Quality of Life Outcomes of Bariatric Surgery: A Systematic Review

Running head: QOL Outcomes of Obesity Surgery

Short communication: Abstract 125 words, Article 3,041 words, 2 tables, 1 figures, 48 references

Aleeya Hachem[1] (PGDipPsych) & Leah Brennan[2] (BAppSc(hons), MSc, PhD)

School of Psychology
Australian Catholic University,
Melbourne, Victoria, Australia

[1]ahachem24@hotmail.com
[2]leah.brennan@acu.edu.au

Author for correspondence:

A/Prof. Leah Brennan
Email: Leah.brennan@acu.edu.au
Phone: +61 3 9953 3662
Address: School of Psychology
Australian Catholic University
115 Victoria Parade
Fitzroy, Victoria 3065 Australia

There are no conflicts of interest to declare.

Abstract

Background: Bariatric surgery is often pursued to improve QOL.

Objectives: This paper systematically reviews the literature examining QOL following bariatric surgery.

Method: Fifteen *c*ontrolled trials examined changes in QOL in obese(BMI>30) adults(18-65 years) following bariatric surgery; 7 compared bariatric surgery to non-surgical interventions and 6 compared different types of bariatric surgery.

Results: Bariatric surgery resulted in greater improvements in QOL than other obesity treatments. Significant differences in QOL improvements were found between different types of bariatric surgery. QOL improvements were more likely to occur within the first two years following surgery, with greater improvements in physical QOL than mental QOL.

Conclusions: Bariatric surgery improves QOL. Future research is needed to investigate changes in QOL in different domains in the short- and long-term following bariatric surgery.

Keywords: QOL, bariatric surgery, outcomes, systematic review, controlled trials

Quality of life Outcomes of Bariatric Surgery: A Systematic Review

The negative health and well-being consequences of excess weight contribute to impairment in quality of life (QOL) in obese adults. QOL, defined as the impact of health on an individual's functioning, encompassing physical, psychological and social wellbeing, is highly subjective relying on personal experiences, beliefs and expectations[1]. Research consistently shows that obese individuals experience poorer physical and mental QOL than non-obese individuals[2].

Weight-related impaired QOL is thought to be the result of physical(e.g., pain, physical activity)[3], psychological (e.g., self-esteem, self-motivation, depressive symptoms, disordered eating) [4] and social (e.g., social support, weight-related stigmatisation)[5]impacts of excess weight. Improvement in QOL is often a motivator for seeking bariatric surgery[6, 7] and is closely related to patient satisfaction following surgery[8]. However, the success of bariatric surgery is largely evaluated by the amount of weight lost and/or medical comorbidity (e.g., Type 2 diabetes) improvement[7, 9, 10]. As improved physical and mental health related QOL are common motivators for bariatric surgery[6, 7], physical and mental aspects of QOL are important considerations in evaluating the success of bariatric surgery[6].

QOL has been shown to improve following bariatric surgery[11, 12]. While there is evidence demonstrating a relationship between QOL improvement and weight loss[13], improvement in QOL cannot be explained by weight loss alone. Patients experience a marked improvement in QOL immediately following surgery before any significant weight loss can occur[14], suggesting that psychological factors (e.g., hope [6]) contribute to improvement in QOL almost instantly. It is also likely that pre-existing and/or post-surgical physical, psychological and social factors interact with weight loss to influence the improvement in QOL following bariatric surgery[15].

There are inconsistencies in the literature surrounding long term QOL outcomes of bariatric surgery. Some research indicates that QOL improves for up to one year and then plateaus and/or declines[10], while other research suggests that QOL continues to improve two to four years following surgery[16]. Moreover, results are inconclusive regarding the domains of QOL (e.g. mental, physical) that improve following bariatric surgery, as previous research demonstrates consistent improvements in physical but not mental QOL[8]. These inconsistencies may be due to variation in the samples, bariatric surgery interventions and QOL measures[17].

To date, there are no systematic reviews evaluating the impact of surgery on QOL comparing QOL outcomes for bariatric surgery to alternative interventions, or comparing QOL outcomes for different bariatric surgical interventions. A number of reviews have focused on mental health outcomes of bariatric surgery[18-20]. Of the five reviews examining QOL following bariatric surgery one has examined psychological predictors of health-related quality of life (HRQOL)[21] , two have examined the impact of psychological factors on QOL outcomes following surgery[22, 23] The remaining two reviews have examined the change in mental and physical QOL following surgery, however neither compared QOL outcomes for bariatic surgical types or bariatric surgery to alternative weight-loss interventions[24, 25]. A review of literature examining QOL outcomes of bariatric surgery is necessary to understand the impact of surgery on QOL, and to clarify inconsistencies in the current literature surrounding which domains (physical vs. mental) of QOL improve, the trajectory of improvements, and differences in improvements between surgical and non-surgical interventions and between different types of surgical approaches. This review aims to examine QOL as an outcome of bariatric surgery in obese (BMI $\geq$30) adults (18-65 years) by comparing bariatric surgery to alternative weight-loss interventions,

as well as different and alternative types of bariatric surgery (i.e. comparing variations of gastric bypass and variations of gastric banding surgical procedures.)

Method

The current review was conducted and reported according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement[26]. MedLine Complete, PsychInfo, Web of Science, Cochrane, Embase and CINAHL were searched using a combination of keywords relating to bariatric surgery and quality of life in titles, abstracts, subject headings and MeSH terms as relevant. If available, limits were placed on studies that focused on adults. Studies were included if they included a comparison group (quasi-group or randomized trials),were published in English, in a peer-reviewed journal, focused on obese adults (18-65 years) who had undergone bariatric surgery and examined QOL outcomes using standardised questionnaires.

Results

Description of selected studies

The strategy for the literature search performed is outlined in Figure 1. Title and abstract review identified 47 full text articles. Thirty-four articles were excluded for various reasons (Table 1).Thirteen articles met the inclusion criteria and were included in the review. Eleven studies measured QOL pre and post-surgery, while two studies only measured QOL post-surgery only. The Short Form-36 was the most commonly used general QOL measure[27]. Others included the Moorehead-Ardelt QOL Questionnaire II (MAI-II)[28], Sickness Impact Profile (SIP)[29] and the General Health Rating Index (GHRI)[30].Weight specific QOL measures used included the Impact of Weight on QOL – Lite Questionnaire (IWQOL-Lite)[31], Bariatric Analysis and Reporting Outcome System (BAROS)[1], Obesity

and Weight Loss QOL Questionnaire (OWLQOL)[32], Weight Related Symptom Measure(WRSM)[32], QOL, Obesity and Dietetics Rating Scale (QOLOD)[32]. For the purpose of this review, studies will be organized by comparator(i.e., bariatric surgery or non-surgical comparison). Only statistically significant results will be discussed.

Bariatric surgery vs.non-surgical comparison

Seven studies (one randomized control trial, six quasi-group control trials) compared outcomes of bariatric surgery to an alternative weight loss intervention (e.g. diet and exercise, medication). These studies are summarised in Table 1. Of the six studies using the SF-36 (general QOL measure), four reported a significant improvement in physical functioning QOL subscale[33-36] and three showed significant improvement in mental health QOL subscale following bariatric surgery within 2 years[34, 35, 37]. No significant changes were found in the non-surgical group in two of these studies. One study demonstrated a significant change in both the surgical and non-surgical groups (i.e. gastric bypass and intensive lifestyle intervention) from baseline on the WRSM (weight-specific QOL measure) on symptom distress and number of symptoms QOL at one year[35]. One study reported a significant difference in psychosocial QOL and mental wellbeing QOL as measured by the SIP and MACL (general QOL measures) at 2 years following surgery[38].

Follow up period

Five studies reported a 1-year follow up period[34, 35, 37-39] and QOL results were inconsistent across these studies. Two studies reported a significant improvement from baseline in all eight QOL domains of the physical and mental subscales on the SF-36 in both surgical and non-surgical groups[34, 35]. Significant differences between groups were not assessed. The remaining three studies reported no significant difference from baseline in QOL following surgery in either the surgical (i.e. gastric banding) or alternative (i.e. lifestyle)

intervention[37-39]. Significant differences between groups were not assessed. One study examining three time points (two months, six months and one year) reported a statistically significant improvement from pre-operative scores within both the surgical and lifestyle condition groups in mental health QOL at two months and mental health QOL and social functioning QOL at six months[37]. There were no significant improvements in physical functioning, bodily pain or general health QOL at any of these three time points for either group[37]. No significant improvements were found in any QOL domain at 12 months for either group[37].

The two studies examined QOL two years post-intervention demonstrated significant improvements in QOL for both groups (i.e. surgical and lifestyle intervention)[33, 38].One of these studies reported significantly greater improvements in mental and physical domains of QOL for the surgical condition compared to the treatment seeking and lifestyle intervention conditions by reporting significant group differences[33],the other study reported a significant improvement in psychosocial functioning and mental wellbeing for both the surgical and lifestyle intervention group from baseline within groups[38]. Group differences were not assessed.

Only one study reported long term(ten year) follow up of QOL outcomes following gastric banding and found no significant improvement in physical and mental QOL within groups[36]. However, those originally allocated to the medical condition who ‘crossed over’ to the surgical intervention at some stage (after the 2 years of the trial) during the 10-year follow up demonstrated statistically significant increases in physical functioning QOL at 10 years compared to baseline[36]. Group differences were not assessed.

Bariatric surgery vs. Bariatric surgery

Six studies (five randomized control trials, one quasi-group design) compared QOL outcomes between different types of bariatric surgery procedures[40-45]. These studies are summarised in Table 2. Studies that compared different types of bariatric surgery demonstrated significant group differences in QOL improvement. However, there were no statistically significant differences in QOL between groups in studies that used a variation of the same type of surgery (e.g. laparoscopic gastric bypass vs. open gastric bypass.)

Surgery type

Two studies compared two different types of bariatric surgery. In one study, both LAGB and laparoscopic sleeve gastrectomy (LSG) resulted in significant improvement in physical, psychosocial, sexual and diet experience QOL domains from baseline[40]. However, LSG resulted in significantly better improvements in psychosocial impact of QOL compared to LAGB. The 'comfort with food' QOL domain was significantly better in the LSG group at 6 months but not at 12 months relative to LAGB[40]. In a randomized control trial comparing vertical banding gastroplasty and gastric bypass, there was a statistically significant improvement in gastrointestinal symptoms, physical, emotional and social QOL domains in both groups. Improvements were greater in the gastric bypass group[41].

Three studies compared variations of gastric bypass surgery. A comparison of laparoscopic roux-en-y gastric bypass surgery and laparoscopic mini gastric bypass surgery demonstrated statistically significant QOL improvements from baseline, as measured by the GIQLI, in both conditions one year after surgery[42]. Two randomized control trials compared outcomes of laparoscopic gastric bypass and open gastric bypass[43, 44]. At one month scores in physical functioning, social functioning, general health and bodily pain QOL were significantly better in the laparoscopic condition compared to the open condition. At six months, all domains of the SF-36 and MAQL-II (general measure) QOL had improved in both groups but did not differ significantly between groups[43].

Two studies did not provide pre-operative QOL data. One study evaluated QOL outcomes three years following surgery using the Bariatric Reporting Outcome System (BAROS; weight-specific measure). Ninety-five percent of those who underwent laparoscopic gastric bypass reported good, very good or excellent QOL outcomes in comparison to 86% of those who underwent open gastric bypass surgery. Statistical comparisons were not conducted[44]. The second study compared the QOL outcomes of two gastric bands: the Lapband and Swedish adjustable gastric band (SAGB). There was no significant QOL differences from baseline or between groups between the two conditions at any of the six time points: 6 months, 12 months, 18 months, 24 months, 30 months, 36 months[45].

Follow up period

Two studies examined changes in QOL at various time points within one year following different types of surgery. In one study, significant improvements within groups (i.e. LAGB and sleeve gastrectomy, laparoscopic GB and open GB) in QOL were found at one month, three months and six months, but were not at one year[40, 46]. Three studies did not find any significant differences between surgical conditions beyond one year post-surgery[42, 44, 45]. One study that compared surgery type(i.e. vertical banding gastroplasty and gastric bypass)[41] found significant improvement from baseline within groups two years following surgery.

Discussion

This review examined changes in QOL following bariatric surgery in obese adults. Results demonstrate significant improvements in QOL following bariatric surgery, with greater improvements in surgical interventions than non-surgical interventions. Comparison of different types of surgeries found statistically significant QOL improvements in gastric

bypass and LSG conditions compared to vertical banding gastroplasty and LAGB respectively. There were no differences in QOL between variations of the same type of surgery (e.g. gastric bypass vs. mini gastric bypass.)

All included studies demonstrated improvements in QOL following bariatric surgery. In the seven studies that compared bariatric surgery to a non-surgical condition, those who underwent bariatric surgery showed a greater improvement in QOL. However, only two of these studies statistically compared outcomes between surgical and non-surgical conditions. The remaining five studies statistically compared preoperative and postoperative data within each condition and commented on differences in improvements without providing statistical comparisons. Improvements in physical QOL were found in the majority of these studies within the first year following surgery. This is likely due to improved medical and physical functioning resulting from weight loss and medical comorbidity reduction following bariatric surgery[9]. Several studies found an improvement in mental health and psychosocial functioning aspects of QOL, with greater improvements occurring within the first year. This is consistent with research demonstrating improvements in self-esteem, body image, sexual and social functioning, and a decline in depressive and anxious symptoms following bariatric surgery within the same time frame[6, 8].

Of the two studies that compared different surgery types, improvement in QOL was greater in LSG and gastric bypass conditions when compared to LAGB(one year) and vertical banding gastroplasty (two years) respectively. This may be because these procedures result in greater weight loss in this time period[47]. However, results need to be interpreted cautiously as each comparison was made in only a single study. Replication is required. In four studies that examined QOL between variations of the same type of bariatric surgery (i.e. comparing variations of gastric bypass and variations of gastric banding surgical procedures) QOL

improved postoperatively in both groups with no differences in QOL between groups. This indicates that minor variations in surgical procedures do not differentially impact on QOL.

The length of follow up between studies varied greatly, ranging from one month to ten years. Generally, studies that had a shorter follow up period were more likely to show significant improvements in QOL. Those with longer follow up periods generally demonstrated maintenance of early QOL improvements. Four studies showed significant improvements in QOL at one to three years relative to baseline. Previous research has shown that QOL improves dramatically after surgery, but then stabilizes at one to two years following surgery[6]. This mirrors weight loss and comorbidity improvement following bariatric surgery(i.e., the majority of weight is lost in the first one to two years) suggesting that QOL improvements are at least in part attributed to weight loss[10]. However, previous research has shown that weight loss alone does not fully account for variations in QOL improvements following bariatric surgery[14]. It is likely that other factors such as medical comorbidity, mental health and social support may contribute to QOL improvements[8].

Not all domains of QOL improved following bariatric surgery. Physical functioning QOL consistently improved following bariatric surgery, while few significant improvements were found in mental health and psychosocial functioning QOL[7]. This finding also suggests that improvements in 'global' QOL are most likely driven by a significant improvement in physical, but not mental, QOL. These findings are consistent with other reviews[24, 25] reporting greater improvements in physical domains of QOL and mixed improvements in mental domains QOL. Further research is required to determine variables associated with improvements in physical and mental QOL. As bariatric surgery is a biological procedure primarily aimed at improving physical outcomes greater improvements in physical QOL are to be expected. However, given the pre-surgery impairment in mental QOL, improvements in other areas of mental health (e.g., depression) demonstrated post-surgery, and the finding that

improved mental health related QOL is a common motivator for bariatric surgery[6, 7], the lack of consistent improvements in mental QOL is concerning. These results highlight a need for adjunctive interventions targeting mental health, social and environmental factors to facilitate improvement in all domains of QOL following bariatric surgery.

In summary, the current findings show that QOL improves following bariatric surgery. QOL is more likely to improve within the first two years of surgery, and physical QOL was more likely to improve following surgery than mental QOL. Further intervention is needed to ensure improvements in mental health and social domains of QOL.

Limitations of existing literature and Recommendations for Future Research

This is the only systematic review of QOL outcomes following bariatric surgery. It was conducted according to PRISMA standards and examined changes in QOL in all published studies comparing bariatric surgery to alternative weight-loss interventions, and comparing different bariatric surgical procedures. Studies using alternative designs (e.g., pre-post comparisons, case series analyses) were excluded from the review and thus, their findings are not considered.

These findings need to be considered in the context of limitations in the literature. The SF-36, a measure of generic QOL, was the most commonly used QOL tool. A generic questionnaire may not capture fully weight related information and the impact of surgery on QOL[17]. While several studies assessed QOL using specific weight and surgical specific questionnaires, variations in the questionnaires used made comparisons difficult. The use of at least one generic and specific QOL questionnaire is recommended to ensure more QOL information is obtained and can assist in comparison of results across studies[48].

Reporting of results was also inconsistent across studies. Some reported scores from all subscales, some reported only overall scores, composite scores, a change in mean score and/or selected subscales scores. Additionally, few studies included in this review statistically

compared QOL improvements between conditions, the majority compared pre- and post-surgical QOL scores within conditions so it was not possible to determine if group differences were statistically significant. Future research should comprehensively report global, domain and subscale QOL outcomes and statistically compare both within and between group differences.

Conclusions were also limited by various and limited follow up periods. Few studies reported both short and long-term QOL outcomes consequently the trajectory of changes in QOL during these time periods remain unclear. Determining at which period QOL improves, stabilises and/or declines (in which QOL domains) can inform interventions targeting maintained improved QOL following surgery.

Summary

This review examined changes in QOL following bariatric surgery in obese adults. Results indicate that QOL improves following bariatric surgery. Available research suggests consistent improvements in the physical domains of QOL but not mental health domains of QOL. In studies comparing bariatric surgery to a non-surgical comparator, QOL improvements were greater in the surgical condition. Studies comparing different bariatric surgical conditions reported general improvement in QOL with few differences between similar surgical approaches. Results show that QOL significantly improves within the first year and improvements are generally maintained at two years. Results are however not consistent across all studies and there is a need for research examining long term QOL outcomes following bariatric surgery, with further investigation into improvements of domain specific QOL. This will facilitate improved promotion of long term QOL improvements following bariatric surgery.

Conflict of Interest

No conflicts of interest.

Statement of Informed Consent

Not applicable as this is a systematic review and did not involve human participation.

Statement of Human and Animal Rights

Not applicable as this is a systematic review and did not involve human or animal participation.

References

1. Oria, H.E. and M.K. Moorehead, *bariatric ananlysis and reporting outcome system (BAROS).* Obesity Surgery, 1998. 8: p. 487-499.

2. Livingston, E.H. and A.S. Fink, *Quality of life: cost and future of bariatric surgery.* Archives of Surgery, 2003. 138(4): p. 383-388.

3. McVinnie, D.S., *Obesity and pain.* British Journal of Pain, 2013. 7(4): p. 163-170.

4. Abiles, V., et al., *Psychological Characteristics of Morbidly Obese Candidates for Bariatric Surgery.* Obesity Surgery, 2010. 20(2): p. 161-167.

5. Van Hout, G.C.M., S.K.M. Verschure, and G.L. Van Heck, *Psychosocial predictors of success following bariatric surgery.* Obesity Surgery, 2005. 15(4): p. 552-560.

6. Stolzenberger, K.M., et al., *Long-term quality of life following bariatric surgery: A descriptive study.* Bariatric Surgical Patient Care, 2013. 8(1): p. 29-38.

7. Van Hout, G.C.M., et al., *Psychosocial functioning following bariatric surgery.* Obesity Surgery, 2006. 16(6): p. 787-794.

8. Van Hout, G., *Psychosocial effects of bariatric surgery.* Acta Chirurgica Belgica, 2005. 105(1): p. 40-43.

9. Livhits, M., et al., *Preoperative predictors of weight loss following bariatric surgery: systematic review.* Obesity Surgery, 2011. 22: p. 70-89.

10. Colquitt, J.L., et al., *Surgery for obesity.* The Cochrane Database Of Systematic Reviews, 2009(2): p. CD003641.

11. Herpertz, S., et al., *Do psychosocial variables predict weight loss or mental health after bbesity surgery? a systematic review.* Obesity Research, 2004. 12(10): p. 1554-1569.

12. Dixon, J.B., M.E. Dixon, and P.E. O'Brien, *Quality of life after lap-band placement: influence of time, weight loss, and comorbidities.* Obesity research, 2001. 9(11): p. 713-721.

13. Robert, M., et al., *Prospective longitudinal assessment of change in health-related quality of life after adjustable gastric banding.* Obesity Surgery, 2013. 23: p. 1564-1570.

14. Dymek, M.P., et al., *Quality of life and psychosocial adjustment in patients after roux-en-y gastric report bypass: a brief report.* Obesity Surgery, 2001. 11(1): p. 32-39.

15. Apovian, C.M., et al., *Patient Factors Associated with Undergoing Laparoscopic Adjustable Gastric Banding vs Roux-en-Y Gastric Bypass for Weight Loss.* Journal of the American College of Surgeons, 2013. 217(6): p. 1118-1125.

16. Herpertz, S., et al., *Does obesity surgery improve psychosocial functioning? A systematic review.* International Journal of Obesity, 2003. 27(11): p. 1300-1314.

17. Abdelrahman, T., et al., *Health related quality of life reporting in bariatric surgery: A systematic review of current practice.* British Journal of Surgery, 2013. 100: p. 48-48.

18. Herpertz, S., et al., *Do psychosocial variables predict weight loss or mental health after obesity surgery? A systematic review.* Obesity Research, 2004. 12(10): p. 1554-1569.

19. Herpertz, S., et al., *Does obesity surgery improve psychosocial functioning? A systematic review.* International Journal of Obesity, 2003. 27(11): p. 1300-1314.

20. Wimmelmann, C.L., F. Dela, and E.L. Mortensen, *Psychological predictors of weight loss after bariatric surgery: a review of the recent research.* Obesity Research and Clinical Practice, 2014. 8: p. 299-313.

21. Wimmelmann, C.L., F. Dela, and E.L. Mortensen, *Psychological predictors of mental health and health-related quality of life after bariatric surgery: A review of the recent research.* Obesity Research & Clinical Practice, 2014. 8(4): p. 314-324.

22. Gregorio, J.M. and R. Palkoner *Quality of life after obesity surgery, an evidence-based medicine literature review: how to improve systematic searches for enhanced decision-making and clinical outcomes*. Obesity Surgery, 2001. 11, 318-326.

23. Vallis, M.T. and M.A. Ross, *The Role of Psychological Factors in Bariatric Surgery for Morbid Obesity: Identification of Psychological Predictors of Success.* Obesity Surgery, 1993. 3(4): p. 346-359.

24. Lindekilde, N., et al., *The impact of bariatric surgery on quality of life: a systematic review and meta-analysis.* Obesity Reviews, 2015. 16(8): p. 639-651.

25. Magallares, A. and G. Schomerus, *Mental and physical health-related quality of life in obese patients before and after bariatric surgery: A meta-analysis.* Psychology, Health & Medicine, 2014. 20(2): p. 165-176.

26. Moher, D., et al., *Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.* Annals of Internal Medicine, 2009. 151(4): p. 264-269.

27. Ware, J., *SF-36 Physical and Mental Health Summary Scales: A User's Manual*. 1994, Boston: The Health Institute, New England Medical Center.

28. Moorehead, M., et al., *The validation of the Moorehead-Ardelt Quality of Life Questionnaire II.* Obesity Surgery, 2003. 13(5): p. 684-692.

29. Gilson, B.S., et al., *The sickness impact profile. Development of an outcome measure of health care.* American Journal of Public Health, 1975. 65(12): p. 1304-1310.

30. Tennant, C., *The general health questionnaire: a valid index of psychological impairment in Australian populations.* The Medical Journal of Australia, 1977. 2(12): p. 392-394.

31. Kolotkin, R.L. and R.D. Crosby, *Psychometric evaluation of the impact of weight on quality of life-lite questionnaire (IWQOL-lite) in a community sample.* Quality of Life Research, 2002. 11(2): p. 157-171.

32. Niero, M., et al., *A new approach to multicultural item generation in the development of two obesity-specific measures: the Obesity and Weight Loss Quality of Life (OWLQOL) questionnaire and the Weight-Related Symptom Measure (WRSM).* Clinical therapeutics, 2002. 24(4): p. 690-700.

33. Adams, T.D., et al., *Health outcomes of gastric bypass patients compared to nonsurgical, nonintervened severely obese.* Obesity (19307381), 2010. 18(1): p. 121-130.

34. Canetti, L., et al., *Health-related Quality of Life Changes and Weight Reduction After Bariatric Surgery vs. a Weight-loss Program.* Israel Journal of Psychiatry & Related Sciences, 2013. 50(3): p. 194-200.

35. Karlsen, T.I., et al., *Health related quality of life after gastric bypass or intensive lifestyle intervention: a controlled clinical study.* Health and quality of life outcomes, 2013. 11(17).

36. O'Brien, P.E., et al. *Intensive medical weight loss or laparoscopic adjustable gastric banding in the treatment of mild to moderate obesity: Long-term follow-up of a prospective randomised trial*. Obesity surgery, 2013. 23, 1345-53 DOI: 10.1007/s11695-013-0990-3.

37. Faulconbridge, L.F., et al., *Changes in depression and quality of life in obese individuals with binge eating disorder: Bariatric surgery versus lifestyle modification.* Surgery for Obesity and Related Diseases, 2013. 9(5): p. 790-796.

38. Karlsson, J., L. Sjostrom, and M. Sullivan, *Swedish obese subjects (SOS) - an intervention study of obesity. Two-year follow-up of health-related quality of life*

(HRQL) and eating behavior after gastric surgery for severe obesity. International Journal of Obesity, 1998. 22(2): p. 113-126.

39. Canetti, L., E.M. Berry, and Y. Elizur, *Psychosocial predictors of weight loss and psychological adjustment following bariatric surgery and a weight-loss program: the mediating role of emotional eating.* International Journal of Eating Disorders, 2009. 42(2): p. 109-117.

40. Brunault, P., et al., *Observations Regarding 'Quality of Life' and 'Comfort with Food' After Bariatric Surgery: Comparison Between Laparoscopic Adjustable Gastric Banding and Sleeve Gastrectomy.* Obesity Surgery, 2011. 21(8): p. 1225-1231.

41. Lee, W.J., et al. *Laparoscopic vertical banded gastroplasty and laparoscopic gastric bypass: a comparison*. Obesity surgery, 2004. 14, 626-34 DOI: 10.1381/096089204323093390.

42. Lee, W.J., et al. *Laparoscopic Roux-en-Y versus mini-gastric bypass for the treatment of morbid obesity: a prospective randomized controlled clinical trial*. Annals of surgery, 2005. 242, 20-8.

43. Nguyen, N.T., et al., *Laparoscopic versus open gastric bypass: a randomized study of outcomes, quality of life, and costs.* Annal Surgery, 2001. 234(3): p. 279-291.

44. Puzziferri, N., et al. *Three-year follow-up of a prospective randomized trial comparing laparoscopic versus open gastric bypass*. Annals of surgery, 2006. 243, 181-8 DOI: 10.1097/01.sla.0000197381.01214.76.

45. Suter, M., et al., *Laparoscopic gastric banding: a prospective, randomized study comparing the Lapband and the SAGB: early results.* Annals Of Surgery, 2005. 241(1): p. 55-62.

46. Nguyen, N.T., et al. *Laparoscopic versus open gastric bypass: a randomized study of outcomes, quality of life, and costs*. Annals of surgery, 2001. 234, 279-89; discussion 289-91.

47. Picot, J., et al., *The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation.* Health Technology Assessment, 2009. 13(41): p. 1-358.

48. Ballantyne, G.H., *Measuring outcomes following bariatric surgery: weight loss parameters, improvement in co-morbid conditions, change in quality of life and patient satisfaction.* Obesity Surgery, 2003. 13(6): p. 954-964.

Table

Table 1

Summary of studies examining Quality of Life in Bariatric Surgery and Non-Surgical Conditions

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
Adams et. al. (2010) United States Quasi-group design N= 1156	GB: Gastric Bypass (n= 32) SS: Seeking Surgery (n=420) NS: Non-Seeking Surgery (n=415)	GB: BMI=47.7 Age: 43.4(0.61) F=83% SS: BMI=46.8 Age: 43.6(0.61) F=85.1% NS: BMI= 44.3 Age: 49.4(0.65) F=76.0%	2y 67% at follow-up	Weight Specific	Impact of Weight on Quality of Life: IWQOL-Lite (Global)	Global GB: 65.7(1.05) SS: 68.5(1.05) NS: 87.9(1.14)	Global GB: 58.90(1.22) SS: 7.47(1.38) NS: 11.51(1.38)	GB vs SS *p*<.0001 GB vs NS: *p*<.0001	NR
				General	Short Form-36: SF-36 (Composite)	GB: PC: 35.9(0.34) MC: 41.3(0.38) SS: PC: 36.2(0.34) MC: 41.4(0.38) NS: PC: 40.0(0.37) MC:44.1(0.41)	GB: PC: 9.39(0.39) MCS: 2.82(0.44) SS: PC: 1.04(0.44) MC: -0.69(0.50) NS: PC: 2.30(0.41) MC: 1.06(0.45)	GB vs SS: PC *p*<.0001 MC p<.0001 GB vs NS: PC *p*<.0001 MC *p*<.01	NR
Canetti (2009) Israel Quasi-group design	BS: Bariatric Surgery (gastric banding, salistic vertical banding)	BS: BMI= 45.1(7.7) Age: 34.2(10) F= 86.3% LI: BMI= 35.4(7.2)	1y 100% at follow-up	General	SF-36 (Global)	BS: 64.49(16.86) LI:71.09(13.35)	Correlated with social support r= -0.43 *p*<.001	NR	NR

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
N=91	(n=44) LI: Lifestyle Intervention (n=47)	Age: 42.8(11.5) F=64.7%							
Canetti (2013) Israel Quasi-group design N=91	BS: Bariatric Surgery (gastric banding, salistic vertical banding) (n=44) LI: Lifestyle Intervention (n=47)	BS: BMI= 45.1(7.7) Age: 34.2(10) F= 86.3% LI: BMI= 35.4(7.2) Age: 42.8(11.5) F=64.7%	1y 100% at follow-up	General	SF-36 (Global, Subscales)	Global BS: 64.18(17) LI: 70.43(12.63) Phys Functioning BS: 59.09(24) LI: 79.90(20.38) Role Phys BS: 57.39(40.56) LI: 76.06(30.38) Bodily Pain BS: 58.33(27.75) LI: 76.36(20.28) Health Perception BS: 72.16(23.73) LI: 68.51(21.21) Vitality BS: 51.82(22.00) LI: 56.17(19.54) Social Functioning BS: 74.43(34.09) LI: 80.59(26.17) Role Emotion BS: 82.58(36.29) LI: 70.21(38.22)	Global BS: 83.78(10.19) LI: 75.46(15.74) Phys Functioning BS: 96.82(6.39) LI: 84.79(20.43) Role Phys BS: 93.18(21.13) LI: 82.98(30.44) Bodily Pain BS: 79.04(26.38) LI: 76.36(23.24) Health Perception BS: 83.18(15.06) LI: 75.74(20.95) Vitality BS: 68.52(18.57) LI: 62.66(23.68) Social Functioning BS: 92.90(17.46) LI: 81.91(24.42) Role Emotion BS: 93.94(20.68) LI: 76.60(35.38)	NR	Global BS: $p<.001$ LI: $p<.001$ Phys Functioning BS: $p<.001$ LI: $p<.05$ Role Phys BS: $p<.001$ LI: $p<.001$ Bodily Pain BS: $p<.001$ LI: $p<.001$ Health Perception BS: $p<.001$ LI: $p<.05$ Vitality BS: $p<.001$ LI: $p<.05$ Social Functioning BS: $p<.001$ LI: $p>.05$ Role Emotion BS: $p<.05$ LI: $p>.05$

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
						Mental health BS: 74.18(20.26) LI: 70.89(19.70)	Mental health BS: 79.55(17.83) LI: 72.09(22.01)		Mental health BS: *p*<.05 LI: *p*>.05
Faulconbridge (2013) United States Quasi-group design N=85	BS: Bariatric surgery (gastric bypass and gastric banding)(n=36) LI: Lifestyle intervention (n=36)	BS: BMI=48.9 (1.1) Age: 47.0(1.6) F=72.2% LI: BMI=44.3(.7) Age: 43.8(1.4) F= 79.6%	2m 6m 12m 49% at 12m follow-up	General	SF-36 (Global, Subscales)	PC BS: 37.70(1.7) LI: 40.80(1.3) MC BS: 43.1(1.6) LI: 45.4(2.0) Phys Functioning BS: 34.9(1.9) LI: 37.3(1.5) Role Phys BS: 41.8(1.7) LI: 43.7(1.5) Bodily Pain BS: 39.5 (1.6) LI: 44.8 (1.6) General Health BS: 38.6(1.7) LI: 41.4 (1.4) Vitality BS: 39.0(1.6) LI: 42.7 (1.4) Social Functioning BS: 38.3(2.0) LI: 42.7(1.7)	(mean change from baseline) **2 m** PC BS: 3.8(.7) LI: 4.7 (.6) MC BS: 4.1(.9) LI: 1.2(.7) Phys Functioning BS: 4.9(.8) LI: 4.5(.6) Role phys BS: 3.7(.9) LI: 3.7(.7) Bodily Pain BS: 3.2(.8) LI: 2.6(.6) General Health BS: 3.4(.7) LI: 4.4(.6) Vitality BS: 5.6(.6) LI: 4.9(.6) Social Functioning BS: 5.4(1.0)	NR	**2 m** PCS BS: *p*>.05 LI: *p*>.05 MCS BS: *p*>.05 LI: *p*>.05 Phys Functioning BS: *p*>.05 LI: *p*>.05 Role Phys BS: *p*>.05 LI): *p*>.05 Bodily Pain BS: *p*>.05 LI: *p*>.05 General health BS: *p*>.05 LI: *p*>.05 Vitality BS: *p*>.05 LI: *p*>.05 Social Functioning

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
						Role Emotional BS: 42.3(1.7) LI: 43.7(1.8) Mental Health BS: 43.5(1.8) LI: 44.8(1.7)	LI: 2.6(.8) Role Emotional BS:3.2(.9) LI: 1.5(.7) Mental Health BS: 4.1(.9) LI: 1.3(.7) **6 m** PC BS: 8.6(1.3) LI: 7.9(1.0) MC BS: 7.5(1.6) LI: 1.7(1.3) Phys Functioning BS:10.7(1.3) LI: 8.2(1.1) Role Phys BS: 8.4(1.4) LI: 6.0(1.2) Bodily Pain BS: 6.5(1.3) LI: 3.3(1.1) General Health BS: 7.4(1.3) LI: 7.6(1.0) Vitality BS: 11.4(1.5)		BS: $p>.05$ LI: $p>.05$ Role Emotional BS: $p>.05$ LI: $p>.05$ Mental Health BS: $p>.05$ LI: $p>.05$ **6 m** PC BS: $p>.05$ LI: $p>.05$ MC $p<.001$ BS: $p>.05$ LI: $p>.05$ Phys Functioning BS: $p>.05$ LI: $p>.05$ Role Phys BS: $p>.05$ LI: $p>.05$ Bodily Pain BS: $p>.05$ LI: $p>.05$ General Health BS: $p>.05$ LI: $p>.05$ Vitality

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
							LI: 8.1(1.2) Social Functioning BS: 11.2(1.6) LI: 3.9(1.4) Role Emotional BS: 6.2(1.6) LI: 2.4(1.3) Mental Health BS: 6.9(1.5) LI:1.8(1.2) **12 m** PC BS: 8.7(2.1) LI: 5.2(1.9) MC BS: 2.4(2.7) LI: 1(2.4) Phys Functioning BS: 10.9(2.1) LI: 6.9(1.9) Role Phys BS: 6.2(2.1) LI: 4.2(1.9) Bodily Pain BS: 3.6(2.2) LI:1.5(1.9) General Health BS: 8.4(2.0)		BS: $p>.05$ LI: $p>.05$ Social Functioning BS: $p>.05$ LI: $p>.05$ BS and LI $p<.001$ Role Emotional BS: $p>.05$ LI: $p>.05$ Mental Health BS: $p>.05$ LI: $p>.05$ **12 m** PC BS: $p>.05$ LI: $p>.05$ MC BS: $p>.05$ LI: $p>.05$ Phys Functioning BS: $p>.05$ LI: $p>.05$ Role Phys BS: $p>.05$ LI: $p>.05$ Bodily Pain BS: $p>.05$ LI: $p>.05$

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
							LI: 3.8(1.7) Vitality BS: 7.5(2.6) LI: 5.2(2.2) Social Functioning BS: 5.3(2.5) LI: 2.4(2.2) Role Emotional BS: 3.2(2.5) LI: 2.3(2.2) Mental Health BS: 1.8(2.4) LI:1(2.1)		General Health BS: *p*>.05 LI: *p*>.05 Vitality BS: *p*>.05 LI: *p*>.05 Social Functioning BS: *p*>.05 LI: *p*>.05 Role Emotional BS: *p*>.05 LI: *p*>.05 Mental Health BS: *p*>.05 LI: *p*>.05
Karlsson et al. (1998) Sweden Quasi-group design N=974	SG: Surgical group (gastric banding (28%), vertical band (65%) and gastric bypass (7%)) (n=487) LI: Lifestyle intervention (n=487)	SG: BMI=40(15.33) Age: 46.6(5.11) F=67.1% LI: BMI=38.7(8.17) Age: 47.7(6.13) F=67.1%	6 m 95% at follow-up 1y 98% at follow up 2y 98% at follow up	General	1) General Health rating Index (GHRI) 2) Sickness impact profile (SIP) 3) Mood adjective checklist (MACL)	Psychosocial Functioning (OP) SG: Male=1.6(1.33) Female=1.94(0.92) LI: Male=0.991.32) Female=1.45(0.92) SIP/SI SG: Male=10.4(16.34) Female=11.3(12.26)	Psychosocial Functioning SG: Male=0.60 (1.23) Female=0.84(0.92) LS: Male=0.92 (1.33) Female=1.28(6.64) SIP/SI SG: Male=7.0(21.46) Female=6.2(11.24) LS: Male=9.8(21.46) Female=8.2(15.33)p<.05 MACL Pleasant/Unpleasant SG:3.17(0.51) LI:3.02(0.61)	NR	Psychosocial Functioning SG: *p*<.0001 LI: *p*<.001 SIP/SI SG: *p*>.05 LI: p<.05 MACL Pleasant/Unpleasant SG: *p*<.01 LI: *p*>.05 Activation/Deactivation SG: *p*>.05 LI: *p*>.05

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
						LI: Male=8.2(18.39) Female=7.4(10.22) MACL Pleasant/Unpleasant SG: 2.96(0.61) LI: 3.04(0.61) Activation/Deactivation SG: 2.86(0.61) LI: 3.01(0.61) Calm/Tension SG: 2.90(0.61) LI: 2.98 (0.61)	Activation/Deactivation SG: 3.18(0.51) LI: 3.02(0.61 Calm/Tension SG: 3.11(0.51) LS: 2.97(0.72)		SG and LI $p<.001$ calm/tension SG: $p>.05$ LI: $p>.05$ SG and LI $p<.05$
Karlsen et al. 2013 Norway Quasi-group design N=146	GB: Gastric bypass (n =76) LI: Lifestyle intervention (n=63)	GB: BMI=46(6) Age: 43(11) F=70% LI: BMI=43(5) Age:47(11) F=70%	1y 100% at follow up	Weight Specific	Obesity and weight-loss Quality of Life (OWLQOL) Weight related symptom measure (WRSM) (combination of scales)	Emotional GB: 32(23) LI: 42(24) Number of Symptoms GB:12(4) LI:11(4) Symptom Distress GB: 43(21) LI:38(20)	Emotional GB: 42.7(25.5) LI: 15.7(21.7) Number of Symptoms GB:-5.3(4.6) LI:-2.9(4.7) Symptom Distress GB:-25.2(20.7) LI:-14.3(16.5)	NR	Emotional GB: $p>.05$ LI: $p>.05$ GB and LI $p<.001$ Number of Symptoms GB: $p>.05$ LI: $p>.05$ GB and LI $p=.012$ Symptom Distress GB: $p>.05$ LI: $p>.05$ GB and LI $p=.013$
				General	SF-36 (Composite)	PC GB: 34(10) LI: 39(10) MC	(Changes from Baseline) PC	NR	PC GB: $p>.05$ LI: $p>.05$ GB and LI $p<.001$

Study Country Design Sample size	Intervention *(n)*	Sample Characteristics	Follow up Retention	General or Weight Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
						GB: 41(11) LI: 42(11)	GB: 16.8(9.7) LI: 4.9(9.4) MC GB: 9.6(9.1) LI: 3.5(8.9)		 MC GB: $p>.05$ LI: $p>.05$ GB and LI: $p<.001$
O'Brien et al. (2013) Australia RCT N=47	LAGB: gastric banding (n=27) CL: Crossover to LAGB (n=10) MT: Medical treatment/life style (n=10)	LAGB: BMI= 33.62(1.93) Age: 53.58(6.18) F= 83.9 CL: BMI=33.76 (1.71) Age: 52.00(7.42) F=70% MT: BMI=33.19 (1.27) Age: 53.30(8.26) F=60%	10y 78% at follow up	General	SF-36 (Composite)	PC LAGB: 45.78(10.60) CL: 46.15(9.22) MT: 49.02(8.10) MC LAGB: 46.03(9.23) CL: 45.56(8.47) MT: 47.65(8.46)	PC LAGB: 48.00(10.53) CL: 49.28(5.65) MT: 52.76(3.90) MC LAGB: 50.77(6.27) CL: 50.32(8.65) MT: 49.59(5.71)	NR	PC LAGB: $p>.05$ CL: $p<.05$ MT: $p>.05$ MC LAGB: $p>.05$ CL: $p>.05$ MT: $p>.05$

Note. Data recorded as per study.

BMI= Body Mass Index
m= month(s)
y = years
PC= Physical Composite Score
MC= Mental Composite Score
F= Percentage of sample female

Table 2

Summary of studies examining Quality of Life in Bariatric Surgery Conditions

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
Brunault et al. (2011) France Cohort study N= 131	LAGB: Laparoscopic adjustable gastric banding (n=102) SG: Sleeve gastrectomy (n= 29)	LAGB: BMI=48.1 (6.1) Age: 39.3 (9.6) F=83% SG: BMI=54.3 (10.1) Age: 41.0 (10.6) F=75%	6m 12m 79% at follow up	Specific	Quality of Life, Obesity and Dietetics rating Scale (QOLOD) (Subscales)	Phys LAGB: 31.3(8.2) SG: 31.1(7.8) Psych/Social LAGB: 32.6(8.3) SG: 36.7(8.5) Sex LAGB:13.4(4.4) SG:14.9(4.6) Comfort w/ Food LAGB:13.4(4.2) SG:14.2(4.0) Diet Experience LAGB: 14.3(4.3) SG: 16.0(4.8)	**6m** Phys LAGB: 41.9(7.1) SG: 42.7(6.1) Psych/Social LAGB: 39.9(8.5) SG: 44.0 (8.5) Sex LAGB: 15.7(4.1) SG: 17.0(3.1) Comfort w/ Food LAGB:14.4(3.9) SG:17.2(3.9) Diet Experience LAGB:16.9(4.0) SG:18.3(5.4) **12 m**	**6m** Phys LAGB: $p<.0001$ SG: $p<.0001$ Psych/Social LAGB: $p<.0001$ SG: $p<.0001$ Sex LAGB: $p<.0001$ SG: $p<.0001$ Comfort w/ Food LAGB: $p<.0001$ SG: $p<.0001$ Diet	NR

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
							Phys LAGB: 43.1(6.9) SG: 42.4(7.1) Psych/Social LAGB: 40.5(8.3) SG: 42.7(9.6) Sex LAGB:15.9(3.9) SG:15.4(4.2) Comfort w/ Food LAGB:14.2(4.3) SG:15.4(4.2) Diet Experience LAGB:16.8(3.9) SG:16.9(5.7)	experience LAGB: *p*<.0001 SG: *p*<.0001 **12 m** Phys LAGB: *p>.05* SG: *p>.05* Psych/Social LAGB: *p>.05* SG: *p>.05* Sex LAGB: *p>.05* SG: *p>.05* Comfort w/ Food LAGB: *p>.05* SG: *p>.05* Diet Experience LAGB:	

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
								p>.05 SG: *p>.05*	
Lee et al. (2004) Taiwan RCT N=80	VB: Vertical banding gastroplasty (n= 40) GB: Gastric bypass (n= 40)	VB: BMI=43.14(6.1) Age: 32.5(7.8) F=72.5% GB: BMI= 43.18(7.5) Age: 31.6(8.6) F=67.5%	2y % follow up not reported		Gastrointestinal Quality of Life Index (GIQLI) (Global, Subscales)	Overall: 106.9 Symptoms: 63.7 Physical: 16.1 Emotional: 12.8 Social: 14.3	Global VB:106.4 GB:121.0 Symptoms VB: 54.3 GB: 60.9 Physical VB: 20.9 GB: 24.0 Emotional VB: 14.7 GB: 17.7 Social VB:16.5 GB: 18.4	NR	Global VB: *p>.05* GB: *p*<.05 Symptoms VB: *p*<.05 GB: *p*<.05 Physical VB: *p*<.05 GB: *p*<.05 Emotional VB: *p*<.05 GB: *p*<.05 Social VB: *p*<.05 GB: *p*<.05
Lee et al. (2005) Taiwan RCT N=80	GB: Gastric bypass surgery (n= 40) MGB: Mini gastric bypass surgery (n= 40)	GB: n= 40 BMI=43.8(4.8) Age: 31.1(9.1) F=70% MGB: BMI=44.8(8.8) Age:	1y % follow up NR		Gastrointestinal quality of life index (GIQLI) (Global, Subscales)	Overall GB: 99.6(19.1) MGB: 104.6(18.5) Symptoms GB: 59.8(7.0) MGB: 63.2(6.2) Physical GB: 14.6(6.3)	Global GB:113.3(16.1) MGB: 113.9(17.0) Symptoms GB: 60.1(9.0) MGB: 58.9(10.3) Physical	NR	Global GB: *p*<.01 MGB: *p*<.01 Symptoms GB: *p>.05* MGB: *p>.05* Physical GB: *p*<.01

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
		30.7(8.4) F=67.5%				MGB:16.2(5.9) Emotional GB: 12.0 (4.4) MGB:11.8(3.3) Social GB: 13.2(2.0) MGB:13.4(6.7)	GB: 20.9(4.8) MGB: 21.3(4.2) Emotional GB:15.0(3.7) MGB:15.8(4.8) Social GB:17.3(2.8) MGB)17.9(6.1)		MGB: $p<.01$ Emotional GB: $p<.01$ MGB: $p<.01$ Social GB: $p<.01$ MGB: $p<.01$
Nguyen et al. (2001) United States RCT N=155	LGB: Laparoscopic gastric bypass (n=79) OGB : Open gastric bypass (n=76)	LGB: BMI= 47.6(4.7) Age: 40(8.0) F=91% OGB: BMI=48.4(5.4) Age:42(9.0) F=88%	1m 75% at follow up 3m 6m 40% at follow up	General	SF-36 (subscales) Moorehead-Ardelt Quality of Life Questionnaire (MAQOLII) (subscales)	Phys Functioning LGB: 46.5(21.3) OGB: 40.0(24.4) Role Phys LGB: 47.2(40.2) OGB: 37.5(37.9) Bodily Pain LGB: 51.0(22.7) OGB: 48.7(24.1) General health LGB: 54.5(21.6)	**1m** Phys Functioning LGB: 60.9(24.7) OGB:46.3(24.7) Role Phys LGB: 29.7(39.2) OGB:18.5(32.3) Bodily Pain LGB: 59.2(21.5) OGB:45.1(24.1) General Health LGB:71.3(18.0) OGB:64.0(18.1) Vitality		**1m** Phys Functioning LGB: $p<.05$ OGB: $p<.05$ Role Phys LGB: $p<.05$ OGB: $p<.05$ Bodily Pain LGB: $p<.05$ OGB: $p<.05$ General Health LGB: $p>.05$ OGB: $p<.05$ Vitality LGB: $p<.05$

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
						OGB: 52.9(22.3) Vitality LGB: 38.5(20.0) OGB: 36.6(19.9) Social Functioning LGB: 64.4(26.3) OGB: 61.6(29.5) Role Emotional LGB: 49.1(24.4) OGB: 45.5(27.2) Mental Health LGB: 73.0(15.1) OGB: 71.9(17.3)	LGB:45.4(20.5) OGB:39.1(18.9) Social Functioning LGB:67.6(24.5) OGB:51.9(29.1) Role Emotional LGB:78.5(28.2) OGB:69.5(33.5) Mental Health LGB)76.8(17.4) OGB:70.8(19.4) **3m** Phys Functioning LGB: 80.2(19.1) OGB:16.8(26.6) Role Phys LGB:80.7(32.5) OGB: 76.8(33.3) Bodily Pain LGB:75.1(24.7) OGB: 68.1(25.6)		OGB: $p<.05$ Social Functioning LGB: $p<.05$ OGB: $p<.05$ Role Emotional LGB: $p>.05$ OGB: $p<.05$ Mental Health LGB: P>.05 OGB:P>.05 **3m** Phys Functioning LGB:$p>.05$ OGB: $p<.05$ Role Phys LGB: $p>.05$ OGB: $p>.05$ Bodily Pain LGB: $p>.05$ OGB:$p>.05$ General

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
							General Health LGB: 77.2(15.7) OGB:72.4(16.5) Vitality LGB: 65.8(17.7) OGB:73.1(99.2) Social Functioning LGB: 87.3(17.9) OGB:74.1(30.0) Role Emotional LGB: 83.0(29.6) OGB: 74.6(40.7) Mental Health LGB: 82.9(14.2) OGB: 75.0(19.2) **6m** MAQOL II Self-esteem		Health LGB: $p>.05$ OGB: $p>.05$ Vitality LGB: $p>.05$ OGB: $p>.05$ Social functioning LGB: $p>.05$ OGB: $p>.05$ Role Emotional LGB: $p>.05$ OGB: $p>.05$ Mental Health LGB: $p>.05$ OGB: $p>.05$ **6m** MAQOL II Self-esteem LGB:$p>.05$ OGB: $p>.05$ Physical LGB: $p>.05$

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
							LGB: 0.84(0.27) OGB: 0.80(0.28) Physical LGB: 0.37(0.17) OGB: 0.34(0.18) Social LGB: 0.33(0.19) OGB: 0.29(0.21) Labour LGB: 0.28(0.21) OGB: 0.21(0.27) Sexual LGB: 0.26(0.20) OGB: 0.19(0.26)		OGB: $p>.05$ Social LGB: $p>.05$ OGB: $p>.05$ Labour LGB: $p>.05$ OGB: $p>.05$ Sexual LGB: $p>.05$ OGB: $p>.05$

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
Puzziferri et al. (2006) United States RCT N=116	LGB: Laparoscopic gastric bypass (n=59) OGB: Open gastric bypass (n=57)	LGB: BMI=48(5.0) Age:47(7.0) F=95% OGB: BMI= 49(6.0) Age: 50(8.0) F=89%	3y 75% at follow up		Bariatric Analysis and Reporting Outcome System (BAROS)		BAROS LGB: 95% reported good, very good or excellent QOL OGB: 86% reported good, very good or excellent QOL	NR	NR
		LGB: n=22 OGB: n=22		General	MAQOLII (Subscales)	NR	Self-Esteem LGB: 0.89 OGB: 0.88 Physical activity LGB: 0.40 OGB: 0.36 Social LGB: 0.34 OGB: 0.33 Labour LGB: 0.33 OGB: 0.25 Sexual LGB: 0.20 OGB: 0.24	NR	Self-Esteem LGB: $p>.05$ OGB: $p>.05$ Physical activity LGB: $p>.05$ OGB: $p>.05$ Social LGB: $p>.05$ OGB: $p>.05$ Labour LGB: $p>.05$ OGB: $p>.05$ Sexual LGB: $p>.05$ OGB: $p>.05$

Study Country Design	Intervention *(n)*	Sample Characteristics	Follow up/retention	General or Specific	QOL Measure	QOL Baseline *M (SD)*	QOL Post-surgery *M (SD)*	Between group differences	Within group differences
Suter et al. (2005) United States RCT N=144	LB: Lapband (n=98) SAGB: Swedish adjustable gastric band (n=46)	LB: BMI=42.6(34.4-55.6) Age: 39.5(22-64) SAGB: BMI=43.4(34.3-51.6) Age: 36.3(19-69) Gender N/R	6/12m 100% at follow up 18/24m 87.2% at follow up 30/36 m 63.8% at follow up				**6m** LB:1.41 SAGB:1.28 **12m** LB: 1.59 SAGB:1.50 **18m** LB: 1.87 SAGB:1.65 **24m** LB: 2.03 SAGB: 1.83 **30m** LB: 1.81 SAGB: 1.86 **36m** LB:1.71 SAGB: 1.76	NR	**6m** LB: *p*>.05 SAGB: *p*>.05 **12m** 1LB: *p*>.05 SAGB: *p*>.05 **18m** LB: *p*>.05 SAGB: *p*>.05 **24m** LB: *p*>.05 SAGB: *p*>.05 **30m** LB: *p*>.05 SAGB: *p*>.05 **36m** LB: *p*>.05 SAGB: *p*>.05

Note. Data recorded as per study.

BMI= Body Mass Index

m= month(s)
y = years
PC= Physical Composite Score
MC= Mental Composite Score
F= Percentage of sample female

Figure 1
Click here to download Figure: 150114 flowchart.docx