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Racial Comparisons of Post-Operative Weight Loss and Eating-Disorder Psychopathology among Patients Following Sleeve Gastrectomy Surgery

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Abstract

Objective: To examine racial differences in post-operative eating-disorder psychopathology, psychosocial functioning, and weight loss among adults with loss-of-control (LOC) eating following sleeve gastrectomy.

Methods: Participants were *N*=123 (*n*=74 Non-Hispanic White and *n*=49 Non-Hispanic Black) patients who underwent surgery within the previous 4-9 months and reported regular LOC-eating during the previous month. The Eating Disorder Examination Interview-Bariatric Surgery Version assessed LOC eating, eating-disorder psychopathology, and meal patterns. Participants completed self-report measures including the Beck Depression Inventory-II(BDI-II) and Medical Outcomes Study Short-Form Health Survey(SF-36).

Results: Pre-surgical BMI did not differ by race, but Black patients had significantly less percent total-weight-loss and percent excess-weight-loss than White patients. Black and White patients did not differ significantly in LOC-eating frequency, onset time of post-operative LOC-eating, eating-disorder psychopathology, depressive symptoms, or physical or mental health-related quality-of-life (SF-36). White patients were significantly more likely to meet criteria for lifetime binge-eating disorder than Black patients. Black patients were significantly more likely to skip breakfast and dinner and engage in night eating than White patients.

Conclusion: Our findings suggest that, among patients with LOC-eating following sleeve-gastrectomy surgery, there exist few racial differences in current eating-disorder psychopathology and psychosocial functioning although Black patients achieve less weight loss than White patients.

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Keywords

race; health disparities; loss-of-control eating; obesity; bariatric surgery

Introduction

Obesity is a leading health concern in the United States due to its relationship with a variety of medical comorbidities and excess burden of healthcare costs (1). While the overall prevalence of obesity is high, currently at 39.8% (2), racial and ethnic disparities in obesity are prominent and concerning. Indeed, obesity rates are disproportionately higher among African American or Black individuals compared to European American or White individuals (46.8% versus 37.9%) and the national average (2, 3, 4). Black adults are 1.5 times as likely to have obesity and two times as likely to have severe obesity (5) as White adults. In fact, prevalence of clinically severe obesity (BMI>40 or 50) was consistently higher among Black compared to Non-Hispanic White adults for every time point during 2005-2010 (5). Strikingly, Black individuals are at higher risk of developing diabetes and dying from cardiovascular disease than White individuals (6).

Despite racial disparities in obesity rates and associated features, Black patients are less likely to seek treatment for weight management (7, 8, 9) and tend to lose less weight compared to their White counterparts (9). These racial differences in treatment utilization and weight loss outcomes seem to generalize to bariatric surgery as well. Bariatric surgery, currently the most effective treatment for severe obesity and associated metabolic syndromes, is utilized less by Black individuals (9), although differences in any treatment utilization is complex and may be due to numerous other associated factors. Available data suggest that bariatric treatment outcomes, including weight, survival, and metabolic outcomes, tend to be poorer for Black than White individuals. Specifically, Black adults tend to lose significantly less weight (10, 11), have higher in-hospital mortality (12), and are less likely to experience resolution of metabolic syndrome (13) following bariatric surgery.

Despite the overall effectiveness of bariatric surgery, sub-optimal weight loss remains a concern following surgery. Recent literature has documented tremendous variation in outcomes with pre-surgical predictors serving as poor signals for post-operative outcomes. Emerging literature, however, suggests that early post-surgical predictors may be effective in identifying individuals at risk for long-term suboptimal outcomes. One consistent post-surgical predictor is loss-of-control (LOC) eating (14, 15), which is strongly associated with eating-disorder psychopathology and psychological impairment outside of the bariatric field (16, 17). Within the bariatric field, post-operative LOC eating appears to be common and impairing among a subgroup of individuals (14, 18). While LOC eating is likely an important prognostic indicator for long-term outcomes, little is known about racial differences in post-operative LOC eating and associated features. To date, only one study has examined racial differences in binge-eating at the pre-operative stage. Results indicated that Black patients reported similar frequencies of binge eating and were equally likely to meet binge-eating disorder criteria compared to White patients (19). To help bridge racial disparities in post-surgical outcomes, it is imperative to gain an improved understanding of

eating disorder features among Black patients following bariatric surgery. Thus, the purpose of the present study was to examine racial differences in clinical features (eating-disorder psychopathology and psychosocial functioning) and weight loss among individuals with LOC eating following bariatric surgery.

Methods

Participants

Participants were 123 individuals seeking treatment for eating concerns approximately four to nine months (*M*=6.3; *SD*=1.5) following sleeve gastrectomy surgery. Participants were recruited from the institution's bariatric surgery center of excellence and the research was performed independently from the bariatric program. Inclusion criteria included adults aged 18-65 years with regular LOC eating (defined as having a sense of LOC while eating at least once weekly over the past four weeks *regardless of the quantity of food consumed*). Exclusion criteria were minimal and included medications that influence weight/eating and current substance dependence or severe psychiatric illness that required immediate treatment. BMI was not part of the inclusion or exclusion criteria; thus, there were no restrictions in BMI based on study design. Most participants were female (*n*=99; 80.5%); 60.2% (*n*=74) identified as White, Not Hispanic and 39.8% (*n*=49) identified as Black, Not Hispanic. Participant mean age and BMI were 46.7 (*SD*=10.7) years and 37.8 (*SD*=7.3) kg/m^2, respectively. This study received approval from the University Institutional Review Board. All participants provided written informed consent.

Height was measured using a stadiometer and weight was measured using a high-capacity digital scale. Per recommended reporting guidelines (20), percent total weight loss (%TWL) and percent excess weight loss (%EWL) were computed as follows: %TWL = [(Initial Weight) – (Postop Weight)] / [(Initial Weight)] * 100, and %EWL = [(Initial Weight) – (Postop Weight)]/[(Initial Weight) – (Ideal Weight)] * 100. Ideal weight was defined based on weights equivalent to a BMI of 25 kg/m^2.

Assessments

Eating Disorder Examination – Alternative Version—The Eating Disorder Examination (EDE; 21), a semi-structured, investigator-based interview used to assess eating-disorder behaviors and psychopathology, was adapted for bariatric surgery patients (EDE-BSV) (22, 23, 24). While surgically-related items were added to the EDE-BSV, psychometric properties of this version are unknown. Thus, for the present study, we used the alternative, seven-item version, which has demonstrated superior psychometric properties in several bariatric studies as well as across non-clinical and clinical samples with eating disorders (25, 26, 27, 28) relative to the original EDE factor structure. The alternative version is comprised of three subscales including restraint, overvaluation of weight or shape, and dissatisfaction with weight or shape, as well as an average global severity score. Responses range from 0-6, with higher scores indicative of greater eating-disorder psychopathology. LOC eating was defined as difficulty stopping or feeling a sense of LOC while eating, regardless of the quantities consumed (18), during the past three months. LOC behavioral indicators (eating more rapidly than normal, eating until feeling uncomfortably

full, eating when not physically hungry, eating alone due to embarrassment, and feeling very depressed, guilty, or disgusted) were also assessed.

As part of the EDE-BSV, meal pattern was assessed including number of days participants ate breakfast, mid-morning snacks, lunch, mid-afternoon snacks, dinner, evening snacks, and number of days participants engaged in night eating and picking/nibbling during the past 28 days. Snacking was computed using two methods: 1) frequency of mid-morning, mid-afternoon, and evening snacking (e.g., during the past 28 days, a mid-afternoon snack was eaten 20 days) and 2) total number of mid-morning, mid-afternoon, and evening snacks (e.g., during the past 28 days, 3 mid-afternoon snacks were eaten).

Mini-International Psychiatric Interview—The Mini-International Psychiatric Interview (MINI) (29), a brief widely-used structured interview for determining psychiatric diagnosis based on the *Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-5),* was administered to assess lifetime (pre-surgical) binge-eating disorder (BED). Interviews were conducted by post-doctoral assessors trained in diagnostic interviewing, including use of the MINI, and in working with patients with eating/weight concerns.

Beck Depression Inventory-II—Beck Depression Inventory-II (BDI-II; 30) is a 21-item self-report measure used to assess current depressive symptomology with strong psychometric support in both bariatric (31, 32) and non-bariatric (33) groups. Higher scores are indicative of greater depressive symptomatology.

Medical Outcomes Study Short Form Health Survey—Medical Outcomes Study Short Form Health Survey – 36 item version (SF-36) (34), is a widely-used measure of mental and physical health-related quality-of-life. The SF-36 has well-established reliability and validity (35) and comprises 2 summary scores (Physical Functioning Score: PFS and Mental Functioning Score: MFS). Scores are transformed and computed as *t*-scores such that the means are 50 and standard deviations are 10 for the general US population.

Statistical Analyses

Data were analyzed using SPSS 24.0. A series of independent samples *t*-tests were used to compare the participant groups on demographic (age, gender, education), weight (pre-surgical BMI, post-surgical BMI, %TWL, and %EWL), eating-disorder behavior (LOC eating) and psychopathology (EDE alternative subscales and global scale), meal pattern (EDE items), and psychosocial functioning (SF-36 and BDI-II). A series of analyses of covariance (ANCOVAs) examined weight and clinical variables while adjusting for BMI, age of LOC eating onset, and education. Chi-square analyses were used to compare the participant groups on lifetime binge-eating disorder diagnosis, and the presence/absence of LOC eating behavioral indicators. Partial eta-squared (η^2), an effect-size measure, was calculated with the following interpretation: small (.01), medium (.06), and large (.14) (36).

Results

Racial comparisons of demography and weight

Table 1 summarizes racial comparisons of demography and weight. Black and White patients did not differ significantly in age (p=.103) but differed significantly in gender (p=.002) and education (p=.022) such that fewer Black than White men participated in the study and a significantly greater proportion of White patients completed at least some college relative to Black patients. With respect to weight variables, the two groups did not differ significantly in pre-surgical BMI (p=.362); however, relative to their White counterparts, Black patients had lost significantly less weight at the time of their assessment as reflected by a significantly elevated BMI and less %TWL and %EWL six months following sleeve gastrectomy surgery.

Racial comparisons of eating-disorder psychopathology and psychosocial functioning

Table 2 summarizes detailed information on racial comparisons of eating-disorder behavior and psychopathology, as well as functioning based on the SF-36 and BDI-II. Black and White patients did not differ significantly in frequency of LOC eating episodes (p=.986), associated distress (p=.663), post-operative month of LOC eating onset (p=.055), or current diagnosis of binge-eating disorder (n=4 or 5.5% White versus n=3 or 6.1% Black); however, White patients were significantly more likely to meet criteria for lifetime binge-eating disorder (60.3% versus 28.6%, p=.001, *phi*=.311) than Black patients. Black patients reported a significantly older age of LOC eating onset (p=.008) and significantly fewer LOC eating behavioral indicators (p=.009). When independently examining racial differences of the five LOC eating behavioral indicators, the two groups did not differ significantly in four of the five behavioral indicators, namely eating more rapidly than normal, eating until uncomfortably full, eating when not physically hungry, and feeling very depressed, guilty, or disgusted about the LOC eating episodes. A significantly greater proportion of White patients, however, reported experiencing LOC eating alone due to embarrassment of eating in front of others. With respect to eating-disorder psychopathology and psychosocial functioning, the two groups did not differ significantly on any of the EDE subscales (*p-values* ranged from .361−.778) or global scale (p=.871), SF-36 physical (p=.203) or mental (p=.833) health-related quality-of-life, or BDI-II scores (p=.396). Adjusting for age of LOC eating onset, education, and current BMI did not change the overall pattern of findings or the magnitude of the effect sizes.

Racial comparisons of meal patterns during the past 28 days

Table 3 summarizes detailed information on racial comparisons of meal patterns. Black and White patients did not differ significantly in number of morning, afternoon, or evening snacks, nibbling/picking, or days of lunch consumption. The two groups differed significantly on frequency of breakfast, dinner, and night eating consumption. Specifically, Black patients were significantly more likely to skip breakfast and dinner, and more likely to engage in night eating than their White counterparts. Based on the effect sizes, the magnitude of these differences was small. Adjusting for age of LOC eating onset, education, and current BMI did not result in changes in findings or attenuation of effect sizes.

Discussion

To our knowledge, this is the first study to examine racial differences in post-operative weight losses, disordered eating, and psychosocial features among individuals seeking treatment for eating and weight concerns following sleeve gastrectomy surgery. Consistent with previous literature (10, 12, 13), Black individuals had higher post-operative BMI and less %TWL and %EWL than their White counterparts. Importantly, despite differences in post-operative weight loss, many similarities of psychosocial features were observed between these racial groups, and few significant differences. In fact, post-operative onset and frequency of LOC eating were similar between both racial groups, with onset of LOC eating occurring approximately four months following surgery for both groups. There were no significant group differences in current eating-disorder behavior, psychopathology, associated distress, depressive symptomatology, or physical and mental health-related quality-of-life. In other words, both White and Black individuals reported comparable levels of LOC eating behavior, eating-disorder features, and psychosocial features six months post-surgery, despite differences in BMI.

The few significant differences included pre-operative age of onset for LOC eating, history of BED, and number of behavioral indicators for LOC eating. Onset of LOC eating was significantly younger for White versus Black individuals and White individuals were significantly more likely to report a history of binge-eating disorder. Additionally, Black patients reported significantly fewer behavioral indicators of LOC eating than White patients, although both groups reported at least three of five behavioral indicators, which is the required number of behavioral indicators for binge-eating disorder and represents a strong signal for LOC eating (37). More broadly, our findings on racial patterns in eating-disorder psychopathology and onset of eating-disorder behaviors are largely consistent with those reported by Lydecker and Grilo (38) in their study of patients with comorbid binge-eating disorder and obesity. Collectively, these emerging findings on racial patterns in clinical studies of patients echo epidemiological evidence of strong associations between binge-eating and obesity that occur across racial groups (39).

Although eating-disorder psychopathology and related psychosocial functioning differed little between the two racial groups, notable differences in meal patterns emerged. Black patients were significantly less likely to eat breakfast and dinner, but significantly more likely to engage in night eating relative to their White counterparts. Identifying and targeting meal patterning and night eating might be useful assessment and intervention targets, particularly because greater meal frequency (i.e., not skipping meals) is often associated with improved cardiometabolic functioning and lower BMI (40, 41), while night eating appears to be associated with greater BMI (42). It is important to note, however, that the observed group differences reflected small effect sizes; thus, it is likely that other factors also contribute to the observed racial disparities in weight outcomes after bariatric surgery (9).

Strengths of the present study include the use of rigorous assessments and highly trained clinicians to assess eating-disorder behavior and psychopathology, as well as the recruitment of a diverse treatment-seeking participant group who underwent sleeve gastrectomy surgery,

currently the most commonly performed bariatric procedure in the United States (43). Despite these strengths, our findings may not generalize to patients who underwent other bariatric surgery procedures, such as the Roux-en-Y gastric bypass, or to individuals from other minority groups such as Latino/as. In addition, very few Black men sought treatment for eating and weight concerns following sleeve gastrectomy surgery; however, these gender differences in treatment-seeking presentations are similar to those observed among treatment-seeking individuals with comorbid binge-eating and obesity (38, 44).

Within the context of these limitations, we offer the following recommendations. As we learn more about eating disorder features following bariatric surgery, it is important to recognize and identify these concerns among individuals from diverse backgrounds, regardless of binge-eating disorder history. Given that binge eating and LOC eating appear to be distributed across racial, ethnic, education, and sex categories (39), it is important that disordered eating does not go undetected among men and women of diverse backgrounds following bariatric surgery. With respect to timing, LOC eating should be assessed as early as four months post-surgery; however, it is important to note that there was a range of post-operative onset with some individuals reporting LOC eating immediately following surgery. Thus, early assessment of LOC eating is imperative. Finally, targeted efforts should be made to recruit and understand post-operative concerns of men and individuals from various racial and ethnic backgrounds, particularly English- and Spanish-speaking Latino/as who represent a significant subgroup of the United States population (45). Future research is needed to examine post-operative treatments for LOC eating and elucidate the relationship among disordered eating, night eating, meal patterns, and long-term weight outcomes among more diverse groups following bariatric surgery.

Conclusion

In conclusion, our findings suggest that there exist few racial differences in eating-disorder psychopathology, depression, or health-related quality of life among individuals with LOC eating six months following bariatric surgery (sleeve gastrectomy) despite differences in post-operative BMI. Assessment of LOC eating and eating-disorder psychopathology should be implemented among post-operative patients, regardless of prior history of binge-eating disorder. Improved understanding of meal patterns and night eating might help elucidate the relationship between disordered eating and poorer weight outcomes post-surgery.

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What is already known about this subject?

- Emerging literature suggests health disparities following bariatric surgery; specifically, Black adults attain less optimal weight outcomes relative to their White counterparts.

What does this study add?

- This study examined racial differences in post-operative maladaptive eating patterns which may contribute to poorer long-term outcomes.
- While results suggest minimal racial differences in post-operative eating-disorder features, important racial differences in post-operative meal patterns and weight emerged.

Table 1.

Demographic variables, time since surgery, and weight by race

	White n=74 M (SD) [a] n(%)	Black n=49 M (SD) [a] n(%)	Test Statistic *t-test* [a] Chi-Square	*p-value*	Effect Size η^2 [a] φ
Demographics					
Age	47.96 (10.59)	44.76 (10.57)	1.64	.103	.022
Gender (Female)[a]	53 (71.6%)	46 (93.9%)	9.30	**.002**	.275
Education (≥ Some College)[a]	57 (85.1%)	30 (66.7%)	5.26	**.022**	.217
Months Since Surgery	6.20 (1.59)	6.37 (1.41)	−0.59	.557	.003
Weight					
Pre-Surgical BMI	46.11 (8.51)	47.49 (9.18)	−0.85	.396	.006
Post-Surgical BMI	36.60 (6.67)	39.50 (7.81)	−2.21	**.029**	.039
%TWL	20.29 (7.32)	16.65 (6.07)	2.88	**.005**	.064
%EWL	46.97 (17.44)	36.96 (13.96)	3.37	**.001**	.086

Note. *N*=123. BMI=Body Mass Index; %TWL=Percent Total Weight Loss; %EWL=Percent Excess Weight Loss

[a]Presented as n(%), Chi-Square test-statistic, and phi

Table 2.

Eating-disorder psychopathology, eating-disorder behavior, and functioning by race

	White n=74 M (SD)	Black n=49 M (SD)	Test Statistic *t-test*	*p-value*	Effect Size η^2	ANCOVA Age, Education, BMI η^2
EDE Alternative						
Restraint	3.12 (1.85)	3.22 (1.85)	−0.28	.778	.001	.000
Overvaluation	2.80 (1.83)	2.48 (2.05)	0.92	.361	.007	.018
Dissatisfaction	3.01 (1.57)	3.12 (1.68)	−0.37	.716	.001	.004
Global	2.98 (1.33)	2.94 (1.330)	0.16	.871	.000	.008
LOC Eating						
Frequency	20.78 (16.60)	20.84 (17.33)	−0.02	.986	.000	.002
Onset (Age)	18.00 (11.22)	24.65 (13.12)	−2.74	.008	.069	.101
Onset After Surgery (Months)	3.68 (1.53)	4.24 (1.61)	−1.94	.055	.030	.027
Distress	3.46 (0.81)	3.53 (0.98)	−0.44	.663	.002	.001
Behavioral Indicators	3.81 (0.99)	3.27 (1.29)	2.65	**.009**	.055	.063
Functioning						
SF-36 Physical	47.89 (8.92)	45.17 (11.87)	1.28	.203	.017	.011
SF-36 Mental	47.87 (9.70)	48.32 (12.14)	−0.21	.833	.000	.001
BDI-II	11.55 (9.45)	13.30 (11.17)	−0.85	.396	.007	.006

Note. EDE=Eating Disorder Examination; LOC=Loss-of-control; SF-36= Medical Outcomes Study Short Form Health Survey; BDI-II= Beck Depression Inventory

Table 3.

Meal pattern during the past 28 days by race

	White n=74 M (SD)	Black n=49 M (SD)	Test Statistic *t-test*	*p-value*	Effect Size η^2	ANCOVA Age, Education, BMI η^2
EDE Meal Pattern (Days)						
Breakfast	23.47 (8.35)	18.92 (9.40)	2.75	**.007**	.061	.057
Mid-Morning Snack[a]	14.40 (10.73)	15.14 (10.88)	−0.38	.706	.001	.002
# Mid-Morning Snacks[b]	1.20 (0.84)	1.37 (0.91)	−1.03	.306	.009	.005
Lunch	23.86 (6.64)	22.55 (6.99)	1.05	.295	.009	.016
Mid-Afternoon Snack[a]	17.61 (9.91)	17.29 (9.19)	0.18	.856	.000	.002
# Mid-Afternoon Snacks[b]	1.49 (0.90)	1.47 (0.77)	0.11	.913	.000	.001
Dinner	26.66 (4.41)	22.86 (7.29)	3.28	**.002**	.097	.078
Evening Snack[a]	22.26 (8.48)	18.61 (10.64)	1.46	.148	.019	.007
# Evening Snacks[b]	1.77 (0.88)	1.53 (0.82)	1.52	.132	.019	.028
Night Eating	1.80 (4.39)	4.90 (8.59)	−2.33	**.023**	.054	.048
Picking/Nibbling	14.04 (9.33)	13.02 (10.21)	0.57	.569	.003	.009

Note. EDE=Eating Disorder Examination

[a]Number of snack days during the past 28 days,

[b]Number of snacks eaten ranging from 0-3

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