psychologist who evaluated the patient. This included demographic variables (e.g., age, gender, and race) and eating behaviors (e.g., binge eating and purging). Patients self-reported their gender and our health care system distinguishes biological sex and gender in the patients' electronic health records. One patient during the study period identified as non-binary and was not included in analyses. Binge eating and purging are assessed through the semi-structured interview assessing for symptomatology that aligned with DSM-5 diagnostic criteria.³² A patient was coded as having (or not having) a history of binge eating or purging.

Hospital Anxiety and Depression Scale (HADS). The HADS is a 14-item scale measuring anxiety and depression.³³ This measure is validated for patients with chronic illness and has been used to assess anxiety and depression among patients pursuing bariatric surgery.^{9,21,22,34} Scores can range from 0 to 21, with higher scores indicating greater severity. The anxiety and depression subscales have adequate internal consistency, with Cronbach's alpha coefficients of 0.80 and 0.76,

respectively.³⁵

Emotional Eating Scale (EES). The EES assesses the urge to eat in response to 25 emotions across 3 separate subscales: anger/frustration, anxiety, and depression.³⁶ Patients report on a scale from 1 (no desire to eat) to 5 (an overwhelming urge to eat). Higher scores indicate greater levels of emotional eating. The EES has established convergent and discriminant validity, and has been previously used to assess emotional eating among those being evaluated for bariatric surgery.^{21,22,36}

Yale Food Addiction Scale 2.0 (YFAS 2.0). The YFAS 2.0 is a 35-item measure that assesses symptoms of food addiction.³⁷ Patients can have 0–11 symptoms of food addiction, and these symptoms reflect the DSM-5 symptoms for substance use disorders.³² Although food addiction is not a recognized diagnosis in the DSM-5, patients meet the threshold for food addiction similar to DSM-5 substance use disorder criteria (i.e., at least 2 symptoms that produce clinically significant distress or impairment). The YFAS 2.0 has been validated for patients pursuing bariatric surgery, and had adequate internal consistency with a Cronbach's alpha coefficient of 0.94.³⁴

2.3. Analyses

Analyses were conducted with SPSS version 25. Frequencies and descriptives were conducted to report on demographic characteristics. Independent samples t-tests and chi-square analyses were conducted to evaluate for gender differences in demographics, psychiatric symptoms, and maladaptive eating patterns at the pre-surgical psychosocial evaluation. Logistic regressions were conducted for the entire sample, and then separately for women and men to determine individual associations between predictors and surgical attrition. Multivariate logistic models were constructed when there were multiple variables that were associated with attrition to surgery in bivariate analyses. We assessed for multicollinearity among all factors, and VIF ranged from 1.02 to 3.28, suggesting that there is not concern for multicollinearity.³⁸

3. Results

Participants were predominantly women (82.7%, n = 259), approximately half Black and half White, with a mean age of 46.46 years (SD = 10.42) and mean pre-surgical BMI of 46.96 kg/m² (SD = 8.17). Men and women were similar in age and pre-surgical BMI; however, men were more likely to be White (Table 1). At the pre-surgical psychological evaluation, men and women reported similar levels of anxiety, depression, and emotional eating, as well as similar likelihoods of reporting a history of binge eating and purging (Table 1). Yet, men had a higher number of symptoms of food addiction and were also more likely to meet the threshold for food addiction (Table 1).

Approximately two-thirds of the sample underwent surgery (66.5%, n = 208), whereas 33.5% (n = 105) experienced attrition. The rate of attrition for men was 42.6% (n = 23) whereas for women was 31.7% (n = 82); this was not a statistically significant difference (Table 1). Among the entire sample, factors associated with a greater likelihood of attrition to surgery included higher BMI, Black race, greater depressive symptoms, greater anxiety symptoms, greater levels of emotional eating in response to anxiety, a higher number of food addiction symptoms, and binge eating (Table 2). In a multivariate model that included all significant variables, factors that were uniquely associated with attrition were Black race and binge eating (Table 3).

When restricting analyses to specific gender, in bivariate analyses among women, those less likely to undergo surgery included Black women, those who reported binge eating, and women with higher levels of anxiety, depression, and eating in response to anger or anxiety (Table 2). In a multivariate analysis of women only, Black race and binge eating remained independent predictors of attrition (Table 4). Among men, there were no statistically significant predictors of attrition to bariatric surgery (Table 2).

Table 1
Comparisons between women and men at the pre-surgical psychological evaluation.

	Women (n = 259)	Men (n = 54)	t	p	ES ^b		
Age, years (M ± SD)	46.08 ± 10.37	48.31 ± 10.54	-1.44	.15	-.21		
Body Mass Index	46.97 ± 8.23	46.89 ± 7.93	.07	.95	.01		
Depression	4.15 ± 3.33	4.83 ± 3.54	-1.36	.18	-.20		
Anxiety	4.81 ± 3.47	4.87 ± 3.37	-.11	.91	-.02		
Emotional Eating Scale							
Anger/Frustration	18.72 ± 8.22	18.26 ± 8.64	.37	.71	.05		
Anxiety	16.58 ± 6.52	16.26 ± 6.63	.33	.74	.05		
Depression	10.75 ± 4.46	11.06 ± 4.65	-.46	.64	-.07		
Food Addiction Symptoms	2.49 ± 3.00	3.54 ± 3.42	-2.28	.02	-.33		
	%	n	%	n	X ²	p	ES ^c
Race ^a							
Black	50.2	130	27.8	15	6.87	.01	.16
White	41.7	108	55.6	30			
Other/Unknown	7.7	20	16.7	9			
Food Addiction Diagnosis							
No	75.3	195	61.1	33	4.54	.03	.12
Yes	24.7	64	38.9	21			
Binge Eating							
No	87.3	226	85.2	46	.17	.68	.02
Yes	12.7	33	16.7	9			
Purging							
No	92.3	239	96.3	52	1.10	.29	-.06
Yes	7.7	20	3.7	2			
Underwent Surgery							
No	31.7	82	42.6	23	2.40	.12	-.09
Yes	68.3	177	57.4	31			

^a Analysis for race includes only White and Black patients.

^b Cohen's d.

^c Phi coefficient.

Table 2
Factors associated with undergoing bariatric surgery among the entire sample and for women and men: bivariate analyses.

	Entire sample N = 313				Women (n = 259)				Men (n = 54)			
	β	SE	OR (CI)	p	β	SE	OR (CI)	p	β	SE	OR (CI)	p
Demographics												
Age	-.01	.01	1.00 (.97, 1.01)	.65	-.01	.01	.99 (.96, 1.01)	.37	.03	.03	1.03 (.98, 1.09)	.28
Body Mass Index	-.03	.02	.97 (.94, .99)	.03	-.03	.02	.97 (.94, 1.00)	.07	-.05	.04	.95 (.87, 1.03)	.20
Race												
White	.26	.09	1.30 (1.09, 1.54)	.003	.85	.29	2.33 (1.32, 4.14)	.004	.71	.65	2.04 (.57, 7.34)	.27
Black (ref group)												
Mental Health Symptoms												
Depression	-.09	.04	.91 (.85, .98)	.01	-.11	.04	.89 (.83, .97)	.01	.01	.08	1.01 (.86, 1.18)	.93
Anxiety	-.08	.04	.93 (.87, .99)	.03	-.11	.04	.90 (.83, .97)	.01	.07	.09	1.08 (.90, 1.29)	.42
Eating Behaviors												
EES-Anger/Frustration	-.02	.01	.98 (.95, 1.00)	.10	-.03	.02	.97 (.94, .99)	.04	.01	.03	1.01 (.95, 1.08)	.68
EES-Anxiety	-.04	.02	.96 (.93, .99)	.03	-.05	.02	.95 (.91, .99)	.01	.01	.04	1.01 (.93, 1.10)	.80
EES-Depression	.01	.03	1.01 (.95, 1.06)	.83	-.001	.03	.99 (.94, 1.06)	.98	.04	.06	1.04 (.92, 1.17)	.54
Food Addiction Symptoms	-.08	.04	.93 (.86, .99)	.04	-.05	.04	.95 (.87, 1.03)	.23	-.15	.08	.87 (.73, 1.02)	.09
Food Addiction Diagnosis												
No	.39	.26	1.47 (.88, 2.47)	.14	.16	.31	1.18 (.65, 2.15)	.59	.98	.56	2.67 (.86, 8.23)	.09
Yes (ref group)												
Binge Eating												
No	.97	.34	2.64 (1.36, 5.13)	.004	1.11	.38	3.04 (1.44, 6.39)	.003	.35	.77	1.42 (.32, 6.40)	.65
Yes (ref group)												
Purging												
No	.34	.45	1.41 (.58, 3.41)	.45	.40	.48	1.49 (.58, 3.79)	.41	.31	1.44	1.36 (.08, 23.01)	.83
Yes (ref group)												

Note. EES = Emotional Eating Scale.

4. Discussion

The aim of this study was to examine whether there were gender differences with regard to demographics, psychiatric symptoms, and maladaptive eating patterns among men and women, and whether these factors differentially predicted attrition. A preponderance of research supports that women pursue bariatric surgery at higher rates than

Table 3
Multivariate analysis of factors associated with undergoing bariatric surgery among the entire sample.

	β	SE	OR (CI)	p
Body Mass Index	-.03	.02	.97 (.94, 1.00)	.05
Race				
White	.85	.29	2.33 (1.33, 4.08)	.003
Black (reference group)				
Depression	-.02	.05	.98 (.89, 1.08)	.67
Anxiety	-.06	.05	.94 (.85, 1.04)	.21
EES-Anxiety	-.01	.03	.99 (.94, 1.04)	.65
Food Addiction Symptoms	-.01	.05	.99 (.89, 1.09)	.79
Binge Eating				
No	.99	.40	2.71 (1.23, 5.97)	.01
Yes (reference group)				

Note. EES = Emotional Eating Scale.

Table 4
Multivariate analysis of factors associated with undergoing bariatric surgery among women.

	β	SE	OR (CI)	p
Race				
White	1.15	.33	3.16 (1.67, 6.01)	<.001
Black (reference group)				
Depression	-.02	.06	.98 (.88, 1.09)	.72
Anxiety	-.10	.06	.91 (.81, 1.01)	.09
EES-Anger/Frustration	.02	.03	1.02 (.96, 1.07)	.61
EES-Anxiety	-.04	.04	.96 (.90, 1.03)	.27
Binge Eating				
No	1.33	.33	3.16 (1.57, 9.03)	<.001
Yes (reference group)				

Note. EES = Emotional Eating Scale.

men,²⁸ which was replicated in this study. Although there was not a statistically significant difference in rates of surgical attrition between men and women, there was a 34% relative higher rate of attrition among men. The attrition rate between men and women lacked statistically significant differences; however, this may have been due to a smaller number of men and thus limited power. Nonetheless, this rate may be clinically significant, which is consistent with past research showing that men experience higher rates of surgical attrition.¹⁴ Females pursuing bariatric surgery engage in more time spent dieting and place greater importance on their self-evaluation with regards to weight and appearance than males, which may also explain why they are more likely to undergo surgery.³⁹ Racial or cultural differences, as well as differences in psychiatric symptoms and eating pathology, may help to further explain the gender differences.

Despite higher rates of racial minorities being eligible for bariatric surgery,⁴⁰ race is a significant predictor of surgical attrition.⁷ In this study, race was a significant predictor of undergoing bariatric surgery. Both men and women had more than two times the odds of undergoing surgery if they were White, although the finding for men did not reach statistical significance. Some evidence has shown that Black women identify that time and poor access to resources (e.g., finances, insurance coverage), as well as a preference for a larger body size, contribute to the decision whether to undergo bariatric surgery.¹² These socioeconomic barriers and image preferences among Black women may explain why they are less likely to undergo bariatric surgery. Black patients also have higher rates of surgical readmission and complications following bariatric surgery,^{41,42} and evidence that Black women feel surgery is “extreme”¹² may also explain the higher rates of underutilization and surgical attrition. Quality of life among Black men seems to be less affected by weight compared to Black women, White women, and White men⁴³; thus, they may be less motivated to pursue bariatric surgery. Therefore, socioeconomic and cultural considerations could explain the racial differences identified in this study; however, further research is needed.

Levels of psychiatric symptomatology could also explain attrition to bariatric surgery. Although a previous study found women who pursue bariatric surgery report higher levels of depression and anxiety than men,²⁹ levels of depression and anxiety were similar between men and women in the current study. Yet, depression and anxiety were predictors of surgical attrition for women only. It may be the case that depressive and anxiety symptoms reduce the likelihood of undergoing surgery among women but not among men.

In addition to Black race, the presence of binge eating was a significant independent predictor of attrition in the multivariate analysis of the entire sample, as well among women only. Because binge eating and loss of control eating can impair success with weight loss surgery,⁴⁴ treatment to address eating pathology may have been a presurgical requirement; it is possible that mandating treatment deters patients from undergoing surgery. Although studies have been mixed regarding gender differences in levels of binge eating,^{39,45} the broader literature on levels of eating pathology suggests higher levels of eating pathology among women.³⁰ Because we did not find that binge eating was related to attrition among men, it is likely that the relation of binge eating predicting attrition among women was driving the finding among the entire sample. Additionally, in the general population, women are more likely to report food addiction,⁴⁶ although studies of bariatric samples have not found gender differences.^{47,48} In our study, food addiction was unexpectedly reported by men more so than women. Although results did not reach statistical significance, men without a food addiction had 2.67 greater odds of undergoing surgery. It may be that food addiction may present as a barrier to undergoing bariatric surgery for men (i.e., reduces interest in surgery); this warrants further study.

A chief limitation of this study is that patients' reasons for surgical attrition are not known, as these are rarely documented in the medical record. There could be other personal reasons patients decided not to undergo bariatric surgery, aside from those examined in this study.

Further, we did not have data regarding whether patients had differential rates of surgical clearance, either medical or psychological, which could be an important area of future study. Only in extremely rare circumstances does our bariatric surgery program turn someone down for surgery, and patients do not begin the work up process without insurance coverage. Thus, it is expected that in nearly all cases, patients did not undergo surgery for personal reasons. Finally, we had limited power to detect significant differences for some of our analyses, especially for those examining factors related to attrition among men; however, some of the effect sizes suggested that some of the factors may be clinically meaningful and warrant future study.

5. Conclusions

Findings from this study suggest that race plays a role for initiating the surgical process and undergoing surgery. Symptoms of depression, anxiety, and eating pathology may impact rates of attrition among women more so than men. This information could be used to identify patients at the pre-surgical psychosocial evaluation at risk for surgical attrition. Future research could further explore the personal reasons why patients who begin the pre-surgical process do not ultimately undergo surgery, as this will inform interventions that could increase utilization of bariatric surgery.

Declaration of competing interest

None.

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