Current Obesity Reports (2019) 8:1–9
https://doi.org/10.1007/s13679-019-0325-3

PSYCHOLOGICAL ISSUES (V DRAPEAU AND V IVEZAJ, SECTION EDITORS)

Psychosocial Concerns Following Bariatric Surgery: Current Status

Melissa A. Kalarchian[1] · Marsha D. Marcus[2]

Published online: 18 January 2019

Abstract

Purpose of Review The purpose of this paper is to review the current status of research on psychosocial concerns following bariatric surgery.

Recent Findings Bariatric surgery has a positive overall impact on weight and obesity-related comorbidities, as well as a positive short-term impact on mental health and psychosocial functioning. Nonetheless, research has documented a number of different psychosocial concerns that may emerge following surgery including maladaptive eating, substance use disorders, suicide, lack of social support, and excess skin. Moreover, special populations of patients may have distinctive psychosocial concerns based on sociodemographic factors such as age or severity of obesity. Available studies suggest that psychosocial interventions have a positive impact on post-surgery outcomes, particularly maladaptive eating. However, research is limited, and long-term data are lacking.

Summary Monitoring patients after bariatric surgery for negative psychosocial outcomes is warranted. Research is needed to develop and evaluate personalized approaches to optimize long-term weight loss and psychosocial adjustment.

Keywords Bariatric surgery · Psychosocial factors · Maladaptive eating · Substance use · Suicide · Social support

Introduction

Bariatric surgery is recommended for individuals with a body mass index (BMI) > 40 kg/m^2 or individuals with a BMI of 35–40 kg/m^2 and significant obesity-related comorbidities [1, 2]. Increasingly, it is considered for those with lower levels of obesity of < 35 kg/m^2 with poorly controlled type 2 diabetes [3–5]. A large and growing body of evidence shows that bariatric surgery is associated with clinically significant weight loss and improvements in obesity-related comorbidities across different procedures [6–12].

Results from the National Institutes of Health (NIH)-funded longitudinal assessment of bariatric surgery (LABS) consortium documented that patients experienced maximal weight loss within the first year following Roux-en-Y gastric bypass or laparoscopic adjustable gastric banding [10, 13]. However, individual response to surgery varied, and distinct weight trajectories were identified, even for a single procedure such as Roux-en-Y gastric bypass [13]. Seven years after gastric bypass, patients in the LABS study lost 28% of their initial weight (having regained 4% on average). The mechanisms underlying individual weight trajectories after different procedures are not fully understood, but are likely due to a complex interplay of patient- and procedure-specific factors [14, 15]. Weight regain is concerning because it could lead to the erosion of the benefits of surgery on health and well-being.

The bariatric surgery literature is marked by a limited range of psychosocial outcomes and lack of longer-term follow-up. A systematic review and synthesis of qualitative research found that surgery has a profound long-term impact on different aspects of patients' lives including activities of daily living, physical health, psychological health, social relations, sexual life, body image, eating behavior, and relationship with food [16], with many of the changes reported as being positive, but others described as neutral or negative. Reviews of quantitative studies have documented that surgery is associated with improvements in physical quality of life [17], as well as physical [18] and occupational [19] functioning. Research has also documented that certain aspects of sexual functioning [20], body image [21•], and quality of life [17, 20, 22•]

This article is part of the Topical Collection on *Psychological Issues*

✉ Melissa A. Kalarchian
kalarchianm@duq.edu

[1] School of Nursing, Duquesne University School of Nursing, 600 Forbes Avenue, Pittsburgh, PA 15282, USA

[2] Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA

improve with short-term weight loss following bariatric surgery. Data on psychosocial outcomes are limited for some procedures such as sleeve gastrectomy [23], which has grown to become the most common procedure in the world [24], but a review of 40 studies (including 208,556 patients) found no significant differences in quality of life between Roux-en-Y gastric bypass and sleeve gastrectomy [25].

Lifetime and current mental disorders are common in bariatric surgery candidates [26•, 27–31], which is unsurprising given that obesity is associated with psychopathology, especially depression and binge eating [32]. Moreover, there is a relationship between severity of obesity and prevalence of binge eating disorder in the general population [33]. Most studies suggest that bariatric surgery has positive short-term impact on mental health disorders and symptoms [34–36], particularly depression and binge eating.

The impact of mental health on post-surgery weight loss is less clear. In a meta-analysis of 68 publications, pre-surgery mental health conditions were not consistently related to post-surgery weight loss [26]. In contrast, post-surgery binge or uncontrolled eating and depression have been identified as negative predictors of weight loss [37]. It should be noted, however, that rigorous, hypothesis-driven prospective studies of psychosocial predictors of post-surgery weight loss are lacking.

In this paper, we review the recent research on psychosocial concerns following bariatric surgery with the goal of identifying gaps in the literature. Despite positive short-term outcomes overall, number of psychosocial concerns have emerged, notably maladaptive eating, substance use, suicide, lack of social support, and excess skin after substantial weight loss. We also consider how special populations of patients may have unique concerns. We conclude by highlighting psychosocial interventions with promising results and offering suggestions for research and practice.

Maladaptive Eating

Successful weight maintenance of weight loss requires ongoing management of behaviors proximal to energy imbalance (i.e., calorie intake and physical activity). Pathological eating behaviors, which are common before surgery [38], may affect outcome. Accordingly, research has examined maladaptive eating as related to initial weight loss as well as weight regain. A review of 15 studies on binge eating after surgery found that the development of binge eating (episodes of recurrent consumption of objectively large amounts of food accompanied by a sense of loss of control over eating), loss of control over eating without eating an objectively large amount of food (a key aspect of binge eating, especially when gastric capacity is reduced post-surgery), or binge eating disorders are associated with less weight loss or more weight regain among patients [37]. Results of this review are also consistent with findings from LABS in which post-surgery eating disorders were independently associated with less weight loss 3 years after surgery [34].

Other eating behaviors may become maladaptive following post-surgery changes in gastric anatomy. For example, research suggests that grazing—which has not been defined consistently in the literature, but pertains to repetitive eating of modest amounts of food in an unplanned manner—is associated with negative weight outcomes post-surgery [39]. A systematic review of the literature, four out of five studies (including 994 subjects) found that grazing was associated with weight regain regardless of definition of grazing or type of surgery [40]. Thus, maladaptive eating constitutes an important post-surgery psychosocial concern.

Substance Use

Alcohol and other substance use is a concern for some bariatric surgery patients, especially for those with a history of problems. A review of 40 studies of post-surgery substance use including tobacco, alcohol, and illicit/non-medical drugs documented that a pre-surgery history of substance use is correlated with post-surgery use, although studies did not consistently report an increase in alcohol use post-surgery [41•]. However, subsequent findings from the LABS study showed that the prevalence of regular drinking doubled in the 7 years following surgery. One-fifth of participants reported incident alcohol use disorder symptoms within 5 years following surgery, with Roux-en-Y gastric bypass associated with higher risk than laparoscopic adjustable gastric banding [42]. The LABS study also documented that despite initial decreases in the prevalence of prescribed opioid analgesics post-surgery, the prevalence increased over time to surpass baseline, such that one fifth of participants reported opioid use at 7 years. Although results are difficult to interpret due to the lack of a control group in LABS, this level of exposure suggests that some patients may be vulnerable to developing problems, although the mechanisms are not fully understood. Increased risk for alcohol and other substance use disorders may be due to changes in neurobiology and increased alcohol reward, as well as rapid and increased peak alcohol concentrations following a procedure associated with malabsorption such as gastric bypass [43, 44]. Thus, substance use is important to monitor following surgery, particularly for those with a history of problems.

Suicide

Suicide and self-harm have been noted before and after bariatric surgery in both adult and adolescent samples [45]. Although rates vary across studies, and reasons are often not documented, a systematic review and meta-analysis of 32 studies found that risk of suicide and self-harm increase

post-surgery [46•]. The rate of suicide post-surgery was 2.7/1000 patients (95% CI 0.0019–0.0038), while the rate of suicide/self-harm attempt was 17/1000 patients (95% CI 0.01–0.03); this risk was higher after bariatric surgery within the same population (OR of 1.9) and compared with age-, sex-, and BMI-matched controls (OR 3.8). In Canada, the risk of self-harm emergencies increased after bariatric surgery, with the most common being intentional overdose [47]. In Sweden, bariatric surgery was associated with suicide and non-fatal self-harm in two matched cohort studies from nationwide registries: One study compared surgery patients with controls in the context of usual care, and another matched surgery patients with those receiving intensive lifestyle modification [48]. Of note, although risk of suicide and self-harm was not associated with poor weight outcomes, substance misuse during follow-up was significantly higher among surgery patients (recorded in approximately 50% of both groups) as compared with the matched comparison groups (recorded in less than 30% in both groups).

A host of medical, biological, genetic, and psychosocial factors have been postulated as possible mechanisms for suicide following bariatric surgery. In addition to poor weight outcomes, possible risk factors have included lack of improvement in quality of life, continued or recurrent physical mobility restrictions, continued or recurrent sexual dysfunction and relationship problems, and low self-esteem [49]. Although the absolute risk for suicide is low, further efforts to identify individuals who are vulnerable to self-harm and suicide in the context of bariatric surgery are warranted.

Social Support

Environmental factors, such as social support, can affect health behavior change among patients post-surgery. Indeed, social support group attendance post-surgery has been found to be associated with greater post-surgery weight loss [50]. Additionally, the family can be an important influence on bariatric surgery patients. One study found that over 90% of adult family members of surgery patients also had overweight or obesity, and physical activity was correlated between the surgery patient and family members [51].

Qualitative studies of couples in which one person had bariatric surgery have documented that surgery affects both people, including emotional intimacy and relationship quality [52], and couples attribute success to a joint effort of both members [53]. A review of 13 studies reported that although sexual contact increases, the quality of couples' relationships tends to decline from pre- to post-surgery [54]. Data from two Swedish cohort studies have shown that as compared with controls, surgery was associated with divorce or separation for those in relationships, and marriage for those who were unmarried [55•]. The amount of weight lost post-surgery tends to be greater for patients who are married [56], and when both members of a couple undergo surgery together, they tend to meet or exceed weight loss goals with similar follow-up adherence [57]. Thus, it appears that surgery affects relationships in ways that can help or hinder weight loss, and it may be important to foster social support to help patients achieve the best possible outcomes.

Excess Skin

Loose and hanging skin can result from substantial post-surgery weight loss. In a review of 13 quantitative and 11 qualitative studies, excess skin was found to adversely impact physical and psychosocial functioning, as well as activities of daily living, among adult patients post-surgery [58•]. However, most studies of body image post-surgery do not investigate excess skin or its impact [21•]. In a path analysis of data from 61 female patients, sexual functioning and impairment caused by excess skin were associated with concerns regarding body image and depressive symptoms, which in turn were associated with weight regain [59]. Thus, excess skin may not only be associated with adverse psychosocial outcomes but also with weight regain. Although available research suggests that body contouring surgery has a positive impact on well-being, functioning, and quality of life [60], cost has been identified as a major barrier [61].

Special Populations

Response to bariatric surgery may differ for subgroups with distinctive sociodemographic profiles. The special populations considered here include factors such as age, Adverse Childhood Experiences (ACEs), severity of obesity, socioeconomic status, severe mental illness, and veteran status.

Age Bariatric surgery has increased in acceptance and popularity among youth [62], despite persistent concerns about potential long-term nutritional and developmental complications [63]. A systematic review of the effect of adjustable gastric banding, gastric bypass, and laparoscopic sleeve gastrectomy in patients ≤ 18 years old identified 37 studies, including 15 with prospective designs. All procedures were associated with substantial weight loss and improvement in comorbidities, with an acceptable complication rate among adolescents [64]. At the other end of the age continuum, systematic reviews of bariatric surgery in adults 60 or over showed that weight loss and complications are comparable to those in a younger population, independent of the type of procedure [65, 66]. Age may interact with other demographic factors such as sex to create patient groups with distinctive needs,

as was recognized with the development of obesity treatment guidelines specific to elderly men [67].

Post-surgery psychosocial concerns may differ depending on the age at which a patient opts for surgery. Youth may encounter issues related to cognitive development and emerging autonomy, such as adherence to post-surgery dietary guidelines and lifelong follow-up visits. Post-surgery weight loss may also impact the occupational or social functioning of young adults, such as entering the workforce or initiating sexual relationships. Older adults may experience different types of concerns, such as age-related decline in health or cognitive abilities. Post-surgery weight loss may affect work and social functioning in older adults, including issues related to retirement from the workforce or social isolation following death of a spouse. Clinical experience suggests that social and occupational concerns are likely to vary with age, but more research is needed in this area.

Adverse Childhood Experiences There is growing appreciation of the associations between ACEs, such as neglect and abuse, and adult health indicators, such as eating disorders, substance abuse, and obesity. For example, adults reporting four or more ACEs had over twice the risk of severe obesity [68]. Among bariatric surgery patients, ACEs such as parental loss [69], as well as emotional, physical, and sexual abuse [70], have been associated with mental disorders. Whereas some research has found poorer weight loss among surgery patients among patients with a history of maltreatment compared with those without [56, 71], one pilot study found a positive association [72], and another did not support an association [73]. Thus, ACEs may affect surgery outcomes, and it is possible that addressing longer-standing consequences of maltreatment could improve post-surgery weight loss [56].

Severity of Obesity With growing recognition of its metabolic effects, bariatric surgery is being performed on relatively lighter patients with poorly controlled type 2 diabetes [3–5]. Although there has been much less research on patients who have overweight, but not obesity, prior to bariatric surgery, these patients may have different motivations or psychosocial concerns than individuals with obesity. Additionally, patients with extreme obesity may be more likely to undergo procedures associated with greater malabsorption than those with lower levels of obesity [74], which in turn may be associated with increased nutritional complications or gastrointestinal symptoms. Furthermore, severity of obesity may interact with other sociodemographic factors, such as age, to create subgroups with unique profiles of psychosocial concerns, such as the elderly with extreme obesity [75].

Socioeconomic Status It is now widely recognized that socioeconomic disadvantage can affect health as well as access to healthcare. For example, patients with Medicaid, the US government program serving individuals with low income, are less likely to receive bariatric surgery [76], despite evidence that they may benefit from it [77•]. In a systematic review of the literature on the effectiveness of bariatric surgery among Medicaid beneficiaries, most studies show similar weight loss and remission of comorbidities when compared with patients with other types of insurance [77•]. However, higher body weight and a greater number of comorbid conditions among Medicaid beneficiaries prior to surgery persist afterward, and mortality and health care utilization measures tend to be worse. Determining causality becomes complex because of baseline differences between those with and without Medicaid, as well as potential challenges in evaluating reasons for seeking post-surgery care. To achieve health equity, Medicaid patients may require extra supports pre- and post-surgery to address social determinants of health, such as financial hardship impacting adherence [78].

Severe Mental Illness A psychological evaluation is recommended prior to bariatric surgery, and psychiatric symptoms such as suicidal ideation, hallucinations, delusions, or severe cognitive impairment may be considered contraindications to surgery [79]. Nonetheless, the decision to pursue surgery involves weighing the risks and benefits, and some patients with severe and persistent mental disorders have undergone bariatric surgery, particularly as bipolar disorder and schizophrenia are associated with increased risk for obesity. A systematic review indicated that people with bipolar disorder achieve weight loss post-surgery comparable to the general bariatric population, with no significant short-term exacerbation of psychiatric symptoms, but information on individuals with schizophrenia was lacking [80].

The literature also includes reports on individuals with genetic syndromes such as Prader Willi Syndrome or Down syndrome who have undergone bariatric surgery [81]. People with persistent and severe disorders, as well as intellectual and developmental disabilities, will likely differ from those without these conditions, particularly related to issues surrounding informed consent for surgery and adherence with the post-surgery guidelines for lifestyle change and lifelong monitoring. Moreover, medication regimens may require adjustment because drug bioavailability is altered following changes in gastric anatomy [82], and certain psychotropic medications may have an adverse impact on post-surgery weight loss [83].

Veterans Most bariatric surgery patients tend to be female, but patients receiving care in the Veterans Affairs (VA) health system are more likely to be male. Similar to research in predominantly female, civilian samples, patients receiving care in the VA health system who underwent bariatric surgery had lower mortality up to 10 years following surgery as compared with matched control patients who did not have surgery [84]. However, veterans may also have distinctive psychosocial concerns post-surgery. For example, in a retrospective chart

review of 356 veterans presenting at the War Related Illness and Injury Study Center, the most commonly reported psychosocial concerns were in the areas of pain, sleep, cognition, vocational issues, education, finances, relationships, anger, substance abuse, and social support, with a mean of 5.2 concerns per veteran [85] – all factors that are potentially relevant in the context of bariatric surgery. For example, among veterans who had bariatric surgery, the median prevalence of post-traumatic stress disorder is 24% as compared with 1% among bariatric surgery samples overall, and substance abuse is 24% vs 2–7%, respectively [86]. Depression and binge eating have also been found to be relatively common among bariatric surgery patients who are veterans [26•]. Evidence suggests a positive impact on mental health among veterans following surgery, with decreased antidepressant use and therapy for depression [87]. Nonetheless, veterans may benefit from post-surgery follow-up to address psychosocial concerns that are particularly salient to this group, and from ensuring the development of comprehensive post-surgery care delivered through the Veterans Health Administration [88•].

Overall, it is important to appreciate that bariatric surgery patients are a diverse and growing population composed of many subgroups. A wide range of biopsychosocial factors may influence post-surgery outcomes. Moreover, post-surgery concerns may evolve over time as patients progress through the period of initial weight loss toward longer-term weight stabilization, or for some, weight regain.

Post-surgery Psychosocial Interventions

Most psychosocial interventions following bariatric surgery have reported weight status as the primary outcome. A systematic review and meta-analysis of post-surgery psychosocial interventions identified two randomized and seven nonrandomized trials [38]. Among 1119 patients, both psychotherapeutic interventions and support groups were associated with greater weight loss 1 to 3 years post-surgery. However, this review did not evaluate the effect of these interventions on psychosocial outcomes, and the relatively small number of heterogeneous post-surgery psychosocial interventions with small samples limits the ability to draw firm conclusions.

Some post-surgery interventions have targeted post-surgery eating behaviors specifically. For example, a 10-week cognitive behavioral mindfulness group intervention for the treatment of binge eating was evaluated among seven bariatric surgery patients [89]. Results showed significant improvement in binge eating symptoms, depressive symptoms, and emotion regulation skills, as well as increased motivation to change maladaptive eating behavior. Investigators in Sweden evaluated acceptance and commitment therapy (ACT), which incorporates mindfulness, for the treatment of emotional eating in bariatric surgery patients [90]. Patients ($n = 39$) were randomized to treatment as usual or 6 weeks of ACT, delivered as two face-to-face sessions and support via an Internet application. Participants in the ACT condition relative to those in the comparison group reported significant improvements in eating disordered behaviors, body dissatisfaction, quality of life, and acceptance of weight related-thoughts and feelings.

Other research has focused on weight regain specifically. In a pilot study of a 10-week acceptance-based behavioral intervention [91], regain was stopped or reversed among 11 bariatric surgery patients. Outcomes included significant improvements in eating- and acceptance-related variables, disinhibition and internal responsivity to food cues, as well as moderate emotional eating, grazing, and binge eating behaviors. Data from a separate study support the feasibility and acceptability of acceptance-based behavioral intervention delivered entirely remotely as 10 weekly online modules plus 5 coaching telephone calls [92].

Investigators have also evaluated a group behavioral intervention utilizing cognitive behavioral therapy (CBT) and dialectical behavior therapy (DBT) techniques adapted for weight regain bariatric surgery patients [93]. In this study, 6-week group behavioral intervention lasting 1 h per week was administered to patients ($n = 28$) experiencing weight regain. Weight decreased, as did grazing and subjective binge eating episodes; depressive symptoms decreased among individuals who completed treatment. Thus, preliminary findings indicate that post-surgery interventions have stopped or reversed weight regain; have a positive impact on a range of outcomes including binge and emotional eating; and can be delivered remotely utilizing Internet and telephone.

Data confirming the utility of technology in delivery of post-surgery information are key given that many patients travel significant distances to surgical centers, and distal follow-up is often the only feasible way to offer intervention. Conducting assessment and intervention remotely may also mitigate time constraints and financial burden [94]. An uncontrolled pilot study for Canadian patients 6-months post-surgery provides some preliminary evidence that CBT delivered remotely (by computer or telephone) was associated with improved symptoms of psychopathology, suggesting feasibility of this approach [95]. In a randomized trial currently underway in Portugal [96], investigators are evaluating an Internet-based program for longitudinal support of bariatric surgery patients that includes a psychoeducational CBT self-help manual, a weekly feedback messaging system, and interactive chat sessions with a psychologist. The team plans to evaluate the effect on weight maintenance, as well as its impact on promoting new eating behaviors, decreasing psychological distress, enhancing individual self-concept, and addressing other psychological outcomes. Results are not yet available, but will add to the small but promising, body of evidence about the impact of post-surgery interventions on psychosocial outcomes, delivered to bariatric surgery patients remotely.

Conclusions

Bariatric surgery has a positive overall impact on weight- and obesity-related comorbidities, as well as aspects of functional health, sexual functioning, body image, and mental health in the short-term. However, some patients experience psychosocial concerns following surgery including maladaptive eating, substance use disorders, suicide, lack of social support, and excess skin. The latest evidence suggests that subgroups of patients based on age, severity of obesity, history of ACEs, socioeconomic status, or veteran status can benefit from bariatric surgery, but may have unique post-surgery psychosocial concerns. In pilot studies, post-surgery behavioral interventions including CBT, ACT, and DBT have had a positive impact on psychosocial outcomes, particularly binge and emotional eating. Future research is needed to evaluate approaches to optimize long-term weight loss and psychosocial adjustment, which may be personalized on the basis of patient- or procedure-specific factors, particularly for the most common types of bariatric surgery currently in use.

Obesity is a chronic condition, and surgery does not end the need for ongoing care. We think that remote delivery of interventions in a stepped-care approach holds promise [97]. This would involve universal post-surgery follow-up for all bariatric surgery patients that can be intensified or modified based on individual psychosocial or medical needs. Patients, providers, and payors require information on how to implement effective systems for careful post-surgery monitoring and how to deliver evidence-supported interventions over time.

Compliance with Ethics Guidelines

Conflict of Interest Melissa A. Kalarchian declares that she has no conflict of interest.

Marsha D. Marcus has received compensation from Weight Watchers International, Inc., for serving on Scientific Advisory Boards.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

Papers of particular interest, published recently, have been highlighted as:
- Of importance

1. Garvey WT, Mechanick JI, Brett EM, Garber AJ, Hurley DL, Jastreboff AM, et al. American Association of Clinical Endocrinologists and American College of endocrinology comprehensive clinical practice guidelines for medical care of patients with obesity. Endocr Pract. 2016;22:1–203.
2. American College of Cardiology. American Heart Association task force on practice guidelines, Obesity Expert Panel, 2013. Expert panel report: guidelines (2013) for the management of overweight and obesity in adults. Obesity (Silver Spring). 2014;22:S41–410.
3. Maggard-Gibbons M, Maglione ML. Masha, Ewing B, Ruelaz a, Hu J, Li Z, et al. Bariatric surgery for weight loss and glycemic control in nonmorbidly obese adults with diabetes: a systematic review. JAMA. 2013;309:2250–61.
4. Dixon JB, Zimmet P, Alberti KG, Rubino F. International Diabetes Federation Taskforce on Epidemiology and Prevention. Bariatric surgery: an IDF statement for obese type 2 diabetes. Diabetic Med. 2011;28:628–42.
5. Courcoulas AP, Belle SH, Neiberg RH, Pierson SK, Eagleton JK, Kalarchian MA, et al. Three year outcomes of bariatric surgery vs. lifestyle intervention for type 2 diabetes mellitus treatment: a randomized trial. JAMA Surg. 2015;150:931–40.
6. Maggard MA, Shugarman LR, Suttorp M, Maglione M, Sugarmen HJ, Livingston EH, et al. Meta-analysis: surgical treatment of obesity. Ann Intern Med. 2005;142:547–59.
7. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, et al. Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004;292:1724–37.
8. Picot J, Jones J, Colquitt JL, Gospodarevskaya E, Loveman E. The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. Health Technol Assess. 2009;13:1–190.
9. Puzziferri N, Roshek TB, Mayo HG, Gallagher R, Belle SH, Livingston EH. Long-term follow-up after bariatric surgery: a systematic review. JAMA. 2014;312:934–42.
10. Courcoulas AP, King WC, Belle SH, Berk P, Flum DR, Garcia L, et al. Seven-year weight trajectories and health outcomes in the longitudinal assessment of bariatric surgery (LABS) study. JAMA Surg. 2018;153:427–34.
11. O'Brien PE, MacDonald L, Anderson M, Brennan L, Brown WA. Long-term outcomes after bariatric surgery: fifteen-year follow-up of adjustable gastric banding and a systematic review of the bariatric surgical literature. Ann Surg. 2013;257:87–94.
12. Colquitt JL, Pickett K, Loveman E, Frampton GK. Surgery for weight loss in adults. Cochrane Database of Syst Rev. 2014: CD003641.
13. Courcoulas AP, Christian NJ, Belle SH, Berk PD, Flum DR, Garcia L, et al. Weight change and health outcomes at 3 years after bariatric surgery among individuals with severe obesity. JAMA. 2013;310: 2416–25.
14. Karmali S, Brar B, Shi X, Sharma AM, de Gara C, Birch DW. Weight recidivism post-bariatric surgery: a systematic review. Obes Surg. 2013;23:1922–33.
15. Beckman LM, Beckman TR, Earthman CP. Changes in gastrointestinal hormones and leptin after roux-en-Y gastric bypass procedure: a review. J Am Diet Assoc. 2010;110:571–84.
16. Coulman KD, MacKichan F, Blazeby JM, Owen-Smith A. Patient experiences of outcomes of bariatric surgery: a systematic review and qualitative synthesis. Obes Res. 2017;18:547–59.
17. Lindekilde N, Gladstone BP, Lübeck M, Nielsen J, Clausen L, Vach W, et al. The impact of bariatric surgery on quality of life: a systematic review and meta-analysis. Obes Res. 2015;16:639–51.
18. Adil MT, Jain V, Rashid F, Al-taan O, Whitelaw D, Jambulingam P. Meta-analysis of the effect of bariatric surgery on physical function. Br J Surg. 2018;105:1107–18.
19. Sharples AJ, Cheruvu CVN. Systematic review and meta-analysis of occupational outcomes after bariatric surgery. Obes Surg. 2017;27:774–81.
20. Sarwer DB, Steffen KJ. Quality of life, body image and sexual functioning in bariatric surgery patients. Eur Eat Disord Rev. 2015;23:504–8.

21.• Ivezaj V, Grilo CM. The complexity of body image following bariatric surgery: a systematic review of the literature. Obes Res. 2018;19:1116–40 **This comprehensive literature review of body image as a multidimensional construct documented that eating pathology is reated to greater body image dissatisfaction following surgery. Notably, however, most studies do not investigate concerns related to excess skin and body contouring surgery**.

22.• Kolotkin RL, Kim J, Davidson LE, Crosby RD, Hunt SC, Adams TD. 12-year trajectory of health-related quality of life in gastric bypass patients versus comparison groups. Surg Obes Relat Dis. 2018;14:1359–65 **This prospective study evaluated changes in quality of life in bariatric surgery patients and 2 non-surgical comparsion groups. Improvements in weight-related and physical quality of life peaked at 2 years post-surgery, and remained improved relative to pre-surgery through 12 years following gastric bypass.**

23. White B, Doyle J, Colville S, Nicholls D, Viner RM, Christie D. Systematic review of psychological and social outcomes of adolescents undergoing bariatric surgery, and predictors of success. Clin Obes. 2015;5:312–24.

24. Angrisani L, Santonicola A, Iovino P, Vitiello A, Zundel N, Buchwald H, et al. Bariatric surgery and endoluminal procedures: IFSO worldwide survey 2014. Obes Surg. 2017;27:2279–89.

25. Ettleson MD, Lager CJ, Kraftson AT, Esfandiari NH, Oral AE. Roux-en-Y gastric bypass versus sleeve gastrectomy: risks and benefits. Minerva Chir. 2017;72:505–19.

26.• Dawes AJ, Maggard-Gibbons M, Maher AR, Booth MJ, Miake-Lye I, Beroes JM, et al. Mental health conditions among patients seeking and undergoing bariatric surgery: a meta-analysis. JAMA. 2016;315:150–63 **Mental health conditions are common among bariatric surgery patients, but their relationship to weight loss is inconsistent as reported in the literature. However, moderate quality evidence supports an assocation between bariatric surgery and lower rates of depression post-surgery.**

27. Rosenberger PH, Henderson KE, Grilo CM. Psychiatric disorder comorbidity and association with eating disorders in bariatric surgery patients: a cross-sectional study using structured interview-based diagnosis. J Clin Psychiatry. 2006;67:1080–5.

28. Mühlhans B, Horbach T, de Zwaan M. Psychiatric disorders in bariatric surgery candidates: a review of the literature and results of a German prebariatric surgery sample. Gen Hosp Psychiatry. 2009;31:414–21.

29. Mitchell JE, Selzer F, Kalarchian MA, Devlin MJ, Strain GW, Elder KA, et al. Psychopathology before surgery in the longitudinal assessment of bariatric Surgery-3 (LABS-3) psychosocial study. Surg Obes Relat Dis. 2012;8:533–41.

30. Mauri M, Ruccic P, Calderone A, Santini F, Oppo A, Romano A, et al. Axis I and II disorders and quality of life in bariatric surgery candidates. J Clin Psychiatry. 2008;69:295–301.

31. Kalarchian MA, Marcus MD, Levine MD, Courcoulas AP, Pilkonis PA, Ringham RM, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. Am J Psychiatry. 2007;164:328–34.

32. Faulconbridge LF, Bechtel CF. Depression and disordered eating in the obese person. Curr Obes Rep. 2014;3:127–36.

33. Hudson JI, Hiripi E, Pope HG Jr, Kessler RC. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol Psychiatry. 2007;61:348–58.

34. Kalarchian MA, King WC, Devlin MJ, Marcus MD, Garcia L, Chen J-Y, et al. Psychiatric disorders and weight change in a prospective study of bariatric surgery patients: a 3-year follow-up. Psychosom Med. 2016;78:373–81.

35. Mitchell JE, King WC, Chen J-Y, Devlin MJ, Flum D, Garcia L, et al. Course of depressive symptoms and treatment in the longitudinal assessment of bariatric surgery (LABS-2) study. Obesity. 2014;22:1799–806.

36. Delvin MJ, King WC, Kalarchian MA, White GE, Marcus MD, Garcia L, et al. Eating pathology and experience and weight loss in a prospective study of bariatric surgery patients: 3-year follow-up. Int J Eat Disorder. 2016;49:1058–67.

37. Meany G, Conceição E, Mitchell JE. Binge eating, binge eating disorder and loss of control eating: effects on weight outcomes after bariatric surgery. Eur Eat Disord Rev. 2014;22:87–91.

38. Beck N, Johannsen M, Støving R, Mehlsen M, Zachariae R. Do postoperative psychotherapeutic interventions and support groups influence weight loss following bariatric surgery? A systematic review and meta-analysis of randomized and nonrandomized trials. Obes Surg. 2012;22:1790–7.

39. Conceição EM, Mitchell JE, Engel SG, Machado PPP, Lancaster K, Wonderlich SA. What is "grazing"? Reviewing its definition, frequency, clinical characteristics, and impact on bariatric surgery outcomes, and proposing a standardized definition. Surg Obes Relat Dis. 2014;10:973–82.

40. Pizato N, Botelho PB, Gonçalves VSS, Dutra ES, de Carvalho KMB. Effect of grazing behavior on weight regain post-bariatric surgery: a systematic review. Nutrients. 2017;9:1322.

41.• Li L, Wu L-T. Substance use after bariatric surgery: a review. J Psychiatr Res. 2016;76:16–29 **This review of substance use following surgery (alcohol, tobacco, and illicit or non-medical drugs) doucumented that a considerable proportion of patients use substances post-surgery. Although results from prospective studies are limited, individuals with a history of substance use may be at risk for post-surgery use, which has been assocaited with medical complications and psychological problems.**

42. King WC, Chen J-Y, Courcoulas AP, Dakin GF, Engel SG, Flum DR, et al. Alcohol and other substance use after bariatric surgery: prospective evidence from a U.S. multicenter cohort study. Surg Obes Relat Dis. 2017;13:1392–402.

43. Steffen KJ, Engel SG, Wonderlich JA, Pollert GA, Sondag C. Alcohol and other addictive disorders following bariatric surgery: prevalence, risk factors and possible etiologies. Eur Eat Disord Rev. 2015;23:442–50.

44. Spadola CE, Wagner EF, Dillon FR, Trepka MJ, de La Cruz Munoz N, Messiah SE. Alcohol and drug use among post-operative bariatric patients: a systematic review of the emerging research and its implications. Alcohol Clin Exp Res. 2015;39:1582–601.

45. McPhee J, Freidl EK, Eicher J, Zitsman JL, Devlin MJ, Hildebrandt T, et al. Suicidal ideation and behaviors among adolescents receiving bariatric surgery: a case-control study. Eur Eat Disord Rev. 2015;23:517–23.

46.• Castaneda D, Popov VB, Wander P, Thompson CC. Risk of suicide and self-harm is increased after bariatric surgery—a systematic review and meta-analysis. Obes Surg. 2019;29(1):322–33 **This review found that risk for self-harm/suicide attempt is higher among bariatric surgery patients compared to age-, sex-, and BMI-matched controls. The authors highlight the pre- and post-surgery psychosocial, pharmacokinetic, physiologic, and medical factors that may be involved.**

47. Bhatti JA, Nathens AB, Thiruchelvam D, Grantcharov T, Goldstein BI, Redelmeier DA. Self-harm emergencies after bariatric surgery: a poplulaiton-based cohort study. JAMA Surg. 2016;151:226–32.

48. Neovius M, Bruze G, Jacobson P, Sjöholm K, Johansson K, Granath F, et al. Risk of suicide and non-fatal self-harm after bariatric surgery: results from two matched cohort studies. Lancet Diabetes Endocrinol. 2018;6:197–207.

49. Mitchell JE, Crosby R, de Zwaan M, Engel S, Roerig J, Steffen K, et al. Possible risk factors for increased suicide following bariatric surgery. Obesity (Silver Spring, MD). 2013;21:665–72.

50. Livhits M, Mercado C, Yermilov I, Parikh JA, Dutson E, Mehran A, et al. Is social support associated with greater weight loss after bariatric surgery?: a systematic review. Obes Res. 2011;12:142–8.

51. Lent MR, Bailey-Davis L, Irving BA, Wood GC, Cook AM, Hirsch AG, et al. Bariatric surgery patients and their families: health, physical activity, and social support. Obes Surg. 2016;26:2981–8.
52. Wallwork A, Tremblay L, Chi M, Sockalingam S. Exploring partners' experiences in living with patients who undergo bariatric surgery. Obes Surg. 2017;27:1973–81.
53. Pories ML, Hodgson J, Rose MA, Pender J, Sira N, Swanson M. Following bariatric surgery: an exploration of the couples' experience. Obes Surg. 2016;26:54–60.
54. Ferriby M, Pratt KJ, Balk E, Feister K, Noria S, Needleman B. Marriage and weight loss surgery: a narrative review of patient and spousal outcomes. Obes Surg. 2015;25:2436–42.
55.• Bruze G, Holmin TE, Peltonen M, Ottosson J, Sjöholm K, Näslund I, et al. Associations of bariatric surgery with changes in interpersonal relationship status: results from 2 Swedish cohort studies. JAMA Surg. 2018;153:654–61 **In two large Swedish cohorts with long-term follow-up, baritric surgery was associated with changes in relationship status. Specifically, surgery was associed with increased incidence of divorce/separation for those who were married, as well as increased incidence of marriage and new relationships for those who were single.**
56. Wedin S, Madan A, Correll J, Crowley N, Malcolm R, Karl Byrne T, et al. Emotional eating, marital status and history of physical abuse predict 2-year weight loss in weight loss surgery patients. Eat Behav. 2014;15:619–24.
57. Mehta A, Hutfless S, Blair AB, Karcher M, Nasatka S, Schweitzer M, et al. Outcomes of partnered individuals undergoing bariatric surgery together: a single institution case series. Obes Surg. 2017;27:2207–10.
58.• Baillot A, Brais-Dussault E, Bastin A, Cyr C, Brunet J, Aimé A, et al. What is known about the correlates and impact of excess skin after bariatric surgery: a scoping review. Obes Surg. 2017;27:2488–98 **Women report more excess skin and greater inconveniences related to excess skin than men following surgery. Although excess skin may adversely impact physical and psychosocial functionig, as well as activites of daily living, it has not been possible to determine which individuals are at risk.**
59. Ramalho S, Bastos AP, Silva C, Vaz AR, Brandão I, Machado PPP, et al. Excessive skin and sexual function: relationship with psychological variables and weight regain in women after bariatric surgery. Obes Surg. 2015;25:1149–54.
60. Gilmartin J, Bath-Hextall F, Maclean J, Stanton W, Soldin M. Quality of life among adults following bariatric and body contouring surgery: a systematic review. JBI Database System Rev Implement Rep. 2016;14:240–70.
61. Azin A, Zhou C, Jackson T, Cassin S, Sockalingam S, Hawa R. Body contouring surgery after bariatric surgery: a study of cost as a barrier and impact on psychological well-being. Plast Reconstr Surg. 2014;133:776e–82e.
62. Childerhose JE, Alsamawi A, Mehta T, Smith JE, Woolford S, Tarini BA. Adolescent bariatric surgery: a systematic review of recommendation documents. Surg Obes Relat Dis. 2017;13:1768–79.
63. Shoar S, Mahmoudzadeh H, Naderan M, Bagheri-Hariri S, Wong C, Parizi AS, et al. Long-term outcome of bariatric surgery in morbidly obese adolescents: a systematic review and meta-analysis of 950 patients with a minimum of 3 years follow-up. Obes Surg. 2017;27:3110–7.
64. Paulus GF, de Vaan LEG, Verdam FJ, Bouvy ND, Ambergen TAW, van Heurn LWE. Bariatric surgery in morbidly obese adolescents: a systematic review and meta-analysis. Obes Surg. 2015;25:860–78.
65. Giordano S, Victorzon M. Bariatric surgery in elderly patients: a systematic review. Clin Interv Aging. 2015;10:1627–35.
66. Caceres BA. Policy implications of a literature review of bariatric surgery in older adults. J Gerontol Nurs. 2014;40:14–9.
67. Han TS, Wu FCW, Lean MEJ. Obesity and weight management in the elderly: a focus on men. Best Pract Res Clin Endocrinol Metab. 2013;27:509–25.
68. Anda RF, Felitti VJ, Bremner JD, Walker JD, Whitfield C, Perry BD, et al. The enduring effects of abuse and related adverse experiences in childhood: a convergence of evidence from neurobiology and epidemiology. Eur Arch Psychiatry Clin Neurosci. 2006;256:174–86.
69. Alciati A, Gesuele F, Rizzi A, Sarzi-Puttini P, Foschi D. Childhood parental loss and bipolar spectrum in obese bariatric surgery candidates. Int J Psychiatry Med. 2011;41:155–71.
70. Wildes JE, Kalarchian MA, Marcus MD, Levine MD, Courcoulas AP. Childhood maltreatment and psychiatric morbidity in bariatric surgery candidates. Obes Surg. 2008;18:306–13.
71. Lodhia NA, Rosas US, Moore M, Glaseroff A, Azagury D, Rivas H, et al. Do adverse childhood experiences affect surgical weight loss outcomes? J Gastrointest Surg. 2015;19:993–8.
72. Hulme PA, McBride CL, Kupzyk KA, French JA. Pilot study on childhood sexual abuse, diurnal cortisol secretion, and weight loss in bariatric surgery patients. J Child Sex Abuse. 2015;24:385–400.
73. Holgerson AA, Clark MM, Ames GE, Collazo-Clavell ML, Kellogg TA, Graszer KM, et al. Association of adverse childhood experiences and food addiction to bariatric surgery completion and weight loss outcome. Obes Surg. 2018;28:3386–92.
74. Peterson K, Anderson J, Boundy E, Ferguson L, Erickson K. Rapid evidence review of bariatric surgery in super obesity (BMI ≥ 50 kg/m(2)). J Gen Intern Med. 2017;32:56–64.
75. Daigle CR, Andalib A, Corcelles R, Cetin D, Schauer PR, Brethauer SA. Bariatric and metabolic outcomes in the super-obese elderly. Surg Obes Relat Dis. 2016;12:132–7.
76. Hennings DL, Baimas-George M, Al-Quarayshi Z, Moore R, Kandil E, DuCoin CG. The inequity of bariatric surgery: publicly insured patients undergo lower rates of bariatric surgery with worse outcomes. Obes Surg. 2018;28:44–51.
77.• Takemoto E, Andrea SB, Wolfe BM, Nagel CL, Boone-Heinonen J. Weighing in on bariatric surgery: effectiveness among Medicaid beneficiaries—limited evidence and future research needs. Obesity. 2018;26:463–73 **This systematic review documented that patients with Medicaid experience weight loss similar to patients with commercial insurance through 2-years post-surgery. However, future research is needed to understand baseline differences in health between the groups, as well as how they contribute to higher short-term health care utilization and mortaility among Medicaid beneficiaries.**
78. Johnson LP, Asigbee FM, Crowell R, Negrini A. Pre-surgical, surgical and post-surgical experiences of weight loss surgery patients: a closer look at social determinants of health. Clin Obes. 2018;8:265–74.
79. Snyder AG. Psychological assessment of the patient undergoing bariatric surgery. Ochsner J. 2009;9:144–8.
80. Kouidrat Y, Amad A, Stubbs B, Moore S, Gaughran F. Surgical management of obesity among people with schizophrenia and bipolar disorder: a systematic review of outcomes and recommendations for future research. Obes Surg. 2017;27:1889–95.
81. Cazzo E. M.A. G, Utrini MP, Chaim FDM, Cândido EC, Jarolavsky LBDS, et al. bariatric surgery in individuals with severe cognitive impairment: report of two cases. Sao Paulo Med J. 2018;136:84–8.
82. Hamad GG, Helsel JC, Perel JM, Kozak GM, McShea MC, Hughes C, et al. The effect of gastric bypass on the pharmacokinetics of serotonin reuptake inhibitors. Am J Psychiatry. 2012;169:256–63.
83. Elliott JP, Gray EL, Yu J, Kalarchian MA. Medication use among patients prior to bariatric surgery. Bariatr Surg Pract Patient Care. 2015;10:105–9.
84. Arterburn DE, Olsen MK, Smith VA, Livingston EH, Van Scoyoc L, Yancy WS, et al. Association between bariatric surgery and long-term survival. JAMA. 2015;313:62–70.

85. Strong J, Ray K, Findley PA, Torres R, Pickett L, Byrne RJ. Psychosocial concerns of veterans of Operation Enduring Freedom/Operation Iraqi Freedom. Health Soc Work. 2014;39: 17–24.
86. Gibbons MM, Maher AR, Dawes AJ, Booth MS, Miake-Lye IM, Beroes JM, et al. Mental health assessment and psychosocial interventions for bariatric surgery [Internet]. Washington (DC): Department of Veterans Affairs (US); 2014. VA Evidence-based Synthesis Program Reports
87. Rutledge T, Braden AL, Woods G, Herbst KL, Groesz LM, Savu M. Five-year changes in psychiatric treatment status and weight-related comorbidities following bariatric surgery in a veteran population. Obes Surg. 2012;22:1734–41.
88.• Funk LM, Gunnar W, Dominitz JA, Eisenberg D, Frayne S, Maggard-Gibbons M, et al. A health services research agenda for bariatric surgery within the Veterans Health Administration. J Gen Intern Med. 2017;32:65–9 **The Veterans Health Adminstration held a conference to develop a research agenda for population-based weight management for veterans. Priority evidence gaps identified by the bariatric surgery work group included (but were not limited to) long-term impact on mental health and substance abuse, as well as health services interventions to optimize outcomes.**
89. Leahey TM, Crowther JH, Irwin SR. A cognitive-behavioral mindfulness group therapy intervention for the treatment of binge eating in bariatric surgery patients. Cogn Behav Pract. 2008;15:364–75.
90. Weineland S, Arvidsson D, Kakoulidis TP, Dahl J. Acceptance and commitment therapy for bariatric surgery patients, a pilot RCT. Obes Res Clin Pract. 2012;6:e21–30.
91. Bradley LE, Forman EM, Kerrigan SG, Butryn ML, Herbert JD, Sarwer DB. A pilot study of an acceptance-based behavioral intervention for weight regain after bariatric surgery. Obes Surg. 2016;26:2433–41.
92. Bradley LE, Forman EM, Kerrigan SG, Goldstein SP, Butryn ML, Thomas JG, et al. Project HELP: a remotely delivered behavioral intervention for weight regain after bariatric surgery. Obes Surg. 2017;27:586–98.
93. Himes SM, Grothe KB, Clark MM, Swain JM, Collazo-Clavell ML, Sarr MG. Stop regain: a pilot psychological intervention for bariatric patients experiencing weight regain. Obes Surg. 2015;25: 922–7.
94. Bradley LE, Thomas JG, Hood MM, Corsica JA, Kelly MC, Sarwer DB. Remote assessments and behavioral interventions in post-bariatric surgery patients. Surg Obes Relat Dis. 2018;14: 1632–44.
95. Sockalingam S, Cassin SE, Wnuk S, Du C, Jackson T, Hawa R, et al. A pilot study on telephone cognitive behavioral therapy for patients six-months post-bariatric surgery. Obes Surg. 2017;27: 670–5.
96. Conceição EM, Machado PPP, Vaz AR, Pinto-Bastos A, Ramalho S, Silva C, et al. APOLO-Bari, an internet-based program for longitudinal support of bariatric surgery patients: study protocol for a randomized controlled trial. Trials. 2016;17:114.
97. Kalarchian MA, Marcus MD. The case for stepped care for weight management after bariatric surgery. Surg Obes Relat Dis. 2018;14: 112–6.