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ORIGINAL CONTRIBUTIONS

Loss of Control Eating and Binge Eating in the 7 Years Following Bariatric Surgery

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Abstract

Background Although bariatric surgery is an effective intervention for severe obesity, a subset of patients demonstrates suboptimal weight outcomes. Postoperative loss of control eating (LOCE) and binge eating may influence weight outcomes, though research has not examined differences by surgical procedure, or factors that predict postoperative LOCE. This study aimed to [1] characterize LOCE and binge eating disorder (BED) over a 7-year period following bariatric surgery; [2] examine concurrent, prospective, and cumulative relationships between LOCE and weight loss; [3] assess whether these associations are moderated by surgery type; and [4] evaluate predictors of LOCE.

Methods Participants were 2156 patients who underwent laparoscopic adjustable gastric banding (LAGB) or Roux-n-Y gastric bypass (RYGB) in the multi-center Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) study. Generalized linear mixed models examined relationships between LOCE and percent weight loss and predictors of LOCE.

Results LOCE and BED initially declined then increased after surgery, with a notable number of de-novo cases (25.6% and 4.8%, respectively). LOCE was related to less concurrent but not prospective or cumulative percent weight loss. Self-monitoring of eating, higher daily eating frequency, older age, male gender, and higher self-esteem were associated with a lower likelihood of LOCE.

Conclusions Results suggest that LOCE and binge eating are clinically relevant behaviors that may impede weight loss, and findings highlight the importance of ongoing assessment of maladaptive eating following surgery.

Keywords Bariatric surgery · Gastric bypass · Gastric banding · Binge eating disorder · Loss of control eating · Weight loss

Introduction

Although most bariatric surgery patients maintain substantial weight loss at long-term follow-up, a subset evidences poor weight outcomes [1–3]. Maladaptive eating behaviors, particularly loss of control and binge eating, are factors that may impede successful long-term weight loss [4]. Loss of control eating, LOCE (i.e., feeling one cannot stop eating or control how much one is eating), is a central feature of binge eating (i.e., the consumption of an objectively large amount of food accompanied by a sense of loss of control) and binge eating disorder (BED), which was introduced in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) and is characterized by recurrent binge eating in the absence of regular compensatory behaviors [5].

Both binge eating and BED are more common among individuals with obesity compared to normal weight individuals,

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and prior research has documented that 43.4% of bariatric surgery candidates report LOCE [6, 7]. While initial decreases in LOCE and binge eating occur following surgery, many individuals continue to endorse or develop these behaviors [4]. Although objective binge eating episodes are often attenuated because the surgery constrains the amount of food patients can consume, over time, some appear able to consume larger amounts [8].

LOCE and binge eating are especially concerning in bariatric populations due to possible attenuation of weight loss [4, 9]. Though the presence of LOCE prior to surgery has not been consistently related to postoperative weight outcomes, converging evidence indicates that LOCE, binge eating, and/or BED following surgery is related to less weight loss or weight regain [4, 9–12]. Some research has also suggested that preoperative BED status is related to attenuated weight loss at 24, but not 12, months after surgery, which demonstrates the importance of examining longer term outcomes [13, 14].

There is also limited research examining whether the relationship between LOCE and postoperative weight change varies according to surgical procedure [10], and studies have not examined what factors may predict postoperative LOCE. Previous research found that eating more frequently, taking medication for psychiatric/emotional problems, alcohol use disorder symptoms, lower self-esteem, and depressive symptoms were associated with pre-surgery BED [7], and thus may be relevant to postoperative LOCE. In addition, successful weight loss has been linked to self-monitoring of weight-related behavior, which may be indicative of self-regulatory capacity [12, 15]. Given that LOCE/binge eating are broadly characterized by self-regulatory difficulties [16–18], a lack of self-monitoring may be related to postoperative LOCE.

Given this evidence, the objectives of this study were to (1) characterize LOCE and BED in the 7 years following bariatric surgery; (2) examine concurrent, prospective, and cumulative relationships between LOCE and weight loss; (3) assess whether these associations differ by surgery type (i.e., laparoscopic adjustable gastric banding [LAGB] or Roux-n-Y gastric bypass [RYGB]); and (4) evaluate predictors of LOCE. It was hypothesized that following initial postoperative declines, LOCE and BED would become more prevalent over time, and that LOCE would be related to less weight loss. It was also expected that less self-monitoring behaviors and greater psychiatric symptoms would be related to greater LOCE.

Materials and Methods

Participants and Procedure

Participants were 2156 patients (76% female) recruited from 2006 to 2009 and followed until 2015 from the Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) study who underwent RYGB ($n = 1640$) or LAGB ($n = 516$). Given the small number of gastric sleeve patients ($n = 59$), these participants were excluded. Patients were assessed prior to bariatric surgery (month 0) and annually to biannually for up to 7 years after surgery (months 12, 24, 36, 48, 60, 84). Year 6 (month 72) was excluded due to lack of LOCE and BED assessments. See Courcoulas et al. [1] for a description of the 7-year weight change.

Self-Report Measures

LOCE was indicated by a response of "yes" to the following questionnaire items: "During the past 6 months, have you had times when you eat continuously during the day or parts of the day without planning what and how much you would eat?" and "did you experience a loss of control; that is you felt like you could not control your eating?". BED was evaluated by items assessing the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) criteria analogous to prior LABS-2 studies [5, 7].

Alcohol use disorder symptoms were assessed by the alcohol use disorders identification test (AUDIT) [19]; the AUDIT has adequate reliability and validity and has been used to screen for alcohol use disorders in bariatric samples [20]. Depressive symptoms were measured using the Beck Depression Inventory (BDI) version 1 [21], which has demonstrated adequate sensitivity and specificity in bariatric patients [22]. Self-esteem was measured using the impact of weight on quality of life-Lite (IWQOL-Lite) self-esteem subscale (higher *T* scores = lower self-esteem); the IWQOL-Lite evidences excellent psychometric properties in patients with obesity and is commonly used in bariatric samples [23–26]. In addition, items assessed whether participants had received psychotherapy or psychiatric treatment since the last assessment, daily frequency of meals/snacks, and whether the participant reported self-weighing (i.e., keeping a graph of weight), recording daily exercise and recording daily intake over the previous 6 months.

Statistical Analyses

Analyses used available data without imputation. Patients were grouped into one of four categories for LOCE and BED: Never (not endorsed pre-surgery or at any follow-up assessment), de novo (not endorsed pre-surgery but endorsed at one or more follow-up assessments), recurrent (endorsed pre-surgery and at one or more follow-up assessments), and remitted (endorsed pre-surgery but not at any follow-up).

Concurrent and prospective relationships between LOCE and weight were assessed with generalized linear mixed models. Weight outcome was operationalized as percent of pre-surgery weight loss: weight at the assessment—pre-surgery weight/pre-surgery weight. The concurrent model included LOCE status over the past 6 months (yes/no), surgery

Table 1 Pre-surgery sample characteristics and visits completed

	M	SD	Minimum	Maximum
Age	45.66	11.32	19	78
BMI	47.06	7.36	32.85	87.04
Weight (lbs)	293.45	56.82	165	554
AUDIT	3.49	2.11	2.00	17.00
BDI	8.96	7.26	0.00	50.00
IWQOL-Lite self-esteem	41.40	27.17	0.00	100.00
Visits completed	4.90	1.95	1.00	7.00

AUDIT, alcohol use identification test; *BDI*, Beck Depression Inventory; *IWQOL-Lite*, impact of weight on quality of life-Lite (*T* scores)

type (RYGB/LAGB), and the interaction between LOCE status and surgery type as predictors of percent weight loss. The prospective model included LOCE status at the prior assessment (i.e., lagged), surgery type, and the lagged LOC status × surgery type interaction as predictors of percent weight loss. Each model included percent weight loss at the previous assessment and pre-surgery LOCE status as covariates. The cumulative effect of LOCE on percent weight loss was also evaluated, in which the total number of LOCE endorsements over the follow-up period for each participant was calculated and entered as a predictor of percent weight loss (measured at the last available assessment) using a generalized linear model.

To examine predictors of LOCE at each time point (1 = LOCE; 0 = no LOCE), generalized linear mixed models with binomial link functions were used. Predictors of concurrent and subsequent (measured at the next assessment) LOCE were first examined at the univariate level; however, the three self-monitoring variables (i.e., self-weighing, recording eating, recording exercise) were entered simultaneously. Significant predictors were retained and entered into two multivariate models: one assessed predictors of concurrent LOCE, while the second assessed prospective predictors of LOCE. Given that surgery site, age, and gender were found to be related to the number of visits completed, these variables were also added to the aforementioned models as covariates and examined as predictors of LOCE.

Results

LOCE and BED

Table 1 displays sample characteristics and Table 2 depicts percent weight loss and LOCE and BED at each assessment.

Table 2 Percent weight loss, LOCE, and BED prior to and following surgery

Sample	Month	*N*	Percent weight loss (SD)		% with LOCE	% with BED
RYGB	0	1641	–	–	33.50	12.10
	12	1343	− 33.84	(7.77)	21.90	1.30
	24	1193	− 34.26	(9.44)	29.40	2.00
	36	1143	− 31.99	(9.75)	31.00	2.70
	48	1128	− 30.09	(10.34)	29.90	3.50
	60	1145	− 28.82	(10.42)	28.70	3.00
	84	812	− 28.13	(10.86)	25.60	3.30
LAGB	0	516	–	–	39.70	14.6
	12	431	− 15.86	(8.28)	32.90	4.50
	24	385	− 17.23	(9.88)	32.70	4.90
	36	364	− 16.70	(11.17)	33.80	5.00
	48	352	− 15.35	(11.10)	36.60	5.10
	60	357	− 14.94	(11.73)	36.40	5.80
	84	237	− 14.50	(12.03)	29.10	6.60
Total sample	0	2157	–	–	35.00	12.70
	12	1774	− 29.45	(11.04)	24.60	2.10
	24	1578	− 30.03	(12.06)	30.20	2.70
	36	1507	− 28.20	(12.08)	31.70	3.30
	48	1480	− 26.58	(12.25)	31.50	3.90
	60	1502	− 25.62	(12.22)	30.60	3.70
	84	1049	− 25.26	(12.42)	26.40	4.00

LOCE, loss of control eating; *BED*, binge eating disorder; *RYGB*, Roux-n-Y gastric bypass; *LAGB*, laparoscopic adjustable gastric banding

More negative percent weight loss values indicate greater weight loss

Table 3 Mixed model results assessing LOCE as a predictor of concurrent and prospective percent weight loss

Concurrent model	*B*	SE	df	*t*	*p*	95% confidence interval	
						Lower	Upper
Intercept	− 19.47*	2.22	1912.53	− 8.86	< 0.001	− 23.83	− 15.11
Visit	0.09*	< 0.01	7058.32	21.11	< 0.001	0.08	0.10
Age	0.08*	0.02	1844.25	4.81	< 0.001	0.05	0.12
Gender	− 2.08*	0.47	1865.92	− 4.39	< 0.001	− 3.01	− 1.15
Surgery site	< 0.01	0.01	1858.00	0.68	0.497	− 0.01	0.02
Surgery type	− 15.40*	0.56	2809.17	− 27.37	< 0.001	− 16.51	− 14.30
Pre-surgery LOCE	0.82*	0.41	1861.61	2.01	0.045	0.02	1.62
Lag percent weight loss	0.05*	< 0.01	5388.49	11.37	< 0.001	0.04	0.06
LOCE	− 1.68*	0.32	5634.87	− 5.29	< 0.001	− 2.31	− 1.06
Surgery type X LOCE	0.13	0.36	5670.54	0.37	0.709	− 0.57	0.84
Prospective model							
Intercept	− 20.32*	2.24	1905.51	− 9.06	< 0.001	− 24.72	− 15.92
Visit	0.09*	< 0.01	7050.74	20.42	< 0.001	0.08	0.10
Age	0.08*	0.02	1849.56	4.82	< 0.001	0.05	0.12
Gender	− 2.03*	0.48	1871.19	− 4.22	< 0.001	− 2.97	− 1.08
Surgery site	< 0.01	0.01	1863.49	0.66	0.508	− 0.01	0.02
Surgery type	− 15.48*	0.55	2597.31	− 27.94	< 0.001	− 16.57	− 14.39
Pre-surgery LOCE	0.68	0.42	1998.70	1.62	0.105	− 0.14	1.51
Lag percent weight loss	0.04*	< 0.01	5371.50	9.72	< 0.001	0.04	0.05
Lag LOCE	− 0.50	0.30	5466.50	− 1.65	0.098	− 1.09	0.09
Surgery type X Lag LOCE	0.08	0.34	5605.21	0.24	0.807	− 0.59	0.76

Visit, time (months) following surgery; *LOCE*, loss of control eating; *Lag*, measured at the prior assessment; surgery type (RYGB vs. LAGB) was coded such that LAGB was the reference category; LOCE (yes vs. no) was coded such that no LOCE was the reference category; gender was coded such that male was the reference category

More negative percent weight loss values indicate greater weight loss

*$p < .05$

LOCE and BED prevalence was highest before surgery (35.0% and 12.7%, respectively), with the greatest decreases observed in the first year. LOCE peaked at 36 months (31.7%) and declined thereafter, though the proportion of patients with BED increased each year to 4.0% by 84 months. With respect to stability and change in LOCE, 39.9% never endorsed LOCE, 25.6% reported de novo LOCE, 25.4% reported recurrent LOCE, and 9.7% reported remitted LOCE. Regarding BED, 82.2% never met criteria, 4.8% reported de novo BED, 3.8% reported recurrent BED, and 9.2% reported remitted BED. However, of the 9.2% remitted BED patients, 46.6% still reported LOCE following surgery.

LOCE and Weight Change

Results of the concurrent mixed model indicated a significant association between LOCE and percent weight loss (Table 3), in which participants who reported LOCE over the last 6 months experienced 1.7% less percent weight loss since the previous assessment compared with participants who did not report LOCE, irrespective of surgery type. There was a significant difference between surgery type in percent weight loss demonstrating greater percent weight loss in the RYGB group, though no significant interaction between LOCE and surgery type. The prospective model also demonstrated significant difference between surgery types in percent weight loss, indicating greater percent weight loss in the RYGB group. There were no significant effects of prior LOCE (measured at the previous assessment) or the interaction between prior LOCE and surgery type on percent weight loss. In both models, age at the time of surgery and gender were also significant predictors, such that older participants and males evidenced greater percent weight loss ($ps < .001$). There was not a significant cumulative effect of LOCE (i.e., total number of LOCE endorsements over the 7-year follow-up) on percent weight loss ($B = 0.17$, SE = .17, $p = .322$) after adjusting for surgery site, age, and gender.

Table 4 Univariate and multivariate predictors of concurrent LOCE

Univariate models	*B*	SE	*t*	*p*	95% confidence interval	
					Lower	Upper
Intercept	1.21	1.58	0.77	0.443	− 1.88	4.30
Age	− 0.01*	< 0.01	− 4.45	< 0.001	− 0.01	− 0.01
Intercept	0.70	1.58	0.44	0.658	− 2.39	3.79
Gender	0.43*	0.06	7.81	< 0.001	0.32	0.54
Intercept	0.82	1.56	0.53	0.600	− 2.25	3.89
AUDIT	− 0.01*	0.01	− 1.25	0.213	− 0.02	0.01
Intercept	1.18	1.55	0.76	0.446	− 1.86	4.22
BDI	− 0.06*	< 0.01	− 19.30	< 0.001	− 0.06	− 0.05
Intercept	0.84	1.58	0.54	0.593	− 2.25	3.94
Self-weighing	− 0.01	0.01	− 1.07	0.285	− 0.03	0.01
Recording eating	− 0.17*	0.03	− 6.37	< 0.001	− 0.23	− 0.12
Recording exercise	0.08*	0.02	3.43	0.001	0.04	0.13
Intercept	0.91	1.56	0.59	0.558	− 2.14	3.97
Medication	− 0.33*	0.04	− 7.94	< 0.001	− 0.41	− 0.25
Intercept	0.82	1.56	0.53	0.600	− 2.24	3.89
Psychiatric treatment	− 0.21*	0.04	− 5.15	< 0.001	− 0.29	− 0.13
Intercept	− 0.43	1.53	− 0.28	0.78	− 3.43	2.57
Self-esteem	0.02*	< 0.01	25.93	< 0.001	0.02	0.02
Intercept	1.34	1.57	0.85	0.394	− 1.74	4.42
Eating frequency	− 0.12*	0.01	− 11.66	< 0.001	− 0.14	− 0.10
Intercept	1.11	1.59	0.70	0.484	− 2.00	4.23
Surgery site	< 0.01*	< 0.01	− 1.98	0.047	< 0.01	< 0.01
Multivariate model						
Intercept	0.49	1.50	0.33	0.742	− 2.44	3.43
Psychiatric treatment	− 0.06	0.04	− 1.39	0.165	− 0.15	0.03
Eating frequency	− 0.11*	0.01	− 8.10	< 0.001	− 0.13	− 0.08
Self-esteem	0.02*	< 0.01	17.34	< 0.001	0.02	0.02
Medication	− 0.13*	0.04	− 2.97	0.003	0.02	0.02
Recording exercise	0.04	0.05	0.83	0.407	− 0.06	0.14
Recording eating	− 0.24*	0.06	− 4.31	< 0.001	− 0.34	− 0.13
BDI	− 0.03*	< 0.01	− 6.16	< 0.001	− 0.03	− 0.02
Gender	0.31*	0.07	4.33	< 0.001	0.17	0.45
Surgery site	< 0.01	< 0.01	1.54	0.125	< 0.01	< 0.01

LOCE, loss of control eating; *AUDIT*, alcohol use identification test; *BDI*, Beck Depression Inventory. Self-esteem was measured by the impact of weight on quality of life-Lite (higher *T* scores indicate lower self-esteem). Gender was coded such that male = reference group

*$p < .05$

Predictors of LOCE

Concurrent Predictors At the univariate level, higher age, higher BDI scores, higher self-esteem, higher eating frequency, recording eating, taking medications for emotional/psychiatric problems, and engagement in psychiatric treatment were related to a lower likelihood of LOCE, while recording exercise was related to a higher likelihood of LOCE ($ps < .001$); additionally, LOCE differed significantly across surgery sites ($p < .01$), and females were significantly more likely to report LOCE than males ($p < .001$). There were no significant effects of self-weighing or AUDIT scores (Table 4). In the multivariate model including all significant univariate predictors, all of the effects except for psychiatric treatment, exercise self-monitoring, and surgery site remained significant.

Table 5 Univariate and multivariate predictors of subsequent LOCE

Univariate models	Estimate	SE	*t*	*p*	95% confidence interval	
					Lower	Upper
Intercept	1.17*	0.14	8.30	< 0.001	0.89	1.44
Age	− 0.01*	< 0.01	− 3.37	0.001	− 0.01	< 0.01
Intercept	0.68*	0.05	14.07	< 0.001	0.58	0.77
Gender	0.52*	0.08	6.63	< 0.001	0.37	0.68
Intercept	0.77*	0.09	8.65	< 0.001	0.60	0.95
AUDIT	− 0.01	0.01	− 1.24	0.215	− 0.03	0.01
Intercept	1.02*	0.07	15.47	< 0.001	0.89	1.15
BDI	− 0.05*	< 0.01	− 10.83	< 0.001	− 0.06	− 0.04
Intercept	0.93*	0.08	12.38	< 0.001	0.78	1.08
Self-weighing	− 0.03*	0.01	− 2.11	0.035	− 0.06	< 0.01
Recording eating	− 0.25*	0.06	− 4.32	< 0.001	− 0.37	− 0.14
Recording exercise	0.04	0.05	0.70	0.427	− 0.06	0.15
Intercept	0.84*	0.05	16.94	< 0.001	0.74	0.94
Medication	− 0.21*	0.05	− 4.37	< 0.001	− 0.30	− 0.11
Intercept	0.76*	0.05	16.64	< 0.001	0.70	0.89
Psychiatric treatment	− 0.17*	0.05	− 3.37	< 0.001	− 0.27	− 0.07
Intercept	− 0.45*	0.10	− 4.71	< 0.001	− 0.64	− 0.26
Self-esteem	0.02*	< 0.01	14.14	< 0.001	0.01	0.02
Intercept	1.32*	0.09	14.89	< 0.001	1.15	1.49
Eating frequency	− 0.11*	0.02	− 7.53	< 0.001	− 0.14	− 0.08
Intercept	0.82*	0.24	3.42	0.001	0.35	1.29
Surgery site	< 0.01	< 0.01	− 0.21	0.833	< 0.01	< 0.01
Multivariate model						
Intercept	1.11*	0.20	5.44	< 0.001	0.71	1.50
Psychiatric treatment	− 0.06	0.06	− 1.11	0.267	− 0.17	0.05
Eating frequency	− 0.11*	0.02	− 6.54	< 0.001	− 0.14	− 0.08
Self-esteem	0.02*	< 0.01	10.08	< 0.001	0.01	0.02
Medication	− 0.09	0.05	− 1.71	0.088	− 0.19	0.01
Recording eating	− 0.22*	0.06	− 3.66	< 0.001	− 0.34	− 0.10
BDI	− 0.02*	0.01	− 4.40	< 0.001	− 0.03	− 0.01
Age	− 0.02*	< 0.01	− 5.50	< 0.001	− 0.02	− 0.01
Gender	0.44*	0.09	4.93	< 0.001	0.26	0.61

LOCE, loss of control eating; *AUDIT*, alcohol use identification test; *BDI*, Beck Depression Inventory. Self-esteem was measured by the impact of weight on quality of life-Lite (higher *T* scores indicate lower self-esteem). Gender was coded such that male = reference group

*$p < .05$

Prospective Predictors Regarding predictors of subsequent LOCE, higher age, higher BDI scores, higher self-esteem, higher eating frequency, recording eating, self-weighing, medication use, and psychiatric treatment were related to a lower likelihood of LOCE ($ps < .05$); and females were significantly more likely to report LOCE than males ($p < .001$). There were no significant effects of recording exercise, surgery site, or AUDIT scores (Table 5). In the multivariate model, all of the effects except for psychiatric treatment and medication use remained significant.

Conclusion

This study extends prior work by examining LOCE and BED 7 years after surgery, considering the effect of LOCE on weight across surgical procedures, and assessing predictors of LOCE. Although LOCE and BED initially declined, a substantial proportion of patients reported de novo postoperative LOCE and BED (approximately 25% and 5%, respectively), and almost half of those with remitted BED continued to report LOCE. One possibility is that individuals minimized

problematic eating prior to surgery, or it may be that over time, individuals have more difficulty adhering to postoperative dietary guidelines, and as a result, experience a sense of loss of control. These data suggest that it would be beneficial to conduct routine assessments of problematic eating behaviors well beyond the first postoperative year. Results also highlight the importance of assessing a range of behaviors rather than categorical diagnoses, especially given that the objective binge episode BED criterion may be problematic in this population.

The finding that LOCE is indicative of less concurrent weight loss, but not weight loss over subsequent or prolonged time periods (as assessed by the prospective and cumulative models) may suggest that LOCE has a more proximal effect on weight. It could be that over an extended time, additional factors exert more potent influences on weight. The lack of significant interactions also indicates that this effect appears to be independent of surgical procedure.

Importantly, both concurrent and prospective multivariate models suggested older age, self-monitoring of eating, more frequent eating, and higher self-esteem were related to lower likelihoods of current and future LOCE, and that females were more likely to report LOCE than males. Monitoring of dietary intake may be particularly relevant to self-regulation in this population, and may help prevent LOCE. Given that eating smaller portions more frequently is recommended following surgery, more frequent meals/snacks could be an indicator of better adherence to postsurgical guidelines, and perhaps another marker of self-regulatory capacity. Concurrent medication use for emotional/psychiatric problems was also related to lower LOCE likelihood; it could be that such interventions help to reduce negative affect, which is consistently implicated in the onset and maintenance of binge eating. [27, 28] Interestingly, higher depression was related to lower LOCE likelihood, contrary to expectations. It could be that some depressive symptoms (i.e., poor appetite) are related to decreases in eating, and/or BDI scores may be inflated by medical or somatic complaints in this population [29]. Further examination of specific depression symptoms may help clarify this.

It is important to note limitations of the present study, including the operationalization and assessment of LOCE and binge eating following surgery. The "objectively large" food amount criterion becomes problematic because bariatric surgery inherently limits the amount one can consume, and experiences of LOCE may be altered by surgery [30]. The measurement of LOCE, while used in prior bariatric research [7], may overlap with grazing, which is a distinct construct that is also associated with poor weight outcome [9]. LOCE was measured as a dichotomous variable, and thus range restriction may be problematic; given evidence that this construct varies in degree within and between persons, future studies should utilize validated, dimensional measures of LOCE [31]. Additionally, the data with the exception of weight were self-reported, and interview-based assessments may be more precise. The relationship between LOCE and weight assessed in the concurrent model cannot determine directionality, and it may be that individuals who experience less weight loss perceive their eating to be out of control. Finally, given that the large proportion of LAGB in the present sample may not reflect current national trends, the relevance of findings should be interpreted with this in mind.

Summary

Collectively, findings demonstrate the importance of postsurgical LOCE and BED in this population, and notably, these behaviors present de novo in a significant minority of postoperative patients. Future research should also examine other potential trait- and state-level risk factors for LOCE, such as temperament, emotion regulation, and momentary affect. Lastly, results highlight the need for long-term monitoring of LOCE and binge eating in the years following surgery, as well as development of prevention and intervention efforts targeting such behaviors.

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Compliance with Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest The authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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