Presurgery Weight Loss Goals, Depressive Symptoms, and Weight Loss Among Women Undergoing Bariatric Surgery

Kyle E. Freese, MPH,¹ Andrew D. Althouse, PhD,² Ramesh Ramanathan, MD,³
Robert P. Edwards, MD,² Dana H. Bovbjerg, PhD,^{4,5} and Faina Linkov, PhD^{1,2}

Purpose: To determine whether preoperative weight loss goals are associated with postoperative weight loss and whether the effect is modified by preoperative depressive symptoms.

Methods: Sixty-three women from an ongoing cohort study who were undergoing first-time bariatric surgery at a large, academic hospital in Pittsburgh, PA, were included in this subanalysis. They were assessed preoperatively and 12 months postoperatively in regard to anthropometric and biobehavioral factors. Multivariable linear regression models were used to estimate associations between weight loss goals, expressed as percentage excess body mass index loss (%EBMIL), and postoperative %EBMIL, as well as test effect modification by depressive symptoms.

Findings: Presurgery weight loss goals were positively associated with %EBMIL 12 months after bariatric surgery ($\beta = 1.0$, $p < 0.01$), adjusting for preoperative body mass index, age, race, and marital status; this relationship was negatively modified by depressive symptoms ($\beta = -0.1$, $p = 0.02$). The association between goal %EBMIL and postoperative %EBMIL was attenuated when type of surgery was added to the model.

Conclusions: This initial report suggests that weight loss goals and depressive symptoms may be associated with achieved weight loss after bariatric surgery. If confirmed in larger cohorts, these findings may indicate that more personalized approaches will be needed when discussing weight loss goals with patients.

Keywords: weight loss goals, depressive symptoms, weight loss

Introduction

OBESITY IS A major risk factor for the development of many chronic diseases in the U.S. population, resulting in significant morbidity and mortality. More than two-thirds of the population is overweight or obese,¹ which is associated with a variety of negative health outcomes including cancer, diabetes mellitus, hypertension, obstructive sleep apnea, and various mental health disorders.^{2,3} Although the incidence of obesity has remained relatively stable in recent years,⁴ the proportion of those in the upper strata of obesity increased significantly from 2005–2006 to 2013–2014.⁵

Depression is particularly common among individuals with high body mass indices (BMIs) and disproportionately impacts women. The prevalence of depression in women is nearly 26% among those with a BMI ≥ 35 compared with that of only 6.5% among those with a BMI < 25 .⁶ For these severely obese, bariatric surgery is a weight loss option that has

been found to be highly effective in reducing severe obesity and its comorbidities.^{7–9} Several studies have reported that preoperative depression/depressive symptoms and anxiety are associated with postoperative weight loss,^{10–13} although disagreement exists regarding the direction and magnitude of the relationship.^{11,14,15} Among those studies whereby a negative association exists, evidence suggests that this effect is more apparent in women. For example, Andersen, *et al.* reported that in a cohort of 160 patients undergoing sleeve gastrectomy, only in women did anxiety and/or depression predict lower percentage excess body mass index loss (%EBMIL).¹⁰

Available literature also indicates that bariatric surgery patients generally have unrealistically optimistic weight loss goals, but there is inconsistent evidence whether this is related to actual postoperative weight loss.^{16–18} Depending on the type of surgery, one may expect a 50–80% reduction in excess body weight after bariatric surgery; low weight loss is typically defined as $< 25\%$ EBMIL in surgical

¹Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania.

²Department of OB/GYN and Reproductive Sciences, Magee-Womens Research Institute, Pittsburgh, Pennsylvania.

³Division of Minimally Invasive and Bariatric Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania.

⁴Departments of Psychiatry, Psychology, and Behavioral & Community Health, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania.

⁵Biobehavioral Oncology Program, University of Pittsburgh Cancer Institute, University of Pittsburgh, Pittsburgh, Pennsylvania.

settings¹⁹; however, these expectations and goal setting are not uniformly or consistently discussed with patients and are not a part of standard care guidelines across bariatric clinics. Gelinas *et al.* reported that women were more likely to have unrealistic weight loss goals before surgery, but found an association with postoperative weight loss only in men.¹⁶ White *et al.* found weight loss goals were unrelated to the amount of weight loss measured 6 months after surgery.¹⁸ Therefore, additional research is needed to clarify these discordant findings in the literature.

Although weight loss goals and depressive symptoms have been studied in relation to postoperative weight loss independently, there is a gap in the literature that reports on their linked effect. Based on a systematic literature search of PubMed using the key words “weight loss goals,” “depressive symptoms,” “achieved weight loss,” and related terms, both in initial and in secondary searches of relevant articles’ reference lists, no known studies have formally examined the association between these factors in the bariatric surgery population. Early work in the area of depression and goal setting utilized social cognitive theory (SCT), which is rooted in an agent-oriented perspective whereby individual behaviors are driven by the individual’s perception of likely outcomes.²⁰ SCT posits that depressed individuals tend to set higher goals for themselves relative to what is attainable,²¹ which can then feed further depressive reactions when they fail to reach their goals. That is, although most people set goals they believe to be attainable, those with depressive symptoms tend to set higher goals, which may not be realistic; when these goals are not achieved, the resulting self-devaluation and despondent mood act to stimulate one another.²¹ A logical continuation of this theory is to hypothesize that symptoms of depression may moderate the relationship between weight loss goals and achieved weight loss after bariatric surgery. However, more research is needed in this specific area as this concept has been applied in other fields relating to obesity and adverse health outcomes, but not in bariatric surgery. Specifically, a recently published meta-analysis demonstrated the utility of SCT for physical activity and dietary interventions among cancer survivors.²² Although the patient populations differ in important respects, SCT may similarly prove useful in the bariatric population.

cal factors before and after bariatric surgery. This analysis was restricted to women with data from the baseline and 12-month postoperative visits to capture women after the majority of weight loss had occurred, consistent with other cohorts.^{23,24} The median time of the baseline assessment, conducted before the surgery date, was 14 days (interquartile range: 10–38) and the time between date of surgery and the follow-up was 368 days (interquartile range: 365–410). All data were collected at Magee-Women’s Hospital of the UPMC Health System in Pittsburgh, PA, between January 2010 and June 2014, whose bariatric surgery population has been the focus of other efforts by our research group.²⁵ The study was approved by the University of Pittsburgh Institutional Review Board. All participants provided signed, informed consent.

Participants

Eligible women were identified by their bariatric surgeon and approached by research personnel at one of their preoperative clinical visits. Women were selected for this subanalysis if they were at least 18 years of age at the baseline assessment, had a baseline BMI ≥ 35 , were undergoing first time Roux-en-Y gastric bypass (RYGB) ($n=39$), sleeve gastrectomy ($n=16$), or laparoscopic gastric banding ($n=7$), and had completed relevant study questionnaires (see Materials and Methods) at both baseline and the 12-month follow-up visit at the time of analysis.

Anthropometric measures

At each study visit, clinical research personnel collected data on patient height using a standard, wall-mounted stadiometer and patient weight using the weighing scale function of a Tanita body composition analyzer (Model TBF-310, Tanita Corporation of America). We used the Screening Questionnaire for General Health History developed by Burke and colleagues to gather self-reported goal weight data.²⁶

Outcome and predictor variables

The primary outcome variable of interest was excess BMI loss (%EBMIL_{achieved}), measured using the formula provided as follows:

$$\%EBMIL = \left(\frac{\text{Preoperative BMI} - 12 \text{ month postoperative BMI}}{\text{Preoperative BMI} - 25} \right) * 100$$

Therefore, the purpose of this investigation was to examine the independent and joint effects of preoperative depressive symptoms and preoperative weight loss goals in relation to postoperative weight loss in a subsample of women who were selected from a larger, prospective cohort study.

Materials and Methods

This was a subanalysis based on the data collected from women participating in the Barimark Trial, an ongoing, prospective cohort study examining behavioral and biologi-

Each participant’s preoperative weight loss goal was calculated using her preoperative height and weight (using the methods already described) and her self-reported goal weight, which was obtained from the Screening Questionnaire for General Health History. We converted each participant’s goal weight to the percentage excess BMI she would lose should she attain her goal weight (%EBMIL_{goal}, previous formula) because this metric is considered a more appropriate benchmark than weight *per se*.

Next, preoperative depressive symptoms were ascertained using scores from the “Center of Epidemiologic

Studies-Depression" (CES-D) survey. The CES-D survey consists of a 20-item questionnaire with high sensitivity and specificity gauging symptoms associated with depression.²⁷ Each question of the survey is scored 0–3 and summed to provide an overall score. A score ≥ 16 is typically indicative of those at high risk of clinical depression.

Covariates

Baseline BMI was calculated based on height and weight collected by research personnel during the patient's first research visit. Race was self-reported and was included in the model as "Caucasian" or "Other," given the overwhelming majority of the sample was Caucasian. Marital status was self-reported and dichotomized to married/unmarried. Type of surgery was also dichotomized as RYGB and "Sleeve gastrectomy or laparoscopic banding" as RYGB typically exhibits the highest magnitude of weight loss compared with the two other options and comprised the majority of this sample.

Statistical analysis

All statistical analyses were performed using SAS Version 9.3 and STATA Version 14.0.^{28,29} Descriptive statistics were used to present patient characteristics, with the Wilcoxon rank-sum test used for continuous variables and the Chi-squared test for categorical variables.

Missing data were addressed with multiple imputation (MI) using chained equations to account for separate conditional distributions for each imputed variable. Given the modest sample size, we chose to create 50 imputed data sets to stabilize the standard deviation estimates. Of the 63 women included in the final analysis, 9.5% were missing goal %EBMIL, 6.3% were missing %EBMIL, and one participant was missing "surgery type," "baseline depression score," and "baseline BMI." Even with the modest sample size, the proportion of missing data is within the limits of MI performing well.³⁰ These variables along with marital status, age, and race were included in our imputation models.

We used multivariable linear regression to test the association between goal %EBMIL, preoperative depressive symptoms, and postoperative %EBMIL, entered as continuous variables, and adjusting for potential confounders. We created two different models: in the first, we adjusted for age, race, baseline BMI, and marital status; in the second, we added "type of surgery" to this list of covariates. We chose to present both models because, although type of surgery is an important predictor of postoperative weight loss, the theoretical causal diagrams that we constructed a priori suggested that "type of surgery" may not be a true confounder of the association between weight loss goals and postoperative weight loss. In addition to these confounders, we added a multiplicative interaction term between goal %EBMIL and depressive symptoms (measured continuously) to the final model. We used the Wald test to formally test our hypothesis that baseline depressive symptoms are an effect modifier of the association between weight loss goals and postoperative weight loss.

Results

Patient demographic and baseline characteristics are presented in Table 1 (without imputation). A majority of

TABLE 1. BASELINE SAMPLE CHARACTERISTICS OF WOMEN UNDERGOING BARIATRIC SURGERY

Characteristics	Median (IQR) or n (%)
Age (years)	46 (34, 53)
Race (% white)	45 (84.9)
Baseline BMI (kg/m ²)	45.2 (41.5, 47.7)
Type of surgery	
RYGB	33 (62.3)
Lap band	6 (11.3)
Gastric sleeve	14 (26.4)
Education (years)	14 (12, 16)
Baseline CES-D score (total score)	11.0 (6.0, 17.0)
Baseline CES-D score (% ≥ 16)	15 (28.3)
Goal %EBMIL at baseline	100.2 (89.5, 110.3)
Total %EBMIL ^a	72.2 (56.1, 86.0)
Total Δ BMI ^a	15.1 (10.7, 17.4)
Total % weight lost (kg) ^a	39.8 (27.7, 44.9)

N = 53 (all women with complete data on all variables of interest).

^aMeasured 12 months postoperatively.

BMI, body mass index; CES-D, Center of Epidemiologic Studies-Depression; %EBMIL, percentage excess BMI loss; IQR, interquartile range; RYGB, Roux-en-Y gastric bypass.

women in this cohort were Caucasian, married, 35 years of age or older, and underwent RYGB. They had a median baseline BMI of 45.2 kg/m², 34% had 16 or more years of education, and ~28% met the subthreshold of depressive symptoms at baseline (CES-D score ≥ 16). Overall, women lost an average of 39.8 kg at follow-up, which corresponded to a median %EBMIL of 72.2%. There were no important differences in terms of age, baseline BMI, education, race, or baseline depression score between women with complete data for their 12-month visit and those with complete data for their 6-month visit only. Furthermore, we tested the correlation between preoperative depression and weight loss goals and found no significant evidence to exclude these two variables from being included in the model ($R=0.34$).

Table 2 presents results from the multivariable linear regression examining the association between preoperative weight loss goals/depressive symptoms and 12-month postoperative weight loss. In the first model (adjusted for age, race, baseline BMI, and marital status), we found a statistically significant, positive association between goal %EBMIL and achieved %EBMIL ($\beta=1.0$, $p<0.01$) that was negatively modified by depressive symptoms ($\beta=-0.1$, $p=0.02$). For every percentage increase in goal %EBMIL, an increase in CES-D score attenuated the association with achieved %EBMIL by a factor of 0.1. For example, based on this model, a woman with a goal %EBMIL of 75% and a CES-D score of 20 would have an expected %EBMIL ~40% lower than comparable women with a CES-D score of 12. In Model 2, when we added "type of surgery" as a covariate, the associations were attenuated for both the overall association of goal %EBMIL and achieved %EBMIL ($\beta=0.7$, $p=0.05$) and the modification effect by depressive symptoms ($\beta=0.0$, $p=0.20$).

TABLE 2. MULTIVARIABLE LINEAR REGRESSION MODELS EXAMINING ASSOCIATIONS OF WEIGHT LOSS GOALS, DEPRESSION, AND OBSERVED WEIGHT LOSS 12 MONTHS AFTER BARIATRIC SURGERY AMONG A PROSPECTIVE COHORT OF SEVERELY OBESE WOMEN

Model	Parameter estimate (95% CI)	p
Model 1 ^a		
Goal %EBMIL	1.0 (0.3 to 1.7)	<0.01
Baseline CES-D score	7.4 (0.9 to 13.8)	0.03
Goal %EBMIL × baseline CES-D score	−0.1 (−0.1 to 0.00)	0.02
Model 2 ^b		
Goal %EBMIL	0.7 (0.0 to 1.4)	0.05
Baseline CES-D score	4.0 (−3.0 to 10.9)	0.26
Goal %EBMIL × baseline CES-D score	0.0 (−0.1 to 0.0)	0.20

N=63 (after multiple imputation using chained equations).

^aAdjusted for age, race, baseline BMI, and marital status.

^bAdjusted for age, race, baseline BMI, marital status, and type of surgery.

CI, confidence interval.

Discussion

In this sample of women undergoing bariatric surgery, there was a positive association between weight loss goals and achieved weight loss that was negatively modified by baseline depressive symptoms. These relationships were found after controlling for age, baseline BMI, race, and marital status, but were attenuated after “type of surgery” was added to the statistical model.

These results suggest that higher preoperative weight loss goals may be beneficial for weight loss success after bariatric surgery, unless undermined by concurrent depressive symptoms. These novel findings need to be replicated in future research to confirm generalizability across demographically diverse samples and other clinical settings.

Bariatric surgery patients typically have unrealistic weight loss goals, but there have been mixed findings in the literature regarding the importance that these goals have for postoperative outcomes. Although some investigators report that the two variables are unrelated, a recent report by Goulart, *et al.* argued that the target postoperative BMI (25 kg/m²) may be an unrealistic goal for some patients, which may lead to demotivation and lack of adherence to follow-up.³¹ If confirmed, our findings would add support to the notion that weight loss goals tailored to the individual may help facilitate weight loss success and raise the possibility that bariatric surgeons should ensure that weight loss goals are discussed in preoperative appointments. Of course, determining potential causal relationships between goals and achievements is difficult because of challenges in accounting for unmeasured confounding factors. For example, it is unclear at what time point an individual’s weight loss goals were established and to what degree they were influenced by previous physician counseling or individual research undertaken by the patient. Future research efforts should collect this information when examining these associations.

Our findings should be viewed within the context of the study’s limitations. Importantly, significant associations between our predictors of interest and achieved weight loss in this modest-sized study were attenuated when we added “type of

surgery” to our regression models. This may be because of the fact that different types of bariatric surgery result in different weight loss trajectories and that this is a strong driver of weight loss, regardless of one’s weight loss goals or depressive symptoms status. Conversely, because of the small sample size, adding this additional covariate likely saturated our model and minimized any variance that existed in our data. Similarly, we combined sleeve gastrectomy and laparoscopic banding patients into one group because of sample size constraints. Although patients who receive these procedures typically exhibit less weight loss than RYGB patients, it may be more appropriate in future studies to separate the groups entirely, given sufficient sample sizes. Next, even though the interaction between preoperative weight loss goals and depressive symptoms was statistically significant in model 1, the effect remained modest. Last, because the Barimark Trial comprises entirely of women, we cannot determine whether our findings extend to men; however, women are more likely to experience depression and to have unrealistic weight loss goals,^{16,32} thus, the effects are not likely to be stronger in men. Upwards of 75–80% of bariatric surgery cohorts are comprised of women (similarly to the composition of gender distribution in typical U.S. bariatric surgery clinical practices),^{33,34} so these findings may help inform larger investigations and generate hypothesis for future trials.

Even with the study’s limitations, this initial examination of prospective relationships between preoperative weight loss goals and depressive symptoms, and achieved weight loss 1 year after bariatric surgery, suggests that these relationship deserve additional study. If weight loss goals and depressive symptoms are together associated with postoperative weight loss, clinicians may want to consider recommending to patients that they receive counseling on weight loss goals, provide more intensive monitoring to those with depressive symptoms, and/or refer high-risk individuals to mental health professionals for assessment and care as appropriate.

Conclusions

The prevalence of severe obesity continues to increase in the United States, resulting in an increasing number of individuals who are eligible for bariatric surgery.³⁵ Additional research to better understand factors that may predict which people may be more or less likely to be successful in long-term weight loss after bariatric surgery is needed. We propose that additional, rigorous, epidemiologic studies should be undertaken to examine the impact of preoperative weight loss goals and depressive symptoms on bariatric surgery patients to confirm our findings. The goal of such research should be to provide evidence regarding the possible utility of developing individualized approaches (including counseling) to promote weight loss success after bariatric surgery.

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Author Disclosure Statement

No competing financial interests exist.

References

1. CDC. Overweight and obesity. 2013. Accessed May 9, 2013. www.cdc.gov/obesity/data/adult.html
2. Belle SH, Chapman W, Courcoulas AP, *et al.* Relationship of body mass index with demographic and clinical characteristics in the Longitudinal Assessment of Bariatric Surgery (LABS). *Surg Obes Relat Dis* 2008;4:474–480.
3. Mitchell JE, Selzer F, Kalarchian MA, *et al.* Psychopathology before surgery in the longitudinal assessment of bariatric surgery-3 (LABS-3) psychosocial study. *Surg Obes Relat Dis* 2012;8:533–541.
4. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA* 2014;311:806–814.
5. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL. Trends in obesity among adults in the United States, 2005 to 2014. *JAMA* 2016;315:2284–2291.
6. Simon GE, Ludman EJ, Linde JA, *et al.* Association between obesity and depression in middle-aged women. *Gen Hosp Psychiatry* 2008;30:32–39.
7. Argenta P, Svendsen C, Elishaev E, *et al.* Hormone receptor expression patterns in the endometrium of asymptomatic morbidly obese women before and after bariatric surgery. *Gynecol Oncol* 2014;133:78–82.
8. Schweitzer M, Lidor A, Magnuson T. Bariatric surgery. *Adv Psychosom Med* 2006;27:53–60.
9. Christou NV, Lieberman M, Sampalis F, Sampalis JS. Bariatric surgery reduces cancer risk in morbidly obese patients. *Surg Obes Relat Dis* 2008;4:691–695.
10. Andersen JR, Aadland E, Nilsen RM, Vage V. Predictors of weight loss are different in men and women after sleeve gastrectomy. *Obes Surg* 2014;24:594–598.
11. Averbukh Y, Heshka S, El-Shoreya H, *et al.* Depression score predicts weight loss following Roux-en-Y gastric bypass. *Obes Surg* 2003;13:833–836.
12. de Zwaan M, Enderle J, Wagner S, *et al.* Anxiety and depression in bariatric surgery patients: a prospective, follow-up study using structured clinical interviews. *J Affect Disord* 2011;133:61–68.
13. Kalarchian MA, Marcus MD, Levine MD, Soulakova JN, Courcoulas AP, Wisinski MS. Relationship of psychiatric disorders to 6-month outcomes after gastric bypass. *Surg Obes Relat Dis* 2008;4:544–549.
14. Ma Y, Pagoto SL, Olendzki BC, *et al.* Predictors of weight status following laparoscopic gastric bypass. *Obes Surg* 2006;16:1227–1231.
15. White MA, Kalarchian MA, Levine MD, Masheb RM, Marcus MD, Grilo CM. Prognostic significance of depressive symptoms on weight loss and psychosocial outcomes following gastric bypass surgery: a prospective 24-month follow-up study. *Obes Surg* 2015;25:1909–1916.
16. Gelinas BL, Delparte CA, Hart R, Wright KD. Unrealistic weight loss goals and expectations among bariatric surgery candidates: the impact of pre- and postsurgical weight outcomes. *Bariatric Surg Patient Care* 2013;8:12–17.
17. Kaly P, Orellana S, Torrella T, Takagishi C, Saff-Koche L, Murr MM. Unrealistic weight loss expectations in candidates for bariatric surgery. *Surg Obes Relat Dis* 2008;4:6–10.
18. White MA, Masheb RM, Rothschild BS, Burke-Martindale CH, Grilo CM. Do patients' unrealistic weight goals have prognostic significance for bariatric surgery? *Obes Surg* 2007;17:74–81.
19. Dixon JB, Laurie CP, Anderson ML, Hayden MJ, Dixon ME, O'Brien PE. Motivation, readiness to change, and weight loss following adjustable gastric band surgery. *Obesity* (Silver Spring, Md.) 2009;17:698–705.
20. Bandura A, Locke EA. Negative self-efficacy and goal effects revisited. *J Appl Psychol* 2003;88:87–99.
21. Bandura A. Social cognitive theory of self-regulation. *Organ Behav Hum Decis Process* 1991;50:248–287.
22. Stacey FG, James EL, Chapman K, Courneya KS, Lubans DR. A systematic review and meta-analysis of social cognitive theory-based physical activity and/or nutrition behavior change interventions for cancer survivors. *J Cancer Surviv* 2015;9:305–338.
23. Courcoulas AP, Christian NJ, Belle SH, *et al.* Weight change and health outcomes at 3 years after bariatric surgery among individuals with severe obesity. *JAMA* 2013;310:2416–2425.
24. Dicker D, Yahalom R, Comaneshter DS, Vinker S. Long-term outcomes of three types of bariatric surgery on obesity and type 2 diabetes control and remission. *Obes Surg* 2016;26:1814–1820.
25. Kaiyrykzy A, Freese KE, Elishaev E, *et al.* Endometrial histology in severely obese bariatric surgery candidates: an exploratory analysis. *Surg Obes Relat Dis* 2015;11:653–658.
26. Wang J, Sereika SM, Styn MA, Burke LE. Factors associated with health-related quality of life among overweight or obese adults. *J Clin Nurs* 2013;22:2172–2182.
27. Radloff L. The CES-D scale: a self report depression scale for research in the general population. *Appl Psychol Meas* 1977;1:385–401.
28. SAS 9.1.3 [computer program]. Cary, NC: SAS Institute Inc., 2000–2004.
29. Stata Statistical Software [computer program]. College Station, TX: StataCorp LP, 2013.
30. Allison PD. The SAGE handbook of quantitative methods in psychology. 2009;72–89.
31. Goulart A, Leao P, Costa P, *et al.* Doctor, how much weight will i lose?—a new individualized predictive model for weight loss. *Obes Surg* 2016;26:1357–1359.
32. Kessler RC, Berglund P, Demler O, *et al.* The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA* 2003;289:3095–3105.
33. Courcoulas AP, Christian NJ, O'Rourke RW, *et al.* Preoperative factors and 3-year weight change in the Longitudinal Assessment of Bariatric Surgery (LABS) consortium. *Surg Obes Relat Dis* 2015;11:1109–1118.
34. Bergh I, Kvalem IL, Risstad H, Cameron LD, Sniehotta FF. Predictors of preoperative weight loss in morbidly obese adults waiting for bariatric surgery: a prospective cohort study. *Obes Surg* 2015;25:1610–1617.
35. Sturm R, Hattori A. Morbid obesity rates continue to rise rapidly in the United States. *Int J Obes (Lond.)* 2013;37:889–891.

Address correspondence to:

Kyle E. Freese, MPH
3520 Fifth Avenue
Suite 100
Pittsburgh, PA 15213

E-mail: kyf4@pitt.edu