Racial Comparisons of Postoperative Weight Loss and Eating-Disorder Psychopathology Among Patients Following Sleeve Gastrectomy Surgery

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Objective: This study aimed to examine racial differences in postoperative eating-disorder psychopathology, psychosocial functioning, and weight loss among adults with loss-of-control (LOC) eating following sleeve gastrectomy.

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

Results: Presurgical 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 postoperative LOC eating, eating-disorder psychopathology, depressive symptoms, or physical or mental health-related quality of life. 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.

Conclusions: 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 achieved less weight loss than White patients.
predictors may be effective in identifying individuals at risk for long-term suboptimal outcomes. One consistent postsurgical 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, postoperative 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 postoperative LOC eating and associated features. To date, only one study examined racial differences in binge eating at the preoperative stage. Results indicated that Black patients reported similar frequencies of binge eating and were equally likely to meet binge-eating disorder criteria compared with White patients (19). To help bridge racial disparities in postsurgical 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 4 to 9 months (mean = 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 to 65 years with regular LOC eating (defined as having a sense of LOC while eating at least once weekly over the past 4 weeks regardless of the quantity of food consumed). Exclusion criteria were minimal and included medications that influence weight or 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 on 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/m², respectively. This study received approval from the Yale 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 presurgical weight] – [postoperative weight]) / ([initial presurgical weight]) × 100, and %EWL = ([initial presurgical weight] – [postoperative weight]) / ([initial presurgical weight] – [ideal weight]) × 100. Ideal weight was defined based on weights equivalent to a BMI of 25.

**Assessments**

*Eating Disorder Examination (EDE): alternative version.* The EDE (21), a semistructured, investigator-based interview used to assess eating-disorder behaviors and psychopathology, was adapted for bariatric surgery patients (EDE-Bariatric Surgery Version; EDE-BSV) (22-24). 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 nonclinical and clinical samples with eating disorders (25-28) relative to the original EDE factor structure. The alternative version is composed 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 to 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 month. LOC behavioral indicators (eating more rapidly than normal, eating until feeling uncomfortably full, eating when not physically hungry, eating alone because of 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, midmorning snacks, lunch, midafternoon snacks, dinner, and evening snacks and number of days participants engaged in night eating and picking or nibbling during the past 28 days. Snacking was computed using the following two methods: (1) frequency of midmorning, midafternoon, and evening snacking and (2) total number of midmorning, midafternoon, and evening snacks.

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

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

*Medical Outcomes Study Short-Form Health Survey (SF-36).* The 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 two summary scores (Physical Functioning Score and Mental Functioning Score). Scores are transformed and computed as t scores, such that the means are 50 and SDs are 10 for the general US population.

**Statistical analyses**

Data were analyzed using SPSS Statistics version 24.0 (IBM Corp., Armonk, New York). A series of independent samples t tests were used to compare the participant groups on demographics (age, gender, education), weight (presurgical BMI, postsurgical 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 (ANCOVA) examined weight and clinical variables while adjusting for BMI, age of LOC eating onset, and education. χ² analyses were used to compare the participant groups on lifetime binge-eating disorder diagnosis and the presence or absence of LOC.
eating behavioral indicators. Partial eta-squared ($\eta^2$), an effect-size measure, was calculated with the following interpretation: small (0.01), medium (0.06), and large (0.14) (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 ($P = 0.103$) but differed significantly in gender ($P = 0.002$) and education ($P = 0.022$), 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.

#### 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 ($P = 0.986$), with respect to weight variables, the two groups did not differ significantly in presurgical BMI ($P = 0.362$); 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 6 months following sleeve gastrectomy surgery.

### Table 1: Demographic variables, time since surgery, and weight by race

| Demographics | White ($n = 74$), mean (SD) | Black ($n = 49$), mean (SD) | Test statistic, $t$ test or $\chi^2$ | $P$ value | Effect size, $\eta^2$ or $\phi$ |
|--------------|-----------------------------|----------------------------|-------------------------------------|-----------|-----------------------------|
| Age          | 47.96 (10.59)               | 44.76 (10.57)              | 1.64                                | 0.103     | 0.022                       |
| Gender (female)$^a$ | 53 (71.6%) | 46 (93.9%) | 9.30                                | 0.002     | 0.275                       |
| Education ($\geq$some college)$^a$ | 57 (85.1%) | 30 (66.7%) | 5.26                                | 0.022     | 0.217                       |
| Months since surgery | 6.20 (1.59) | 6.37 (1.41) | -0.59                              | 0.557     | 0.003                       |
| Weight       |                             |                            |                                     |           |                             |
| Presurgical BMI | 46.11 (8.51) | 47.49 (9.18) | -0.85                              | 0.396     | 0.006                       |
| Postsurgical BMI | 36.60 (6.67) | 39.50 (7.81) | -2.21                              | 0.029     | 0.039                       |
| %TWL         | 20.29 (7.32)                | 16.65 (6.07)               | 2.88                                | 0.005     | 0.064                       |
| %EWL         | 46.97 (17.44)               | 36.96 (13.96)              | 3.37                                | 0.001     | 0.086                       |

$^a$Presented as n (%), $\chi^2$ test statistic, and $\phi$.

### Table 2: Eating-disorder psychopathology, eating-disorder behavior, and functioning by race

| EDE alternative | White ($n = 74$), mean (SD) | Black ($n = 49$), mean (SD) | Test statistic, $t$ test | $P$ value | Effect size, $\eta^2$ | ANCOVA, age, education, BMI ($\eta^2$) |
|----------------|-----------------------------|-----------------------------|--------------------------|-----------|----------------------|-------------------------------------|
| Restraint     | 3.12 (1.85)                 | 3.22 (1.85)                 | -0.28                    | 0.778     | 0.001                | 0.000                               |
| Overvaluation | 2.80 (1.83)                 | 2.48 (2.05)                 | 0.92                     | 0.361     | 0.007                | 0.018                               |
| Dissatisfaction | 3.01 (1.57)       | 3.12 (1.68)                 | -0.37                    | 0.716     | 0.001                | 0.004                               |
| Global        | 2.98 (1.33)                 | 2.94 (1.330)                | 0.16                     | 0.871     | 0.000                | 0.008                               |
| LOC eating    |                             |                            |                         |           |                      |                                     |
| Frequency     | 20.78 (16.60)               | 20.84 (17,33)               | -0.02                   | 0.986     | 0.000                | 0.002                               |
| Onset (age)   | 18.00 (11.22)               | 24.65 (13.12)               | -2.74                   | 0.008     | 0.069                | 0.101                               |
| Onset after surgery (months) | 3.68 (1.53) | 4.24 (1.61) | -1.94                 | 0.055     | 0.030                | 0.027                               |
| Distress      | 3.46 (0.81)                 | 3.53 (0.98)                 | -0.44                   | 0.663     | 0.002                | 0.001                               |
| Behavioral indicators | 3.81 (0.99) | 3.27 (1.29) | 2.65                  | 0.009     | 0.055                | 0.063                               |
| Functioning   |                             |                            |                         |           |                      |                                     |
| SF-36 physical | 47.89 (8.92)               | 45.17 (11,87)               | 1.28                     | 0.203     | 0.017                | 0.011                               |
| SF-36 mental  | 47.87 (9.70)                | 48.32 (12.14)               | -0.21                   | 0.833     | 0.000                | 0.001                               |
| BDI-II        | 11.55 (9.45)                | 13.30 (11.17)               | -0.85                   | 0.396     | 0.007                | 0.006                               |
TABLE 3 Meal pattern during the past 28 days by race

| EDE meal pattern          | White (n = 74), mean (SD) | Black (n = 49), mean (SD) | Test statistic, t test | P value | Effect size, $\eta^2$ | ANCOVA, age, education, BMI (n$^2$) |
|---------------------------|----------------------------|---------------------------|------------------------|---------|----------------------|-------------------------------------|
| Breakfast                 | 23.47 (8.35)               | 18.92 (9.40)              | 2.75                   | 0.007   | 0.061                | 0.057                               |
| Midmorning snack$^a$      | 14.40 (10.73)              | 15.14 (10.88)             | -0.38                  | 0.706   | 0.001                | 0.002                               |
| Midmorning snacks$^{b}$   | 1.20 (0.84)                | 1.37 (0.91)               | -1.03                  | 0.306   | 0.009                | 0.005                               |
| Lunch                     | 23.86 (6.64)               | 22.55 (6.99)              | 1.05                   | 0.295   | 0.009                | 0.016                               |
| Midafternoon snack$^a$    | 17.61 (9.91)               | 17.29 (9.19)              | 0.18                   | 0.856   | 0.000                | 0.002                               |
| Midafternoon snacks$^{b}$ | 1.49 (0.90)                | 1.47 (0.77)               | 0.11                   | 0.913   | 0.000                | 0.001                               |
| Dinner                    | 26.66 (4.41)               | 22.86 (7.29)              | 3.28                   | 0.002   | 0.097                | 0.078                               |
| Evening snack$^a$         | 22.26 (8.48)               | 18.61 (10.64)             | 1.46                   | 0.148   | 0.019                | 0.007                               |
| Evening snacks$^{b}$      | 1.77 (0.88)                | 1.53 (0.82)               | 1.52                   | 0.132   | 0.019                | 0.028                               |
| Night eating              | 1.80 (4.39)                | 4.90 (8.59)               | -2.33                  | 0.023   | 0.054                | 0.048                               |
| Picking/nibbling          | 14.04 (9.33)               | 13.02 (10.21)             | 0.57                   | 0.569   | 0.003                | 0.009                               |

$^a$Frequency of snack days during the past 28 days.
$^b$Number of snacks eaten ranging from 0 to 3.

associated distress ($P = 0.663$), postoperative month of LOC eating onset ($P = 0.055$), or current diagnosis of binge-eating disorder ($n = 4$ or 5.5% White vs. $n = 3$ or 6.1% Black); however, White patients were significantly more likely to meet criteria for lifetime binge-eating disorder (60.3% vs. 28.6%, $P = 0.001$, $\phi = 0.311$) than Black patients. Black patients reported a significantly older age of LOC eating onset ($P = 0.008$) and significantly fewer LOC eating behavioral indicators ($P = 0.009$). 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 because of 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 ($P = 0.361-0.778$) or global scale ($P = 0.871$, SF-36 physical ($P = 0.203$) or mental ($P = 0.833$) health-related quality of life, or BD-II scores ($P = 0.396$). 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 or 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 postoperative 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 postoperative BMI and less %TWL and %EWL than their White counterparts. Importantly, despite differences in postoperative weight loss, many similarities of psychosocial features were observed between these racial groups and few significant differences. In fact, postoperative onset and frequency of LOC eating were similar between both racial groups, with onset of LOC eating occurring approximately 4 months following surgery for both groups. There were no significant group differences in current eating-disorder behavior, psychopathology, associated distress, depressive symptomatology, or physical or 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 6 months post surgery despite differences in BMI.

The few significant differences included preoperative age of onset for LOC eating, history of binge-eating disorder, and number of behavioral indicators for LOC eating. Onset of LOC eating was significantly younger for White than 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/Latina. 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 4 months post surgery; however, it is important to note that there was a range of postoperative 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 postoperative concerns of men and individuals from various racial and ethnic backgrounds, particularly English- and Spanish-speaking Latinos and Latinas who represent a significant subgroup of the US population (45). Future research is needed to examine postoperative 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

Our findings suggest few racial differences exist in eating-disorder psychopathology, depression, and health-related quality of life among individuals with LOC eating 6 months following bariatric surgery (sleeve gastrectomy) despite differences in postoperative BMI. Assessment of LOC eating and eating-disorder psychopathology should be implemented among postoperative 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.© 2019 The Obesity Society

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