

When Does The Honeymoon End? Patients' Perspective on Post-Operative Success Following Bariatric Surgery

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Abstract

Background: Bariatric surgery offers multiple benefits above and beyond weight loss including improved cardiovascular health and psychological well-being. Despite well documented health and psychosocial benefits within the first-year post-surgery, there is less known about the longevity of these outcomes. We explore whether time since bariatric surgery attenuates psychological well-being.

Methods: Patients at an accredited Bariatric Program were surveyed to determine whether changes in psychological well-being differ in patients less than or greater than three years post-operatively.

Results: Patients who underwent surgery more than 3 years prior reported significantly greater percent total weight loss than those who underwent surgery recently ($37.9\% \pm 10.6\%$ vs. $32.4\% \pm 11.4\%$, $p < .001$). There was no significant difference in post-operative weight regain, self-esteem, depression or health related quality of life based on time since surgery.

Conclusion: While both groups endorsed weight regain, patients who underwent surgery more than 3 years prior had a significantly greater total percent weight loss as well as a significantly lower current weight than those who underwent surgery more recently. Although previous literature demonstrates a weight-mood relationship, we did not identify a relationship between health-related quality of life indicators, time since bariatric surgery and weight loss achievement.

Keywords: Bariatric surgery; Psychological well-being; Weight loss outcomes

Introduction

Bariatric surgery is the most effective long-term treatment for obesity, promoting weight loss as well as enhancing psychological well-being and improving obesity-related co-morbidities such as diabetes, hypertension, and dyslipidaemia [1-5]. Studies have demonstrated that patients may lose up to 77% of excess weight within the first year post-operatively with total excess weight loss reaching a plateau at five years [6]. The effectiveness of weight loss and improvements in health-related quality of life, including reduced pain, enhanced performance status and comorbid disease remission are well documented during the first two years post-surgery. However, more recent research has documented weight fluctuation thereafter and variable maintenance of initial physical benefits. [4, 5, 7-10]

The psychological experience post-surgery centers on themes of identity, body image and mood; however, there is less known about the longevity of these psychological outcomes compared to physical outcomes [11-14]. Variables associated with psychological well-being, such as anxiety and depression, have received significant attention in the literature, with weight loss surgery linked to reduced psychological distress [9, 11, 15]. Emerging data has demonstrated dichotomies in the patient experience with persistent psychological distress despite significant weight loss and improvement in comorbidities [12,13,16]. Weight recidivism is a common phenomenon following bariatric surgery with up to 50% of patients experiencing long-term weight regains and a significant variance in weight change following surgery [4, 17]. The literature has demonstrated that pre-operative psychological distress does not predict postoperative weight loss, instead self-efficacy for behavior changes following surgery is necessary for sustained weight loss and may also be linked to overall health related quality of life [12, 16, 18, 19].

The literature has shown that peak improvements in health-

related quality of life occur in the first year of weight loss and gradually decline throughout the next 5 years [8, 9]. While gleaned benefits are largely maintained, previous studies have demonstrated that that it is the transition to maintenance, three and four-years post-op, that is associated with the most significant increase in endorsed anxiety and depression, and a decline in self-esteem compared to initial post-operative psychosocial assessment [8,20,21]. Variability in physical and psychological outcomes post bariatric surgery suggests surgery itself is not an end but instead a beginning that requires more surveillance and guidance to bolster initial benefits.

Much of the literature exploring mental health implications of bariatric surgery do not extend beyond the first three years following surgery, thus the present study aims to evaluate whether time since bariatric surgery attenuates psychological well-being in patients up to five years post-surgery. We secondarily sought to determine if time since surgery correlates with a patient's achievement of their weight loss goals, their reported total percent weight loss and the incidence of weight regain.

Material and methods

Adult patients who underwent bariatric surgery at an accredited

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Bariatric Centre between 2011 and 2017 (n=591) were invited to participate within this study. We included patients who underwent primary or revision bariatric procedures including Roux-en-Y gastric bypass, sleeve gastrectomy and adjustable gastric band. Patients were excluded from this study if the indication for the surgical procedure was not for weight loss (e.g. gastrectomy related to GI cancer). A retrospective survey was developed to assess post-operative psychological well-being and health-related quality of life. This study received a waiver of consent through the IRB and eligible participants were sent a cover letter via email with a link requesting the completion of an online survey via Qualtrics Survey Software. Patients who failed to respond after 1 week were sent a reminder via email to complete the survey.

The administered survey was designed to assess relevant postoperative challenges, including post-operative complications, nutritional deficiencies, weight regain and unexpected obstacles related to physical or psychological health, documented in the literature as well as expert opinion [22,23]. The survey was designed to assess patients' post-operative experience, as well as to determine whether time since bariatric surgery attenuates psychological well-being based on the patient's perspective of relative success post-operatively. Previous studies have demonstrated that the transition to maintenance, three to four-years post-op, marks an increase in psychological distress compared to initial post-operative psychosocial assessment [8,20,21]. Based on this, we compared patients who had undergone surgery in the last 36 months to those 37 months and beyond. Questions targeted self-reported weight loss outcomes, postoperative satisfaction, challenges with maintaining weight loss, as well as interest in and preferences for postoperative programs to promote sustainable weight loss. The electronic medical record was used to collect patient demographic information and clinical data. Variables of interest included patients' body mass index (BMI), type of surgery and date of surgery.

Instruments

Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a widely used instrument for the screening of depression in primary care populations. It consists of 9 questions assessing the patient's mental health experience over the last 2 weeks with possible scores ranging from 0-27 and scale scores assessing the severity of depressive symptoms (minimal to severe). The PHQ-9 has proven to be a valid instrument and has been used in screening for depressive symptoms in bariatric populations [24,25].

Health related quality of life (HRQOL) was measured with the 12 item Short-Form Health Survey (SF-12). The SF-12 is a valid and reliable short version of an instrument used in the Medical Outcomes Study (MOS), which was a multi-year study of patients with chronic conditions and provides data regarding mental (MCS) and physical (PCS) functioning that moderates overall HRQOL [26,27]. We chose to utilize the abbreviated form, which has been shown to be highly correlated with SF-36 and is a more sensitive measure of differences in quality of life associated with BMI in obese populations, in an effort to optimize survey participation rates by reducing survey burden [28,29].

Self-esteem was assessed with the Rosenberg Self-Esteem Scale (RSE). It was originally developed to measure global feelings of self-worth and includes 10 face valid items with sum scores ranging from 0-30 and scores below 15 suggesting low self-esteem [30]. Reliability and validity have been well evaluated internationally and it is the most widely used measure for global self-esteem; however, it has not been validated in bariatric surgery patients [31].

Data Analysis

The Medical College of Wisconsin Institutional Review Board (Milwaukee, Wisconsin) approved this study. Data was analysed using SPSS, version 21 (IBM corp.). Categorical data were analysed using Chi-square tests and continuous data were analysed using independent samples t-tests. A Wilcoxon rank-sum test was used for percent weight regain and lowest post-operative weight. Percent total weight loss regained was calculated using the following equation $1 - ((\text{start} - \text{current}) / (\text{start} - \text{lowest})) * 100 = \text{percent total WL regained}$. Categorical data is represented as n (%), while continuous data is represented as mean (\pm) standard deviation. A p-value of <0.05 was considered statistically significant for all analyses.

Results

Of the 591 patients surveyed, 183 responses were received, with a response rate of 30.9%. There were no significant differences between responders and non-responders on an analysis of variance for gender ($p=0.47$). The type of surgery performed was significantly different between groups with non-responders more likely to have undergone a laparoscopic sleeve gastrectomy ($p=0.02$). There was a total of 19 (10.4%) patients with revisional procedures (e.g. band removal, or conversion from sleeve gastrectomy to Roux-en-Y gastric bypass), 88 (48.1%) patients who underwent Roux-en-Y gastric bypass (LRYGB), 74 (40.4%) patients who underwent laparoscopic sleeve gastrectomy (LSG) and 2 (1.1%) patients with laparoscopic adjustable gastric band (LAGB) placement (Table 1). There were no significant demographic differences between responders who underwent primary surgery vs. revisional surgery. The 183 responders were divided into two groups based on time since surgery using a cut off of 36 months. The first group had bariatric surgery within 0-36 months ($n=87$, mean 25.3 ± 9.3 months) and the second group had bariatric surgery between 37-60 months ($n=96$, mean 56.5 ± 10.4 months). The number of patients who underwent a revisional procedure was not significantly different between groups ($p=0.33$). Of the 183 responders, the sample was predominately female (84.2%), Caucasian (80.3%), and currently married (55.7%). There were no significant differences in the age, sex, education, employment status, or insurance status between groups (Table 1).

Weight Loss

Self-reported weight change between groups is summarized. Patients who were more than 3 years from bariatric surgery demonstrated a significantly greater percent total weight loss ($37.9\% \pm 10.6\%$ vs. $32.4\% \pm 11.4\%$, $p < 0.001$) (Table 2). These patients also reported a significantly lower current weight (93.5 ± 20.8 kg vs. 100.1 ± 25.9 kg, $p=0.03$). There was no significant difference between groups regarding patients who reported post-operative weight regain. Those undergoing surgery in the past 3 years reported $17.0\% \pm 32.3\%$ from their lowest weight and those 3 or more years out from surgery reported $23.7\% \pm 22.3\%$ from their lowest weight ($p=0.1$). There was no significant difference in weight regain based on surgery type ($p=0.25$).

Psychological Well-being

There was no statistically significant difference between groups in self-esteem, as measured by the Rosenberg Self Esteem Scale, or in depressive symptoms, as measured by the PHQ-9 (Table 3). The mean PHQ-9 sample score for our entire cohort was 6.3 indicating mild depressive symptoms. The mean Rosenberg Self-esteem score for our sample was 15.7 which is within normal range. There was a significant

Table 1: Characteristics of post-operative bariatric survey respondents based on time since surgery.

Demographics	0-36 months (n=87)	37+ months (n=96)	p-value
Age	2 (2.3%)	0 (0.0%)	0.75
18-24	4 (4.6%)	10 (10.4%)	
25-34	17 (19.5%)	17 (17.7%)	
35-44	30 (34.5%)	25 (26.0%)	
45-54	22 (25.3%)	28 (29.2%)	
55-64	12 (13.8%)	16 (16.7%)	
65 and above			
Sex- Female	74 (85.1%)	80 (83.3%)	0.75
Ethnicity			0.18
White	64 (73.6%)	83 (86.5%)	
Black or African American	16 (18.4%)	9 (9.4%)	
American Indian/Alaska Native	1 (1.1%)	0 (0.0%)	
Asian	1 (1.1%)	0 (0%)	
Other	5 (5.7%)	4 (4.2%)	
Education			0.38
Did Not Complete High School	1 (1.1%)	0 (0%)	
High School/GED	15 (17.2%)	14 (14.6%)	
Some College	32 (36.8%)	45 (46.9%)	
Bachelor's Degree	21 (24.1%)	25 (26.0%)	
Master's Degree	9 (10.3%)	8 (8.3%)	
Advanced Graduate Work	9 (10.3%)	4 (4.2%)	
Marital Status			0.14
Currently Married	43 (49.4%)	59 (61.5%)	
Widowed	5 (5.7%)	2 (2.1%)	
Divorced	19 (21.8%)	19 (19.8%)	
Separated	2 (2.3%)	1 (1.0%)	
Never Married	18 (20.7%)	15 (15.6%)	
Employment Status			0.62
Student	3 (3.4%)	1 (1.0%)	
Self-Employed	4 (4.6%)	8 (8.3%)	
Retired	15 (17.2%)	17 (17.7%)	
Unable to Work	13 (14.9%)	8 (8.3%)	
Employed for Wages	42 (48.3%)	59 (61.5%)	
Homemaker	7 (8.0%)	1 (1.0%)	
Unemployed	3 (3.4%)	2 (2.1%)	
Current Insurance Status			0.12
Employer-Based	48 (55.2%)	61 (63.5%)	
Self-Pay	2 (2.3%)	5 (5.2%)	
Medicare	27 (31.0%)	22 (22.9%)	
Medicaid	10 (11.5%)	8 (8.3%)	
Type of Bariatric Surgery			0.03
Roux-en-Y Gastric Bypass	31 (35.6%)	57 (59.4%)	
Sleeve Gastrectomy	45 (51.7%)	29 (30.2%)	
Adjustable Gastric Band	0 (0.0%)	2 (2.1%)	
Revisions	11 (12.6%)	8 (8.3%)	

Table 2: Patient reported weight change based on time since surgery.

	Months Since Bariatric Surgery		p-value
	0-36 Months n=87	37+ Months n=96	
Starting Mean Weight (kg)	133.7 ± 30.1	129.4 ± 23.7	0.3
Percent Total Weight Loss (lowest)	32.4% ± 11.4%	37.9% ± 10.6%	<0.001
Current Weight (kg)	100.1 ± 25.9	93.5 ± 20.8	0.03
Percent Total Weight Loss Regained	17.0% ± 32.3%	23.7% ± 22.3%	0.07

difference in self-esteem based on surgery type (LRYGB 16.26 ± 1.94, LSG 15.4 ± 2.17, LAGB 16.3 ± 1.41, revisions 14.68 ± 2.94, p=0.01) with the highest self-esteem scores in those who had undergone LRYGB or LAGB. Table 3 compares the impact of time since surgery on patient

recalled weight loss, weight regain and measures of quality of life. While we found patients in the 37+ months out from surgery group reportedly weighed less than those within three years of surgery, there was not a significant difference between groups of patients more or less

than 3 years post-surgery in weight regain psychological measures of self-esteem or depressive symptoms.

Health Related Quality of Life

There was no statistically significant difference between groups in quality-of-life scores (Table 3). There was a significant difference in health-related quality of life based on surgery type (Table 4). Of note, there was no difference within the time groups between PCS and MCS scores (0-36 months -2.3 ± 14.5 , $p=0.16$ vs 37+ months 1.6 ± 17.1 , $p=0.36$) demonstrating that neither physical nor mental components of health-related quality of life were more profound based on time since surgery. We found a negative correlation between PCS and MCS with PHQ-9 scores (-0.38 , $p<.0001$; -0.77 , $p<.0001$). PCS and MCS were also found to be significantly positively correlated with Rosenberg Self-esteem scores (0.39 , $p<.0001$; 0.35 , $p<.0001$).

Discussion

The aim of this study was to evaluate whether time since bariatric surgery attenuates psychological well-being in patients up to five years post-surgery. We secondarily sought to determine if time since surgery correlates with a patient's reported achievement of their weight loss goals, their total percent weight loss and the incidence of weight regain. In this sample, participants who were more than 3 years post-surgery did not differ from those who had surgery within the past 3 years on measures of depression, self-esteem, and health-related quality of life which may suggest that psychological well-being does not attenuate over time. Overall, most patients reported satisfaction with their bariatric surgery outcomes. In this study, there was no significant difference between whether patients felt they had met their weight loss goal, overall patient satisfaction, or patient reported post-operative weight regain when evaluated based on time since surgery. While our results are only patient reported, they contrasted from the prevalence of weight recidivism that is routinely documented in the literature while documenting stable levels of health-related quality of life [4, 17,20].

Focus on durability of benefits gleaned from weight loss surgery is gaining more traction in research with literature suggesting that between 20-30% of patients fail to reach their weight loss target and most report that once obtained, nadir excess weight lost is sustained for only a few short months [2,3,9,11,20,32,33]. With rapid weight loss occurring within the first 24 months post-surgery, psychological ramifications of weight regain including guilt, shame and anxiety are more prevalent in patients entering the maintenance phase, thus we expected patients greater than 3 years post-surgery to endorse greater emotional distress [9,15,32] In our sample, the symptoms of depression, as measured by the PHQ-9 questionnaire, did not reach clinical relevance regardless of the time since surgery despite those further out from surgery reporting a greater percent total weight loss. Kalarchain, et al., found similar results in a 7-year prospective study where prevalence of having a mental disorder was significantly lower up to 5 years post-surgery and was not related to post-surgical weight loss outcomes [16].

While weight loss may ameliorate psychological distress initially, the necessary demands to maintain weight loss may temper the durability of the psychological gains. Previous studies have suggested that post-operative variables such as the degree of a patient's adjustment or any unrealistic expectations may play a role in the longevity of psychologic improvement after bariatric surgery [2,13,34,35]. Many studies have demonstrated a dose-response relationship between weight and mood [9,11,15,36]. With a significant number of patients experiencing weight regain after bariatric surgery, we investigated the incidence of weight regain, the ability to achieve one's goal weight loss and percent total weight loss while also assessing patient's psychologic well-being.

Our results demonstrated that those 3+ years out from surgery reported a greater percent of weight loss than those less than 3 years post-surgery. We found statistically significant correlations between depression, self-esteem and health-related quality of life. This highlighted a positive correlation between physical and mental functioning with self-esteem and a negative correlation between these

Table 3: Post-operative survey responses regarding preparation, goals, depression, self-esteem and health related quality of life based on time since surgery.

	Months Since Bariatric Surgery		p-value
	0-36 Months n=87	37+ Months n=96	
Did you meet your weight loss goal? "Yes"	30 (34.9%)	47 (49.0%)	0.06
Patient Health Questionnaire (PHQ-9) Depression Module	6.1 ± 5.2	6.3 ± 6.7	0.38
Rosenberg Self-Esteem Scale	15.5 ± 2.4	16.0 ± 2.0	0.14
"Do you like your new body?" "Yes"	58 (67.4%)	62 (64.6%)	0.64
"Do you exercise?" "Yes"	50 (58.1%)	59 (61.5%)	0.58
"Have you experienced weight re-gain?" "Yes"	47 (54.7%)	62 (64.6%)	0.15
"If you had to do it over again, would you undergo bariatric surgery?" "Yes"	78 (90.7%)	84 (87.5%)	0.47
Physical Component Score	45.8 ± 11.2	47.7 ± 11.3	0.28
Mental Component Score	48.1 ± 11.6	46.0 ± 13.1	0.29

PHQ-9 is a self-reported instrument used to screen, monitor, and measure the severity of depression. Higher scores indicate worsening depression severity. Rosenberg Self-Esteem Scale is a self-reported instrument used to evaluate a patient's self-esteem. Higher scores indicate better self-esteem. SF-12 is a self-reported instrument used to measure health related quality of life as it relates to a physical component score (PCS) and mental component score (MCS). Higher scores indicate better quality of life.

Table 4: Patient reported health-related quality of life based on surgery type.

	Surgery Type				p-value
	RYGB	SG	LGB	Revision	
PCS	48.1 ± 10.8	47.2 ± 10.9	49.8 ± 5.6	39.6 ± 13.4	0.03
MCS	47.8 ± 13.0	48.7 ± 10.5	53.9 ± 5.6	36.6 ± 12.6	0.0012

SF-12 is a self-reported instrument used to measure health related quality of life as it relates to a physical component score (PCS) and mental component score (MCS). Higher scores indicate better quality of life. RYGB=Roux-en-Y gastric bypass, SG= Sleeve gastrotomy, LGB= Laparoscopic gastric band.

tests and depression scores as indicated by the PHQ-9. These results suggest it is important to further explore the relationship between weight regain, health-related quality of life and psychological well-being. While pre-operative services are useful in producing momentum and motivation it leaves patients feeling unprepared and unsure how to manage their weight as surgical effects wane and life stressors resume [11,32,34,37]. Emerging research is suggesting post-operative psychological interventions targeting weight regain and elements of health-related quality of life improve compliance and enhance motivation [36,38]. Many potential post-op challenges identified span physical, emotional and social domains, it seems imperative to identify feasible interventions to promote adjustment to body changes, relationship and long-term expectations regarding lifestyle changes to mitigate weight regain.

There are limitations to this study. The non-controlled design of this study primarily utilized patient-reported data which is subjective and unable to be corroborated. The low response rate leaves our study with risk of non-responder bias. Of note, we have to consider that greater weight loss and achievement of weight loss goals is procedure related given those further out from surgery were more likely to have a RYGB. Additionally, we did not collect both pre and post-surgery health-related quality of life measures, which did not allow us to account for the baseline psychological state of our patients. This exploratory study is inherently subject to patient interpretation of their results and overall experience. We acknowledge that patients who perceived a more positive outcome may underestimate the psychological challenges following surgery, whereas those who perceived a less positive outcome may have exaggerated recall of their experience. Despite these limitations we feel that the patient's perspective on their outcome is an important measure to follow. Coulman et al described in a systematic review of the literature that patients' psychosocial outcomes after bariatric surgery are complicated and affected by the time since their procedure [39]. Despite well documented literature demonstrating the comorbidity resolution and weight loss associated with bariatric surgery psychosocial outcomes are less clear. The improvement in quality of life after bariatric surgery does not always correlate with a reduction in body mass index [40]. Studies investigating the qualitative outcomes of these patients are not without value and may allow for improved post-operative care of patients to improve long-term quality of life after bariatric surgery.

Conclusions

In this sample, participants who were more than 3 years post-surgery did not differ from those who had surgery within the past 3 years on measures of depression and self-esteem, which may suggest that psychological well-being, does not attenuate over time. Weight recidivism after bariatric surgery appears to be independent of the health-related quality of life in these patients. With much of the literature emphasizing pre-surgical screening, further studies into the post-operative assessment and monitoring of these patients would be beneficial to guide post-operative interventions to promote healthy body adjustment and sustainable lifestyle changes. In addition, further long-term studies assessing psychological underpinnings of weight and eating behaviours should be performed to assess the longevity of the effects of bariatric surgery and its potential psychological benefits over the course of a patient's life.

References

1. Stewart KE, O'Leary ME, Bean MK (2010) Back on Track Confronting post-surgical weight gain. *Bariat Nurs Surg Pat* 5:179-185.
2. Courcoulas AP, Christian NJ, O'Rourke RW (2015) Preoperative Factors and

Three Year Weight Change in the Longitudinal Assessment of Bariatric Surgery (LABS) Consortium. *Surg Obes Relat Dis* 11:1109-1118.

3. Maciejewski ML, Arterburn DE, Van Scoyoc L (2016) Bariatric Surgery and Long-term Durability of Weight Loss. *JAMA Surg* 15:1046-1055.
4. Karmali S, Brar B, Shi X, Sharma AM, de Gara C, et al (2013) Weight recidivism post-bariatric surgery: a systematic review. *Obes Surg* 23:1922-1933.
5. Courcoulas AP, King WC, Belle SH, Berk P, Flum DR et al (2018) Seven-Year Weight Trajectories and Health Outcomes in the Longitudinal Assessment of Bariatric Surgery (LABS) Study. *JAMA Surg* 153:427-434.
6. Wittgrove AC, Clark GW (2000) Laparoscopic gastric bypass, Roux-en-Y- 500 patients: technique and results, with 3-60 month follow-up. *Obes Surg* 10:233-239.
7. David LA, Sijercic I, Cassin SE (2020) Preoperative and post-operative psychosocial interventions for bariatric surgery patients: A systematic review. *Obes Rev* 21:e12926.
8. Burgmer R, Legenbauer T, Muller A, de Zwaan M, Fischer C et al (2014) Psychological outcome 4 years after restrictive bariatric surgery. *Obes Surg* 24:1670-1678.
9. Karlsson J, Taft C, Ryden A, Sjostrom L, Sullivan M (2007) Ten-year trends in health-related quality of life after surgical and conventional treatment for severe obesity: the SOS intervention study. *Int J Obesity* 31:1248-1261.
10. Shubeck S, Dimick J, Telem DA (2018) Long-term Outcomes Following Bariatric Surgery. *JAMA* 319.
11. Liu RH, Irwin JD (2017) Understanding the post-surgical bariatric experiences of patients two or more years after surgery. *Qual Life Res* 26:3157-3168.
12. Jumbe S, Hamlet C, Meyrick J (2017) Psychological Aspects of Bariatric Surgery as a Treatment for Obesity. *Curr Obs Rep* 6:71-78.
13. Griaucude DH, Ibrahim AM, Fisher N, Stricklen A, Ross RA (2018) Understanding the psychosocial impact of weight loss following bariatric surgery: a qualitative study. *BMC Obes* 5.
14. Batsis JA, Lopez-Jimenez F, Collazo-Clavell ML, Clark MM, Somers VK et al (2009) Quality of life after bariatric surgery: a population-based cohort study. *Am J Med* 122.
15. Gade H, Friberg O, Rosenvinge JH, Smastuen MC, Hjeltnes J (2015) The impact of a preoperative cognitive behavioural therapy (CBT) on dysfunctional eating behaviours, affective symptoms and body weight 1 year after bariatric surgery: a randomised controlled trial. *Obes Surg* 25:2112-2119.
16. Kalarchian MA, King WC, Devlin MJ, Hinerman A, Marcus MD et al (2019) Mental disorders and weight change in a prospective study of bariatric surgery patients: 7 years of follow-up. *Surg Obes Relat Dis* 15:739-748.
17. Magro DO, Geloneze B, Delfini R (2008) Long-term Weight Regain after Gastric Bypass: A 5-year Prospective Study. *Obes Surg* 18:648-651.
18. Paul L, van der Heiden C, Hoek HW (2017) Cognitive behavioural therapy and predictors of weight loss in bariatric surgery patients. *Curr Opin Psychiatry* 30:474-479.
19. Gill H, Kang S, Lee Y, Rosenblat JD, Briezke E et al (2019) the long-term effect of bariatric surgery on depression and anxiety. *J Affect Disorders* 246:886-894.
20. Liebl L, Barnason S, Brage Hudson D (2016) Awakening: a qualitative study on maintaining weight loss after bariatric surgery. *J Clin Nurs* 25:951-961.
21. Kalarchian MA, Marcus MD (2015) Psychosocial Interventions Pre and Post Bariatric Surgery. *European Eating Disorders Review* 23:457-462.
22. Sheets CS, Peat CM, Berg KC et al (2015) Post-operative Psychosocial Predictors of Outcome in Bariatric Surgery. *Obes Surg* 25.
23. ASMBS (2019) Bariatric surgery: Postoperative concerns. 2008. Accessed 2.
24. Lowe B, Kroenke K, Herzog W, Grafe K (2004) Measuring depression outcome with a brief self-report instrument: sensitivity to change of the Patient Health Questionnaire (PHQ-9). *J Affect Disord* 81:61-66.
25. Kroenke K, Spitzer RL, Williams JBW (2001) The PHQ-9: Validity of a Brief Depression Severity Measure. *J Gen Intern Med* 16:606-613.
26. Tarlov AR, Ware JE, Greenfield S, Nelson EC, Perrin E et al (1989) The Medical Outcomes Study. An application of methods for monitoring the results of medical care. *JAMA* 262:925-930.

27. Resnick B, Parker R (2001) Simplified scoring and psychometrics of the revised 12-item Short-Form Health Survey. *Outcomes Manag Nurs Pract* 5:161-166.
28. Wee CC, Davis RB, Hamel MB (2008) Comparing the SF-12 and SF-36 health status questionnaires in patients with and without obesity. *Health Qual Life Outcomes* 6.
29. Ware J, Kosinski M, Keller SD (1996) 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 34:220-223.
30. Frerking D, Filipp S (1996) Measurement of self-esteem: findings on reliability, validity, and stability of the Rosenberg Scale. *Diagnostic* 42:284-292.
31. Schmitt DP, Allik J (2005) Simultaneous administration of the Rosenberg Self-Esteem Scale in 53 nations: exploring the universal and culture-specific features of global self-esteem. *Pers Soc Psychol* 89:623-642.
32. Jones L, Cleator J, Yorke J (2016) Maintaining weight loss after bariatric surgery: when the spectator role is no longer enough. *Clin Obes* 6:249-258.
33. Bradley LE, Forman EM, Kerrigan SG, Butryn ML, Herbert JD et al (2016) A Pilot Study of an Acceptance-Based Behavioural Intervention for Weight Regain After Bariatric Surgery. *Obes Surg* 26:2433-2441.
34. Amundsen T, Strommen M, Martins C (2017) Suboptimal Weight Loss and Weight Regain after Gastric Bypass Surgery-Postoperative Status of Energy Intake, Eating Behavior, Physical Activity, and Psychometrics. *Obes Surg* 27:1316-1323.
35. Parretti HM, Hughes C, Jones LL (2018) the rollercoaster of follow-up care' after bariatric surgery: a rapid review and qualitative synthesis. *Obes Rev* 20:88-107.
36. Bradley LE, Forman EM, Kerrigan SG (2017) Project HELP: a Remotely Delivered Behavioural Intervention for Weight Regain after Bariatric Surgery. *Obes Surg* 27:586-598.
37. Lier HØ, Biringer E, Stubhaug B, Tangen T (2012) The impact of preoperative counselling on postoperative treatment adherence in bariatric surgery patients: a randomized controlled trial. *Patient Educ Couns* 87:336-342.
38. Conceicao EM, Machado PP, Vaz AR (2016) APOLO-Bari, an internet-based program for longitudinal support of bariatric surgery patients: study protocol for a randomized controlled trial. *Trials* 17:114.
39. Coulman KD, Mackichen F, Blazeby JM, Owen-Smith A (2017) Patient experiences of outcomes of bariatric surgery: a systematic review and qualitative synthesis. *Obes Rev* 18:547-559.
40. Major P, Matlok M, Pedziwiatr M (2015) Quality of life after bariatric surgery. *Obes Surg* 25(9):1703-1710.