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SYSTEMATIC REVIEW

Quality of life among adults following bariatric and body contouring surgery: a systematic review

Jo Gilmartin¹ • Fiona Bath-Hextall² • Joan Maclean¹ • Wendy Stanton² • Mark Soldin³

¹School of Healthcare, University of Leeds, UK affiliated to the University of Nottingham Centre for Evidence Based Healthcare, ²University of Nottingham Centre for Evidence-based Healthcare: a Joanna Briggs Institute Centre of Excellence, and ³Department of Plastic Surgery, St George's Hospital, London, UK

EXECUTIVE SUMMARY

Background

Weight loss following bariatric surgery is associated with significant improvements in obesity-related comorbidities, body satisfaction and psychosocial outcomes, at least in the short term. However, in the context of extreme weight loss, body image and appearance may worsen again because the “excess” or “loose” skin can lead to both functional and profound dissatisfaction with appearance. These concerns have led to an increasing uptake of post-bariatric surgery, “body-contouring” procedures but the implications for quality of life (QoL) have not been thoroughly considered.

Objective/purpose

The objective was to identify the best available evidence regarding the QoL outcomes for adults following bariatric and body contouring surgery.

Inclusion criteria

Types of participants

The review considered studies involving people aged 18 years and beyond who underwent bariatric surgery and body contouring surgery.

Types of interventions

The review considered studies that evaluated bariatric surgery as well as body contouring surgery.

Types of studies

The review considered both experimental and epidemiological study designs.

Outcomes

The primary outcomes were QoL as measured by validated tools at less than two years, two to five years and more than five years following body contouring surgery. The secondary outcomes were adverse events, unsatisfactory aesthetic appearance and weight gain.

Search strategy

Six databases were searched, including Cochrane Central, MEDLINE, Embase, Web of Science, PsycINFO and CINAHL. Studies published from 1954 to 2014 were considered. Additional searches for unpublished studies were undertaken in BIOSIS citation index, Register of Current Controlled Trials and Global Health Observatory.

Methodological quality

The methodological quality of eligible studies was assessed independently by two reviewers using the Joanna Briggs Institute quality assessment tool.

Data extraction

Data extraction from the included studies was undertaken and summarized independently by two reviewers using the standardized Joanna Briggs Institute data extraction tool.

Data synthesis

Studies were too heterogeneous and could not be pooled in statistical meta-analysis. Therefore, the data results are presented as a narrative summary in relation to the outcomes of interest.

Correspondence: Jo Gilmartin, j.gilmartin@leeds.ac.uk

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Results

Nine quantitative studies (four comparable cohort studies, including two group design and two four-group designs and five descriptive or case-series studies) were included in the review. The included studies reported significant clinical improvements in appearance, wellbeing and QoL. These included primary outcomes pointing to body image satisfaction, improved self-esteem and confidence, improved physical function/pain and improved social function. The secondary outcomes were related to adverse events in the early postoperative period and reported wound healing problems, including seromas, partial necrosis, dehiscence, hematoma and anemia because of blood loss. Also, some data sets shed light on appearance-related distress and body dysphoria post surgery associated with visible scars and contour deformities.

Conclusion

Body contouring surgery has been shown to have positive benefits, especially in relation to improved wellbeing, function and QoL. However, adjustment to changing body image following body contouring is both challenging and empowering and seems to be a transitional process.

Keywords bariatric surgery; body contouring; body contouring surgery; quality of life outcome; systematic review

Background

Obesity is one of the greatest public health problems in industrialized countries. In the United States, the United Kingdom and Australia, for instance, the prevalence of obesity (BMI > 30 kg/m²) has more than doubled in the past 25 years.¹ Currently, 67% of the US population are either obese or overweight, and in most European countries the prevalence ranges between 40 and 50%.² Obesity has severe impacts on health, increasing the risk of type 2 diabetes, hypertension, cardiovascular disease, dyslipidemia, depression and anxiety.³

Bariatric surgery refers to a group of surgical interventions which aim to limit the body's ability to consume and absorb food through the reduction of stomach capacity and/or intestinal length.^{4,5} According to the National Health Service (NHS) health and social care information center, bariatric surgery appears to be growing in the United Kingdom.⁶ It is estimated that approximately 80% of all bariatric surgery patients are women.⁷

A growing number of morbidly obese patients (BMI of 35 kg/m² or greater with comorbidities) are seeking surgical solutions such as bariatric surgery. Several reviews have concluded that weight loss is associated with improvements in weight-related health problems such as type 2 diabetes, hypertension and sleep apnea.^{4,8} Additionally, patients often report increased quality of life (QoL)⁹⁻¹¹ and improved physical health following weight loss.^{12,13} In the context of extreme weight loss following bariatric surgery, however, patients commonly experience body dissatisfaction and QoL

challenges because of the resultant excess skin on the abdomen, thighs, face and arms.¹³⁻¹⁵ Although a high proportion of patients (87%) in one study¹⁶ were happy with their weight loss, 70% of respondents considered that excess skin was a negative consequence for appearance and attributed this to "flappy skin" (53%), an abdominal overhang (47%) and pendulous breasts (42%). The main challenge following bariatric surgery is to manage ongoing comorbidities, assess functional impairment caused by excessive skin and detect patients at risk of continuing psychological distress. The excess of lax, overstretched skin may cause physical discomfort and psychosocial problems that interfere with QoL.¹⁷

The resultant redundant skin presents new concerns in a range of areas such as difficulties with mobility, hygiene problems, skin rashes, decreased activity, body image dissatisfaction and depression.^{18,19} There is evidence from an outcome study to suggest that some patients showed "normalization" in their levels of body dissatisfaction post weight loss and others continue to experience significantly impaired levels of body dissatisfaction.²⁰ Moreover, although numerous studies have established body dissatisfaction in bariatric surgery patients, a few studies have also shown that people who have lost weight through lifestyle changes may also report body dissatisfaction.^{21,22} These concerns have led to an increase in the uptake of post-bariatric "body contouring" procedures.^{23,24} Patient motivation appears to be akin to "fixing" of the body to uncover true identity, feel "normal" and improve

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lifestyle and QoL.⁵ Body contouring after weight loss (or reconstructive body contouring) refers to a series of procedures that eliminate excess skin and fat that remains after previously obese individuals have lost a significant amount of weight in a variety of places, including the torso, upper arms, chest and thighs.²³

Several recent quantitative studies have investigated psychosocial outcomes of body contouring surgery, reporting on changes in appearance, well-being and QoL. Quality of life outcomes included physical function and feeling of healthiness,²⁵ improvements in psychological and mental well-being,²⁶ stability in mood,¹⁸ body image satisfaction,^{27,28} identity transformation and changed lifestyle,²⁹ improved social acceptance²⁵ and greater involvement in the social and cultural performance domain.³⁰ Other contemporary qualitative studies reported that “shame and self-acceptance” appear to be in a continued sense of flux following body contouring, in which embodiment is destabilized and the relationship between the self and the body is confused.³¹ This particular study goes on to suggest that considerable distress continues to be experienced in relation to the body, including feelings of shame and disgust, which affect not only the relationship with the self, but also restrict the relationships with others. Moreover, a further contemporary study alluded to the negativity associated with early scarring following body contouring with women’s accounts in particular alluding to looking “mutilated,” “ugly” or “shocking.”³² Thus, perceptions of body image were consequently highly diverse, ambivalent and shifting.

The most common serious adverse effects following body contouring surgery for massive weight loss (MWL) are wound-healing deficits, including wound break downs and seroma formation.^{33,34} One retrospective study²⁶ of 41 abdominoplasties reported that seven patients had postoperative complications, including four hematomas and three abscesses that required secondary intervention. They went on to report other minor incidents, including 10 seromas, five hematomas and three focal skin necroses with no long-term consequences. Seroma development can promote scar tissue formation and tissue pressure impeding contour outcome and prolong recovery time. A further retrospective follow-up study of 21 women who underwent a circular belt lipectomy reported wound-healing problems.³⁵ Six patients had partial wound dehiscence, two patients

had hematoma and three patients had minor infections of the umbilicus. Six of the eight patients with complications were reported as smokers. Although blood-clotting analysis had not shown any abnormalities, four patients in this particular study were given blood transfusions to manage hemoglobin drops of 2.3 mmol/l. Another retrospective chart review pointed to deforming late complications, including dog ears, problematic scars and relative hypertrophy of the mons pubis among 25 abdominoplasty patients.³³ The potential risk of thromboembolism appears to be low and one recent chart review foregrounds evidence of a useful algorithm to prevent the development of this particular complication.³⁶

Body contouring surgery to remove excess skin improves long-term weight control in patients who undergo bariatric surgery, especially following Roux-en-Y gastric bypass (RYGBP). A fairly recent matched control study reported the weight regain after seven years was 22.9 kg for patients with RYGBP alone; and only 6.2 kg for those with gastric bypass and body contouring.³⁷ Another analysis of clinical records of MWL patients who underwent body contouring surgery reported that gastric bypass patients maintained weight loss better than “diet” patients.³⁸ Shermak *et al.*³⁸ went on to suggest that weight loss diminished over time for gastric bypass patients, with eventual weight gain, comparable with that seen in the general population with increase in age.

In addition, the gold standard to assess QoL following body contouring surgery is to use patient-specific psychometrically validated patient-reported outcome (PRO) measures.³⁹ Patient-reported outcome instruments report the status of a patient’s condition that comes directly from the service user without any interpretation from health professionals. A systematic review of PRO instruments to measure QoL and patient satisfaction following body contouring surgery was undertaken by Reavey *et al.*⁴⁰ They discerned five PRO measures with varying psychometric validity: one general plastic surgery (Derriford appearance scale 59), three breast reduction (the Breast Reduction Assessed Severity Scale Questionnaire, Breast Related Symptoms Questionnaire, Breast-Q) and one liposuction instrument (the Freiburg Questionnaire on Aesthetic Dermatology and Cosmetic Surgery) and the Assessed Severity Scale

Questionnaire. Following on from this, Reavey *et al.*⁴⁰ appealed for the development of new PRO measures for this specific population.

Another fairly recent critical review examined PRO measures related to a variety of psychosocial issues, such as QoL, body image or sexual function following body contouring surgery.³⁹ This review also identified a scarcity of validated PRO measures (PROMS) for this population. In terms of QoL outcomes, general instruments such as health-related QoL, the 36 Item Short Form Health Survey (SF-36) or the life satisfaction questionnaire appear to be employed without subscales about factors directly or specifically relevant for this particular group. Therefore, there is an urgent need to develop a well-constructed PRO instrument to obtain reliable information regarding QoL and patient satisfaction following body contouring surgery. Against this background, this review will focus on QoL among adults following body contouring surgery.

A preliminary search of the following databases: Cochrane Central Register of Controlled Trials (CENTRAL), PubMed/MEDLINE, CINAHL and PsycINFO have indicated that there is currently no systematic review either underway or published on this topic. This is the first systematic review to look at QoL among adults following body contouring surgery after bariatric surgery. The objectives, inclusion criteria and methods of analysis for this review were specified in advance and documented in a protocol.⁴¹

Review objective/question

The objective of this review was to identify the best available evidence regarding the QoL outcomes for adults following bariatric and body contouring surgery.

Specifically the review question was How does body contouring surgery following bariatric surgery influence QoL among adults?

Inclusion criteria

Types of participants

Studies including adult patients, 18 years and over, who have had bariatric surgery and body contouring surgery were considered for inclusion in this review.

Types of intervention(s)

The review considered studies that evaluated body contouring surgery following bariatric surgery.

Types of bariatric surgery procedures considered included: temporary gastric balloon, adjustable gastric banding, sleeve gastrectomy, biliopancreatic diversion (BPD), BPD duodenal switch modifications and RYGBP. Excluded interventions included the jejunoileal bypass procedure, as it is no longer recommended in Europe and the United States because of unacceptably high morbidity and mortality rates associated with the procedure.⁴²

Types of body contouring surgery procedures considered included: any type of body contouring surgical procedure, including but not limited to abdominoplasty (tummy tuck), fleur-de-lis abdominoplasty (tummy tuck and liposuction of back and buttocks), apronectomy (mini-tummy tuck), mastopexy (breast lift), thigh lift or mini-thigh lift and brachioplasty (arm lift).

Eligibility for body contouring surgery includes: a current BMI of less than or equal to 28.0 kg/m², weight stability over 12 months and significant functional disturbances (both physical and psychological) following MWL (from either post-bariatric surgery or lifestyle changes).

Comparisons were considered as follows:

- Body contouring surgery versus no body contouring.
- Body contouring surgery with multiple area procedures versus single-area procedures.

Outcomes

The review considered studies that included the following outcome measures:

Primary outcomes: QoL as measured by validated tools at less than two years, two to five years and more than five years following body contouring surgery, to distinguish between short-term and longer term outcomes, if reported in the included studies.

Validated health status tools considered included: Pictorial Body Image Assessment, Body Image and Satisfaction Assessment, Current Body Image Assessment (CBIA), Health-Related Quality of Life, Post Bariatric Surgery Quality of Life (PBSQOL) survey, Beck's inventory, Hospital Anxiety And Depression Scale, SF-36, Quality of Life Instrument, Body Uneasiness Test, Obesity Psychosocial State Questionnaire (OBSQ).

Secondary outcomes: adverse events (as reported in the included studies), unsatisfactory aesthetic appearance and/or weight gain.

Types of studies

The review considered both experimental and epidemiological study designs, including randomized controlled trials, non-randomized controlled trials, quasi-experimental, before and after studies, prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies and case-series studies.

Search strategy

The search strategy aimed to find both published and unpublished studies. A three-step search strategy was utilized in this review. An initial limited search of MEDLINE and CINAHL was undertaken followed by analysis of the text words contained in the title and abstract, and the index terms used to describe the articles. A second search using all identified keywords and index terms was undertaken across all included databases. Third, the reference list of all identified reports and articles was searched for additional studies. Only studies published in the English language are considered for inclusion in this review. Studies published from 1954 to 2014 are considered for inclusion in this review, as this is the earliest recorded date of bariatric surgery being introduced into clinical practice.⁴³

The databases searched included: Cochrane Central, MEDLINE, Embase, Web of Science, PsycINFO and CINAHL.

The search terms strategy employed and one database search is presented in Appendix I.

The search for unpublished studies included: BIOSIS citation index, Register of Current Controlled Trials and Global Health Observatory.

Assessment of methodological quality

The methodological quality of studies selected was assessed by two independent reviewers (JG and JM) using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix II). Any disagreements that emerged between the reviewers were resolved through discussion.

Data extraction

Data was extracted from studies included in the review by two independent reviewers using the standardized data extraction tool from JBI-

MAStARI (Appendix III). The data extracted included specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives. Any disagreements that emerged between the reviewers were resolved through discussion.

Data synthesis

Studies were too heterogeneous to be pooled in statistical meta-analysis using JBI-MAStARI. There were several sources of variability or heterogeneity among the included studies. Variability was noted in the participants' age, sex and characteristics, the types of outcome measurements employed and the timing of the outcomes (<2 years or >2 years). Moreover, there was variability in the quality of outcome reported between the studies. For example, Coriddi *et al.*⁴⁴ placed weighting on functional outcomes related to QoL and in contrast Van der Beek *et al.*⁴⁵ were more explicit about a range of QoL domains. Methodological heterogeneity hinged on aspects of diverse designs across the nine included studies in terms of applying different interventions, and method of patient selection was diverse.

Of the included studies, the majority reported mean and SDs or statistically significant change in the intervention group, before or after body contouring with only a few studies reporting data from a control group. The main justification for omitting meta-analysis was the lack of numerical data (mean and SDs and confidence intervals for both the intervention and the control group) reported in the included studies, which would have allowed estimation of the effects of the body contouring intervention. Therefore, the results are presented in narrative form according to outcomes of interest. Tables and figures to aid in data presentation are employed, wherever appropriate.

Review results

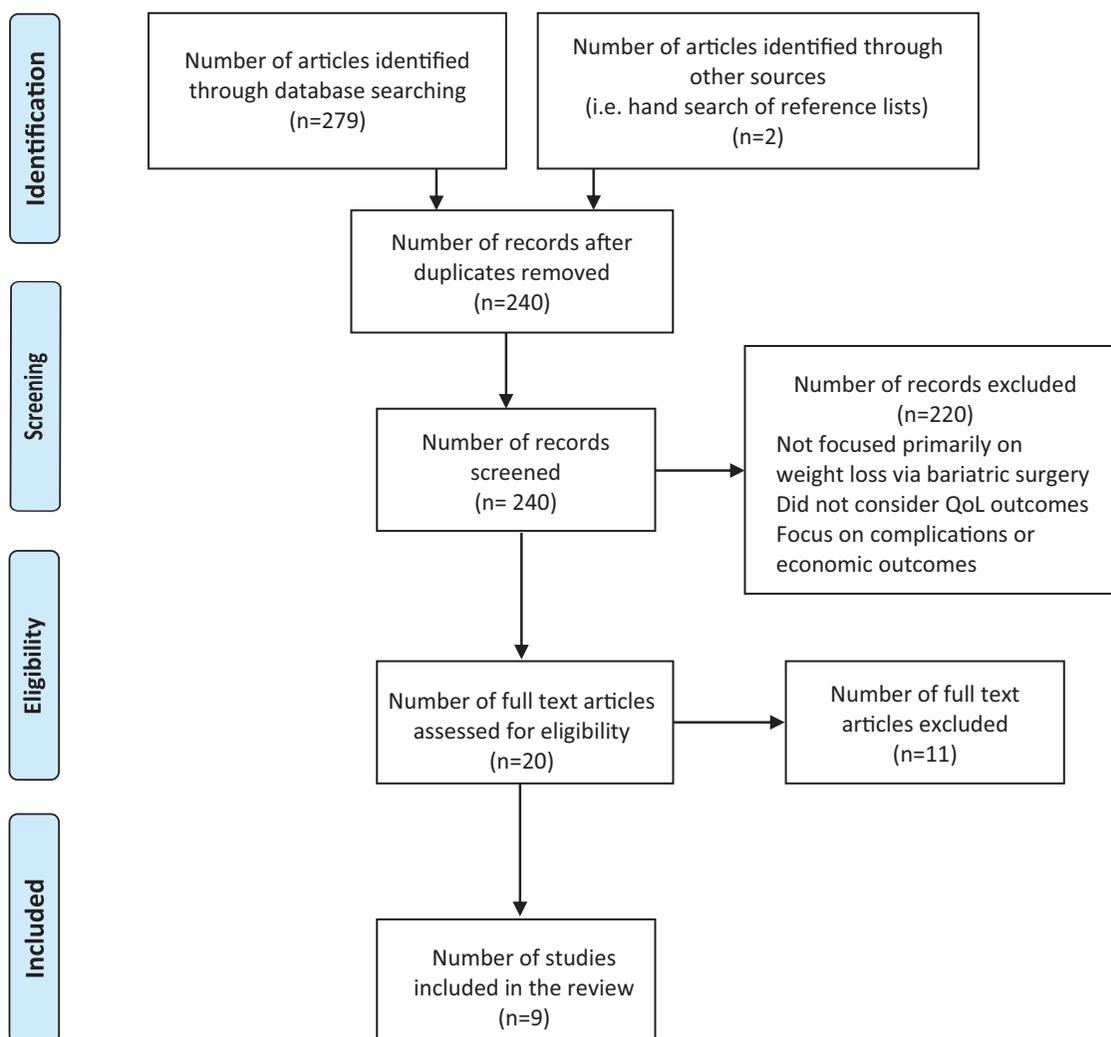
Description of studies

From the search of databases reported above, 279 potentially relevant citations/records were identified and two by hand search, resulting in 281 citations. Following the removal of 41 duplicate citations, the remaining titles and abstracts were then carefully assessed on the basis of the eligibility criteria. During this process, 220 records were excluded, leaving 20 studies that were retrieved in full for further inspection. A total of nine studies met the inclusion criteria

totaling 480 participants. Schematic presentation of this process is shown in Figure 1.

The details of the nine included studies are provided in Appendix IV. Four of these were comparable cohort studies (two two-group design^{48,50} and two four-group design^{51,52}) and five were descriptive or case-series studies,^{44,45,47,49,53} as seen in Table 1. Studies were published in 2003–2013. Of the included studies, three were carried out in the United States ($n=3$), one was undertaken in Brazil ($n=1$) and the remaining studies were undertaken in

European countries, including Geneva ($n=1$), Turkey ($n=1$), Italy ($n=1$), Austria ($n=1$) and the Netherlands ($n=1$). The age range of the participants was from 31 to 48 years and an average BMI before body contouring surgery was 29.4 kg/m². The majority of the studies included a mix of female and male participants; however, two studies^{47,52} only included female patients. The list of excluded studies (and the reasons for exclusion) is provided in Appendix V. Nine studies were critically appraised. No studies were excluded after critical appraisal.



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

Figure 1: Flowchart showing the study selection process⁴⁶

Table 1: Methodological quality of included comparable cohort/case-control studies

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Modarressi <i>et al.</i> , 2013 ⁴⁹	Y	Y	Y	N	Y	Y	N	Y	Y
Steurz <i>et al.</i> , 2008 ⁵¹	Y	Y	Y	N	Y	Y	N	Y	Y
Pecori <i>et al.</i> , 2007 ⁵²	Unclear	Y	Y	N	Y	Y	Unclear	Y	Y
Singh <i>et al.</i> , 2012 ⁵³	Y	Y	Y	Y	Y	Y	N	Y	Y

N, no; Y, yes.

Methodological quality

The overall quality of the selected studies is summarized in Tables 1 and 2; good agreement was noted by the two reviewers at the appraisal stage. In the comparable cohort studies (Table 1) representativeness was apparent in all studies except one.⁵¹ None had assessed participants at a point which exceeded two years.

Of the descriptive case-series studies (Table 2), all clearly defined inclusion criteria and adopted reliable outcome measures. Only two of the studies^{47,48} presented follow-up beyond two years.

Results

Primary outcomes: quality of life following bariatric and body contouring surgery

A range of primary QoL outcomes was assessed in the studies and results are discussed in a narrative summary below. The results are organized and presented by QoL outcomes.

Quality of life at less than 2 years following body contouring surgery

Body image/appearance

Seven of the nine studies fell in the less-than-two-year classification and two studies assessed body

image and appearance-related concerns, especially in regard to measuring changes resulting from body contouring treatment.^{50,51} Of these two studies, both assessed body image combined with other contemporary social and cultural norms of the post-surgical body such as “ideal body silhouette.”⁵⁰ The body image outcome was not only assessed in terms of body size and shape but in some studies this outcome was concordant with function and normality.

Song *et al.*⁵⁰ conducted a pretest-posttest study among 16 female and two male participants (mean age 46 ± 10 who underwent both bariatric and body contouring surgery in a follow-up period of three to six months). A battery of instruments was used in the follow-up assessments, including a body image and satisfaction scale in conjunction with a pictorial body image assessment and a current body image assessment scale. Statistical testing was performed using the Student's *t* test and Analyses of Variance (ANOVA), with *P* less than 0.05 considered statistically significant. Body image scores improved with body contouring surgery at three months (Table 3) but reported data on ideal body silhouette showed no distinctive difference between the before and after test at six months (Table 4). At three months, there was a statistically significant improvement in body

Table 2: Methodological quality of included for descriptive/case-series studies

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Cintra <i>et al.</i> , 2008 ⁴⁷	N	Y	Unclear	N	N	Y	N	Y	Y
Coriddi <i>et al.</i> , 2011 ⁴⁴	N	Y	Unclear	Y	N	Y	N	Y	Y
Menderes <i>et al.</i> , 2003 ⁴⁸	N	Y	Unclear	Y	N/A	Y	Unclear	Y	Y
Song <i>et al.</i> , 2006 ⁵⁰	N	Y	Y	Y	N/A	Y	N	Y	Y
Van der Beek <i>et al.</i> , 2010 ⁴⁵	N	Y	Y	Y	N/A	Y	N	Y	Y

N, no; N/A, not applicable; Y, yes.

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Table 3: Body image outcomes after 3 months following body contouring surgery Pictorial Body Image Assessment, Body Image and Satisfaction Assessment and Current Body Image Assessment⁵⁰

Primary QoL outcome	Intervention group before body contouring	Intervention group after body contouring
Body perception of appearance	9.1 ± 2.0	9.1 ± 1.9
Current perception	4.7 ± 1.5	3.3 ± 1.4*
Body image and satisfaction	49 ± 18	64 ± 24**
Ideal body silhouette	2.6 ± 0.9	2.2 ± 0.9*

Values presented are mean ± SD.

QoL, quality of life.

* $P < 0.05$.** $P < 0.01$.

image satisfaction with the total Body Image And Satisfaction Assessment increasing from 49 ± 18 to 64 ± 24 , $P < 0.01$. This particular improvement remained stable at six months, with a mean overall score of 65 ± 20 , $P < 0.05$. This increase was because of improvement in four areas of the torso, including the abdomen, buttocks, hips and thighs ($P < 0.05$).

Steurz *et al.*⁵¹ carried out a before and after study among 60 women and men (range 30-47 years of age) with morbid obesity. All of the participants underwent bariatric surgery and 34 received abdominoplasty after weight loss. The 26 participants in the control group received no body contouring intervention. Body image outcomes were measured using a body assessment instrument and a body perception questionnaire. Follow-up assessments were conducted at three and 12 months post body contouring surgery. The Mann-Whitney *U* test was used for intergroup differences in ordinal variables and nominal variables were analyzed with the Pearson χ^2 test.

Significant statistical difference was observed in the scores in the body contouring group in comparison with the control group. The data reported on attractiveness/self-confidence ranged from 9.45 (mean) in the control group to 10.52 (mean) in the intervention group. The same study reported data on measurement of accentuation of external appearance; this data set ranged from 7.37 in the control group to 8.37 in the post body contouring group. It was noted that worry about possible physical deficits showed a score of 3.35 in the control group in comparison with 4.03 in the post-plastic surgery group (Table 5). The higher scores reflect increase in accentuation of external appearance. However, Steurz *et al.*⁵¹ conclude in their study that while body contouring surgery can reduce body image distress, it should not be expected to improve other areas of psychosocial functioning. They stated that 34.6% of their participants reported feeling “bad” because the surgery did not heal their “psychological narcissistic wounds”.

Table 4: Body image outcomes after 6 months following body contouring surgery using Pictorial Body Image Assessment, Body Image and Satisfaction Assessment and Current Body Image Assessment⁵⁰

Primary QoL outcome	Intervention group before body contouring	Intervention group after body contouring
Body perception of appearance	9.1 ± 2.0	8.9 ± 2.6
Current perception	4.7 ± 1.5	3.7 ± 1.3*
Body image and satisfaction	Not reported	65 ± 20*
Ideal body silhouette	2.6 ± 0.9	2.6 ± 1.2

Values presented are mean ± SD.

QoL, quality of life.

* $P < 0.05$.

Table 5: Body image and appearance outcome scores at 12 months following abdominoplasty using a body image questionnaire⁵¹

Primary QoL outcome	Control (before)	Intervention (before)	Control (after)	Intervention (after)
Attractiveness/self-confidence	8.50	5.73	9.45	10.52***
Accentuation of external appearance	7.31	7.52	7.37	8.35
Worry about possible physical deficits	4.38	3.73	3.35	4.03
Problems regarding sexuality	1.88	2.24	1.45	2.42

Values presented are mean values.
QoL, quality of life.
*** $P < 0.001$.

Self-esteem/confidence

Two of the studies measured self-esteem/confidence following body contouring, which is interconnected to the changing perception of body image and wellbeing.^{49,51}

A statistically significant post-surgical improvement was found in the subscale for attractiveness/self-esteem and body image in the plastic surgery group reported in the study performed by Steurz *et al.*⁵¹ Scores in the control group were found to decrease and then rise again after the second follow-up. It is important to note that the mean self-confidence/attractiveness for the control group at the first point of measurement (Table 5) was considerably higher than that of the group electing for body contouring and only just lower than the mean score for the surgery group postoperatively. The authors have suggested that, while abdominoplasty could be perceived as an effective way to reduce body image distress, expectations of improvement of general psychological functioning might be too much to expect from the plastic surgery procedure.

Modarressi *et al.*⁴⁹ conducted a before and after study in Geneva to determine the benefits of plastic surgery on QoL. The sample included women and men with a mean age of 38.6 years (ranging from

34 to 45 years) in the control group and a mean age of 42.6 years (ranging from 31 to 48 years) in the intervention group. Of the control group, the sample size consisted of 102 participants ($n = 102$) who underwent gastric bypass surgery and the intervention group comprised 98 patients ($n = 98$). Quality of life and self-esteem were measured using the Moorehead-Ardelt questionnaire. Outcome comparisons were undertaken by two-tailed paired Student *t* test to a statistical significance level of 5% ($P < 0.05$). A statistically significant difference was observed in the self-esteem score (Table 6) between the intervention and control group at and up to two years post-plastic surgery. Based on this changing and enhanced trend in self-esteem, body contouring appears to be an effective intervention.

Physical function and pain

Of the seven studies falling in the less than two-year classification, six measured aspects of physical function, with Coriddi *et al.*'s⁴⁴ study offering the most comprehensive assessment of both function and pain.

Coriddi *et al.*'s⁴⁴ telephone survey of 49 patients (40 women, nine men) post contouring surgery was heavily physically orientated, drawing on the Barthel Activities of Daily Living Index and the Functional

Table 6: Self-esteem scores at less than 2 years following body contouring using the Moorehead–Ardelt questionnaire⁴⁹

Primary QoL outcome	Control group (before)	Intervention group (before)	Control group (after)	Intervention group (after)
Self-esteem	0.71	0.71	0.70	0.85 $P < 0.001$

Values presented are mean scores.
QoL, quality of life.

Table 7: Functional outcome scores pre and post body contouring surgery⁴⁴

Outcome	Pre body contouring score	Post body contouring score
Neck pain	2.52	2.02*
Back pain	5.63	2.1***
Shoulder pain	2.63	2.00
Abdominal pain	5.96	1.43***
Pain during exercise	6.17	1.83***
Difficulty with walking	4.96	1.57***
Difficulty with standing	4.94	1.88***
Difficulty with posture	5.04	1.94***
Difficulty with sleeping	5.31	1.48***
Difficulty with travel	5.10	1.55***
Difficulty with work tasks	3.66	1.39***
Difficulty with personal hygiene	7.20	1.25***
Difficulty with toilet habits	3.51	1.27***
Difficulty finding clothes	7.51	2.04***
Lymphedema	3.35	1.65***
Skin irritation	6.61	1.16***
Lower extremity paresthesia	2.84	1.45***
Lower extremity weakness	2.84	1.63**
Ability to climb stairs	4.78	1.80***
Ability to descend stairs	4.20	1.63***
Ability to jog/run	7.43	2.97***
Ability to rise from squatting position	5.89	1.57***
Ability to play with kids	5.52	1.35***
Ability to do household tasks	4.76	1.51***

Values presented are mean.

* $P \leq 0.05$.

** $P \leq 0.0005$.

*** $P \leq 0.0001$.

Rating Index, thereby addressing a good range of physical function, including pain experience.

Before and after testing using Wilcoxon-signed rank demonstrated statistically significant improvement in 23 of 24 functional outcomes after body contouring, as shown in Table 7. Larger resection weights were associated with greater improvement in back and neck pain, and regression analysis demonstrated statistically significant ($P < 0.05$) association between higher maximum and pre-contour BMI and improvement in physical function.

Singh *et al.*⁵³ studied 104 patients in four groups: control ($n = 27$), obese pre-bariatric surgery ($n = 31$), post-bariatric surgery ($n = 30$) and post body contouring surgery ($n = 16$). Health-related QoL was measured with the SF-36, which addresses pain and physical function as well as mental function.⁵³ Three of the eight SF-36 domains are dedicated to these aspects (physical function, role physical and bodily pain), whereas a further two, general health and vitality, address them in part along with mental aspects (Tables 8-9).

Table 8: SF-36 physical scales for pre bariatric and post body contouring groups⁵³

Outcome	Obese	Post body contouring
Physical function	0.62	0.86***
Role physical	0.71	0.80
Bodily pain	0.62	0.65
General health	0.53	0.90***
Vitality	0.58	0.69*

Values presented are mean.

* $P \leq 0.05$.

** $P \leq 0.0005$.

*** $P \leq 0.0001$.

When compared with the obese group by *t* test, scores in the post body contouring surgery group showed statistically significant improvement; however, comparison with the post-bariatric surgery group demonstrated no statistically significant improvement in physical aspects.

Song *et al.*⁵⁰ also used – as part of a battery – a modification of the SF-36 to measure physical function and distress as two of five domains. In addition, other aspects of QoL were measured by way of the post-bariatric surgery QoL scale. Total, 18 (16 women, 2 men) post-bariatric surgery patients were recruited and surveyed pre-body contouring surgery and then at 3 ($n = 18$) and 6 ($n = 13$) months. SF-36 scores subjected to ANOVA demonstrated statistically significant improvement related to the surgically induced MWL (mean improvement 59%, $P < 0.01$), but body contouring surgery was not associated with

Table 9: SF-36 physical scales for post bariatric and post body contouring groups⁵³

Outcome	Post bariatric surgery	Post body contouring
Physical function	0.89	0.86
Role physical	0.93	0.80
Bodily pain	0.82	0.65
General health	0.85	0.90
Vitality	0.76	0.69

Values presented are mean.

* $P \leq 0.05$.

** $P \leq 0.0005$.

*** $P \leq 0.0001$.

any significant improvement at three or six months. Post-bariatric surgery QoL scores, however, showed statistically significant improvement in scores after body contouring surgery with a 55% mean improved score ($P < 0.01$) on all measures except skin infection.

Van der Beek *et al.*'s⁴⁵ study measured QoL after body contouring surgery in 43 (41 women, two men) participants. The instrument used – the OPSQ – includes 15 items (out of 43 total), which address physical function. A statistically significant improvement pre and post surgery was indicated by *t* test scores on the physical scale.

Modarressi *et al.*⁴⁹ studied 98 patients who underwent body contouring surgery following RYGBP, and a control group of 102 roux-en-bypass-only patients. Physical function was measured by the “physical activity” domain of the Moorehead-Ardelt questionnaire, and this was evaluated as improved by both sets of participants. Compared using *t* testing, the group undergoing body contouring surgery had a statistically significant increase in domain mean score from 0.32 before surgery to 0.38 after ($P < 0.05$).

Studies in the less than two-year group with little focus on physical function included Pecori *et al.*⁵² who addressed aspects of image and appearance rather than physical function. Steurz *et al.*'s⁵¹ study was similarly focused, with just one of its four measures assessing physical aspect in one dimension only.

Social function

In the less than two-year classification, Van der Beek *et al.*⁴⁵ and Singh *et al.*⁵³ both offered substantial information about social function in the context of their studies.

Van der Beek *et al.*'s⁴⁵ use of the OPSQ for their 43 post body contouring surgery participants (see

Table 10: Obesity Psychosocial State Questionnaire scores pre and post body contouring surgery⁴⁵

Outcome	Pre body contouring surgery	Post body contouring surgery
Physical function	3.58 (0.75)	2.34 (0.74)*

Values presented are mean (SD).

* $P < 0.001$.

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Outcome	Pre body contouring surgery	Post body contouring surgery
Social acceptance	3.42 (1.16)	2.28 (0.77)**
Social network	2.79 (0.98)	2.22 (0.78)*
Mental wellbeing	3.42 (0.97)	2.48 (0.89)**

Values presented are mean (SD).

* $P < 0.05$.** $P < 0.001$.

previous subsections) yielded data for four items on social acceptance and two items on social networks. In addition, the instrument measured six mental wellbeing items. The study demonstrated, by way of *t* test, statistically significant improvement in the social acceptance and network scores as well as improvement in mental wellbeing (Tables 10–11).

Singh *et al.*⁵³ employed the SF-36 in their study of 104 patients in four groups: control ($n = 27$), obese pre-bariatric surgery ($n = 31$), post-bariatric surgery ($n = 30$) and post body contouring surgery ($n = 16$). SF-36 includes a measure of social function, whereas its role emotional scale also assesses function in daily activities.⁵³

Using ANOVA and *t* test, Singh *et al.*'s⁵³ study demonstrated improvements in social function and role emotional scores after bariatric surgery; comparison of the obese (pre-surgery) group with the post body contouring surgery group demonstrated a statistically significant difference in function (Table 12). However, comparison of the body contouring group with the post-bariatric surgery group showed no improvement – indeed the social function scores were worse in the post body contouring participant group (Table 13).

Table 12: SF-36 social function and role emotional scales for pre bariatric and post body contouring groups⁵³

Outcome	Obese	Post body contouring
Social function	0.65	0.76*
Role emotional	0.8	0.84

Values presented are mean.

Table 13: SF-36 social function and role emotional scales for post bariatric and post body contouring groups⁵³

Outcome	Post bariatric surgery	Post body contouring
Social function	0.9	0.76*
Role emotional	0.94	0.84**

Values presented are mean.

* $P < 0.05$.** $P < 0.005$.

The study carried out by Song *et al.*,⁵⁰ though concentrating on body image, also used the SF-36 but scores on the social subscales were not addressed. Further information about social function is offered by Modarressi *et al.*,⁴⁹ comparing patients undergoing body contouring surgery ($n = 98$) with those having RYGBP alone ($n = 102$). The Moorehead–Ardelt questionnaire measures social life as one of its five domains. Although bypass alone improved social life scores from the pre-surgical obese state, body contouring surgery resulted in a statistically significant difference on *t* test (mean score pre-body contouring surgery 0.2, mean score post body contouring surgery 0.3, $P < 0.001$). Other studies paid less attention to specific measures of social function. The focus of studies by Steurz *et al.*⁵¹ and Pecori *et al.*⁵² was body image; although Steurz *et al.*⁵¹ included items on leisure, friends and relatives, no change was evident in relation to body contouring surgery. Meanwhile, Coriddi *et al.*⁴² concentrated almost entirely on physical functional status rather than social.

Primary Quality of Life outcomes following body contouring from two to five years*Body image/appearance*

Two of the included studies were arranged in this particular category. Of these, one study in particular considered appearance matters. Menderes *et al.*⁴⁸ performed a pretest-posttest study in Turkey among 11 morbidly patients (mean age 37.4 years, ranging from 24 to 65 years) who underwent bariatric and body contouring surgery. The sample included four male and seven female participants. The authors used the Derriford appearance scale to evaluate

Table 14: Appearance outcome scores at 25 months post body contouring using Derriford appearance scale 59⁴⁸

Primary QoL outcome	Before body contouring	After body contouring
General self-consciousness	27.6 (3.1)	21.2 (1.9)
Social self-consciousness	19.4 (2.1)	16.6 (1.8)
Self-consciousness reappearance	11.8 (2.3)	8.2 (1.6)

Values presented are mean \pm SD.
QoL, quality of life.

general self-consciousness of appearance. The results from this study are displayed in Table 14, indicating a statistically significant difference in body image and self-acceptance up to 25 months post plastic surgery. The authors concluded that body contouring improves the patient's general, sexual and bodily self-consciousness. In contrast to the previous studies, the increasing body esteem and self-acceptance might be attributed to late scarring which contributes to dramatic shifts in appearance and increasing body esteem.³³

Self-esteem/confidence

One of the two included studies (two-to-five-year post-contouring group) measured self-esteem/confidence following body contouring which is interconnected to the changing perception of body image and wellbeing.⁴⁷

Cintra *et al.*⁴⁷ also investigated QoL, including self-esteem and social and cultural domains after abdominoplasty in 16 women (age 40.1 \pm 8.0 years) who had previously undergone bariatric surgery in Brazil. Quality of life was assessed by a psychologist employing the "adaptive diagnostic scale," which is designed to measure affectivity, relationships, productivity, social and cultural performance and somatic health. The interview was conducted one to three years post surgery. Most strikingly, the domain of cultural and social adaptation rendered the best results, with 81.3% of the participants showing the highest level of adaption. In the other three domains (affect, relationships and productivity), 62.5% of the tests displayed the highest level of adaption with few complete failures. The authors reported an overall percentage of 43.8% of patients having a "good adaption," leaving 56.2% with mild-to-severe maladaptation. The postoperative time variable could account for some of the variation in the results but this is not explored or discussed.

Physical function and pain

Of the two studies in the two-to-five-year classification, Cintra *et al.*⁴⁷ assessed QoL using the Adaptive Operationalised Diagnostic Scale. In total, 68.8% of the sample of 16 female post-abdominoplasty patients reported themselves as "disability free" via the subtopic of the "organic/somatic health" domain.

Menderes *et al.*⁴⁸ concentrated on participants' measurement of appearance rather than any evaluation of their physical symptoms.

Social function

Of the two studies in the two-to-five-year classification only one addressed this: Cintra *et al.*'s⁴⁷ QoL study using the Adaptive Operationalised Diagnostic Scale included social and cultural "performance" as one of four assessed domains. In total, 81.3% of 16 female patients reported "excellent" adaptation in this domain, following abdominoplasty. As above, Menderes *et al.*⁴⁸ did not specifically evaluate social function.

Secondary outcomes

Adverse events and patient dissatisfaction

Four of the included studies reported adverse events. Cintra *et al.*⁴⁷ highlighted two adverse events following circumferential abdominoplasty which were transient, and one problem was related to serous

Table 15: Number and percentage of complications of body contouring surgery⁴⁸

Complications	No	%
Wound problems	3	27
Infection	2	18
Hematoma	1	9
Seroma	2	18

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fluid collections (18.8%) and anemia because of the blood loss (6.3%).

Another pre-posttest study undertaken by Menderes *et al.*⁴⁸ pointed to two wound problems, including partial necrosis and dehiscence and one infection following 11 abdominoplasties. They went on to report further adverse events following three reduction mammoplasties alluding to one infection, one hematoma in a gynecomastia reduction and one seroma in a medical thigh lift (Table 15).

One case-series study undertaken by Van der Beek *et al.*⁴⁵ referred to an overall complication rate of 27.9%; however, adverse events were not adequately described but patient dissatisfaction was associated with dogs' ears (excess tissue) after abdominoplasty or postoperative contour deformities.

Modarressi *et al.*⁴⁹ mentioned visible scars as the most common reason for dissatisfaction following body contouring surgery, especially after breast reduction but did not provide specific details of the impact.

Weight regain

Only one of the included studies reported weight regain following body contouring surgery. Pecori *et al.*⁵² assessed BMI following bariatric and body contouring surgery with a marked increase in BMI, one year following plastic surgery. Although the BMI values were similar in both groups following bariatric surgery, the control group showed a lower mean score value than the body contouring patients at more than two years as displayed in Table 16. Factors that might have influenced weight regain were not carefully considered.

Discussion

This particular review sought to synthesize the best available evidence regarding the effectiveness of

body contouring surgery on QoL among people who had undergone bariatric surgery. Through the search and retrieval process, nine studies were identified that both met the inclusion criteria and were deemed to be of suitable methodological quality. Four of these were comparable cohort studies (two group designs^{48,50} and two four-group designs^{51,52}) and five were descriptive or case-series studies,^{44,45,47,49,53} Thus, only a small number of relevant studies was identified during the review process. This might indicate that QoL following body contouring surgery requires more serious research attention from scientists and researchers.

The majority of the included studies assessed QoL domains using a diverse range of instruments. Seven studies alluded to evaluating QoL, in particular, one study focused on assessing the psychosocial impact of abdominoplasty⁵¹ and another individual study considered the attitudes of morbidly obese patients to weight loss and body image following BPD and body contouring.⁵² The majority of the studies reported on QoL outcomes after staged multiple interventions with only a few assessing outcomes following a single procedure such as abdominoplasty.^{47,51} Seven of the studies reported QoL outcomes less than two years following body contouring surgery with only two studies falling in the two-to-five-year category.

The review appears to be the first investigating the effectiveness of body contouring intervention to manage the "excess" or "loose" skin as a consequence of rapid and significant weight loss. The excess skin remaining after weight loss was perceived as a disappointing barrier that stopped people from living the life they hoped to live when they had lost weight. Even though there have been other critical reviews published in the field of body contouring,^{39,40} both reviews focused on PROMS employed and no data were extracted or synthesized regarding QoL outcomes. Nonetheless, both reviews identify a

Table 16: BMI outcome

Secondary outcome	Control group before bariatric surgery	Body contouring group (before)	Control group (after)	Body contouring group (after)
BMI	48.0 ± 10.1 kg/m ²	31.2 ± 4.5 kg/m ²	36 ± 5 kg/m ² >2 years	38 ± 12 kg/m ² >2 years after bariatric surgery and 1 year following body contouring surgery

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scarcity of well-developed PROMS for this patient population and put forward useful recommendations for further research. However, in an attempt to address this oversight, a team of researchers in Canada is currently developing a new PRO instrument called the BODY Q designed specifically to cover the concerns that are common across patients having cosmetic body contouring surgery, as well as patients after MWL.⁵⁴ The BODY Q is being designed using modern psychometric methods and will perhaps be a useful instrument to employ in assessing future outcomes among body contouring patients.

This particular review has clearly shown the positive impact of body contouring on most QoL outcomes, especially in regard to body image, self-esteem, wellbeing, physical and social functioning. First and foremost, the changing body image data appeared central to wellbeing as the postoperative scores were reporting shifts “permeating all areas” of body consciousness, appearance and self-esteem. This became most obvious in the later postoperative category, where the consequences of the resulting weight loss and diminished scarring from long wounds on the participant’s body image and lives were illuminated more powerfully.^{48,49} Their reduced weight and core data sets (cited in the above tables) show a striking improvement in body image, self-esteem and wellbeing.

Beyond this fairly obvious point, the successful creative shifts in perception in the body image outcome had connections with self-acceptance and confidence. From the data provided in this review, following plastic surgery most participants saw themselves as being on a dynamic trajectory, with a greater sense of self-acceptance and being accepted into society, rather than being marginalized. Similar beneficial effects were reported in other studies that explored body image and wellbeing following body contouring.^{25,27,28} The results of the present systematic review both support and add to the findings of previous studies.

Although this review has shown the positive impact of body contouring on self-acceptance and confidence, the data reported in Cintra *et al.*⁴⁷ highlighted polarized experiences of either “good adaptation” or “severe maladaptation” which relates to turbulent embodied experience. This data set reflects the state of flux which participants appear to inhabit in relation to self-acceptance and confidence (imagined or real). This variance could be attributed to the

varying stages of body change and troublesome early scarring, contributing to conflict and confusion that seem to be rife in some participants. In a society with such a specific homogenous ideal of beauty, suffering distress about appearance, lack of acceptance, shame and reduced self-esteem, especially post surgery seems to be a natural response. Similar tensions have been reported in other recent studies pointing to “identity lag” post body contouring because participants’ physical bodies were changing faster than their internalized social perception of body image and appearance, resulting in psychological distress and problems with self-acceptance.^{29,31} Nonetheless, the data suggests that when the participants were more attuned to body acceptance, or made connections between positive self-evaluations and self-esteem, the attuned traits appeared to elicit others’ acceptance.⁵⁵

Body contouring after dramatic weight loss requires considerable surgical incision and removal of skin, and while physical function was addressed in part by most of the studies, pain as a specific variable, surprisingly, received less of a focus. As described above, Coriddi *et al.*⁴⁴ measured pain in five specific body parts, and those studies employing the SF-36 (Singh *et al.*⁵³ and Song *et al.*⁵⁰) will have assessed two aspects: amount of pain and interference as a result of pain.

Mobility and aesthetics are of course very important aspects of outcome in body contouring. Moreover, pain can be influenced by psychological factors such as motivation and optimism⁵⁶ and may perhaps be a less important outcome variable after voluntary procedures such as this. Yet given the extent and siting of this type of surgery, it was of note that as a measured outcome it did not feature strongly in the considered studies.

Although none of the studies entirely ignored social function, this aspect of QoL was addressed more fully by some than others, by way of either items within generic measures (Singh *et al.*⁵³ and Song *et al.*⁵⁰) or targeted QoL instruments (Van der Beek *et al.*,⁴⁵ Modarressi *et al.*,⁴⁹ and Cintra *et al.*⁴⁷). The findings from these studies suggested an overall improvement in social, or psychosocial function brought about by contouring surgery, although one anomalous finding by Singh *et al.*⁵³ bears consideration: this study demonstrated reduced perceived social function after body contouring when compared with the post-bariatric state.

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Body contouring is of course an elective process, and its positive impact on social function, as seen in this small review, is very encouraging. Nonetheless, this is a complex and major aspect of QoL, which will remain an important area of assessment in studies aiming to explore the outcomes of body contouring after MWL.

Massive weight loss patients have a significantly higher complication rate than other patients undergoing body contouring procedures. The frequency of occurrences is far greater for patients with an elevated BMI. Wound dehiscence can occur immediately after surgery or later in the postoperative period usually triggered by an underlying seroma.^{33,34} Only two studies reported complications related to wound healing and seromas (Cintra *et al.*,⁴⁷ Menderes *et al.*⁴⁸) but there is evidence to suggest that most patients with a BMI above 35 are at risk of developing seromas. Seromas may result in large cavities than can lead to dehiscence and chronic wounds but there is a range of interventions that surgeons can employ to reduce the incidence (Langer *et al.*⁵⁷). Another adverse event reported by Menderes *et al.*⁴⁸ pointed to a hematoma that was aspirated and resolved, fairly swiftly. Although Van der Beek *et al.*⁴⁵ reported a complication rate of 27.9%, details were not included.

Despite this deficit, Van der Beek *et al.*⁴⁵ mentioned that the high complication rate had no influence on patients' satisfaction. Nonetheless, eight patients (18.6%) in their sample were dissatisfied with occurrence of dogs' ears, especially in the scars. This particular subgroup appeared to have high expectations about the aesthetic outcome, based on internet examples, and expressed dissatisfaction with their aesthetic appearance following surgery. Cintra *et al.*⁴⁷ illustrated an overall percentage of 43.8% of participants having a "good adaptation," leaving 56.2% with a "mild" to a "very severe maladaptation." They went on to state that patients rarely complained about multiple interventions or extensive scars to surgeons and were typically ready for more plastic surgery. Cintra *et al.*⁴⁷ seemed to infer from their findings that because people want more body contouring surgery they may not complain to their surgeons about their outcomes. This finding coheres with Song *et al.*'s⁵⁰ work pointing to the tendency for patients to request more surgery after the initial procedure. Their explanation was that the closer participants came to their body ideal,

the higher their expectations became. In contrast, it could be the case that when they underwent another procedure and were still feeling dissatisfied and distressed, patients looked for another procedure to meet that need.

With respect to weight regain, the American Society of Plastic Surgeons reports that patients undergoing body contouring surgery after gastric bypass are more likely to keep their weight off. This improvement in long-term weight control is associated with significant improvement in QoL. Only one of included studies (Pecori *et al.*⁵²) in this review pointed to weight regain following body contouring surgery. Unfortunately, the follow-up period in this particular study was less than two years and it is difficult to infer longer term outcomes.⁵²

According to the JBI levels of evidence for effectiveness, the studies included in this particular review constitutes level 2, level 3 and level 4 evidence with no studies falling in the level 1 category. The results showed that body contouring procedures in MWL patients led to higher overall patient QoL but also recognized that some subdomains of QoL displayed enduring dissatisfaction. Despite this deficit, the overall evidence in this review provides a robust recommendation for offering body contouring procedures as part of a package for patients who undergo bariatric surgery on the national health system (NHS) in the United Kingdom and globally.⁵⁸ National Health Service funding for BC following bariatric surgery remains a controversial topic because it is considered "aesthetic" in nature.⁸ This perception is distorted and requires careful review because the debilitating effects of excess skin post-MWL impacts on QoL. There is evidence of adequate quality in this review, with the patient experience taken into account, supporting the use of BC.

The National Institute of Clinical Excellence (NICE) guidance has acknowledged the need for continued care of patients post-bariatric surgery through their recommendations of a bariatric multi-disciplinary team that can provide information and access to plastic surgery procedures.⁵⁹ The employment of evidence based information foregrounded in this review could be used to counsel patients regarding the benefits of body contouring procedures and is applicable to the majority population globally. The evidence has shown the importance of body contouring in combating physical, mental

and emotional distress and is easily adaptable to employ in a variety of circumstances for patients intending to undergo single or staged procedures. The beneficial effects of PROs using QoL instruments showed that body contouring procedures following MWL surgery is both beneficial and well tolerated.

Limitations of the review

There are a number of limitations to this systematic review. The prevailing limitation is the small number of QoL outcome studies post body contouring surgery in this population resulting in the small number of studies included in this review. Although a rigorous search was undertaken across six databases, including both published and gray literature, there is a possibility that some studies could be overlooked. Another limitation is the inclusion of only studies published in English. Moreover, a lack of clinical trials, poor experimental designs and lack of reported numerical data such as SDs and confidence intervals meant that a meta-analysis was not possible. The lack of homogeneity between the studies in terms of methodology, sample size and QoL assessment instruments was problematic. Thus, all the studies could not be statistically combined and effectiveness values or definitive statement of benefit could not be determined.

Conclusion

The review presents important and useful evidence regarding the treatment of excess skin following bariatric surgery that causes physical discomfort, mobility problems, hygiene problems, body image dissatisfaction and depression. Body contouring surgery has been shown to have positive benefits; especially in relation to QoL outcomes and well-being. However, adjustment to changing body image following body contouring is both challenging and empowering and seems to be a transitional process. However, because of the cultural ideal of beauty and typology of bodies that may be acceptable, some participants appeared to experience body distress, post surgery. It is suggested that tailored body image acceptance programs might be beneficial to this patient group.

Implications for practice

It is proposed that alongside government drivers promoting weight loss and body contouring surgery,

interventions regarding the promotion of positive self-esteem and prevention of appearance-related distress might be helpful. Owing to the cultural ideal of beauty and the “narrowness” of the typology of bodies that are deemed to be acceptable, this review clearly points out that the vast majority of individuals seem to experience some degree of body dysphoria, post surgery. Thus, health professionals will face considerable challenges when they encounter patients with body image dissatisfaction and intense scarring. Crucially, body image enhancement programs, support and education are likely to be extremely important to empower clients to achieve individual goals.

Concepts of “compassion” and “acceptance” are increasingly central in the third-wave CBT models,⁶⁰ acceptance and commitment therapy,⁶⁰ Gilbert’s⁶¹ compassion mind work and mindfulness-based cognitive therapy.⁶² These therapies appear to be effective when employed with individuals who are struggling to adjust to body image or appearance related concerns and might be useful in addressing body image dysphoria and anxiety.

Moreover, individual tailored rehabilitation programs should be considered in the management of MWL patients who undergo body contouring surgery to help improve holistic QoL. Support groups might also be beneficial to empower clients to achieve their individual long-term outcomes. In addition, consideration of psychological factors in the management of postoperative pain might be beneficial, especially in regard to individual care plans.

The findings of this review are very important and provide positive support for the ongoing discussion for offering body contouring procedures as part of the package for patients who undergo bariatric surgery on the national health care system (NHS) in the United Kingdom⁵⁸ and globally.

Implications for research

Further research studies are required to determine the development of PROMS, in particular the BODY Q for the body contouring population because many studies seem to employ ad hoc or generic QoL instruments that do not yield high-quality data.

More systematic research studies, including large, rigorously conducted controlled trials are required to provide definitive data on the comparative benefits of bariatric surgery and body contouring surgery on QoL.

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Further research studies on the positive impact of body contouring on long-term QoL to provide more evidence-based interventions for such patient groups are needed.

Further research studies are required to examine the benefits of CBT and body image acceptance programs to determine the benefits of such treatments.

In addition, further research studies are required to understand factors influencing return to work activity, following body contouring with particular attention to motivation and support.

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Appendix I: Search strategy

Database: Embase <1954 to 2014 Week 49>

- 1 exp Bariatric Surgery/(16123)
- 2 limit 1 to (english language and yr="1954 - 2014") (14878)
- 3 Gastric Bypass.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (8471)
- 4 Gastric band*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (5388)
- 5 Gastroplasty.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (2837)
- 6 Adjustable gastric banding.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (2024)
- 7 bilopancreatic diversion.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (3)
- 8 roux-en-y gastric bypass.mp. (4635)
- 9 1 or 3 or 4 or 5 or 6 or 7 or 8.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (22070)
- 10 Body contouring procedure*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (75)
- 11 Abdominoplasty.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (1544)
- 12 Fleur-de-lys-abdominoplasty.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (4)
- 13 Mastopexy.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (3)
- 14 Breast lift*.mp. (29)
- 15 Upper body lift*.mp. (14)
- 16 Lower body lift*.mp. (32)
- 17 Thigh lift*.mp. (54)
- 18 Surgery, Plastic/(36431)
- 19 Abdominal fat/su (42)
- 20 Abdominal wall/su (643)
- 21 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 (37969)
- 22 Body image.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (12113)
- 23 Body Esteem.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (249)
- 24 Quality of life.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (275071)
- 25 Depression.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (310405)
- 26 Wound problems.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (397)
- 27 Aesthetic appearance.mp. (409)
- 28 Weight gain/(55629)
- 29 Age 18+.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (9390)

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30 Patient satisfaction.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (82979)
31 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 (686781)
32 9 and 21 and 31 (106)

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Appendix II: Appraisal instruments

MAStARI appraisal instrument

JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Was the assignment to treatment groups truly random?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were participants blinded to treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was allocation to treatment groups concealed from the allocator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were those assessing outcomes blind to the treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were the control and treatment groups comparable at entry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were groups treated identically other than for the named interventions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in the same way for all groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info.

Comments (Including reason for exclusion)

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JBI Critical Appraisal Checklist for Descriptive / Case Series

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Was study based on a random or pseudo-random sample?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the criteria for inclusion in the sample clearly defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were confounding factors identified and strategies to deal with them stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were outcomes assessed using objective criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. If comparisons are being made, was there sufficient descriptions of the groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up carried out over a sufficient time period?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

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JBI Critical Appraisal Checklist for Comparable Cohort/ Case Control

Reviewer Date

Author Year Record Number

	Yes	No	Unclear	Not Applicable
1. Is sample representative of patients in the population as a whole?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are the patients at a similar point in the course of their condition/illness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Has bias been minimised in relation to selection of cases and of controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are confounding factors identified and strategies to deal with them stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are outcomes assessed using objective criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up carried out over a sufficient time period?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info.

Comments (Including reason for exclusion)

Appendix III: Data extraction instruments
MAStARI data extraction instrument

JBI Data Extraction Form for
Experimental / Observational Studies

Reviewer Date

Author Year

Journal Record Number

Study Method

RCT Quasi-RCT Longitudinal
Retrospective Observational Other

Participants

Setting _____

Population _____

Sample size

Group A _____ Group B _____

Interventions

Intervention A _____

Intervention B _____

Authors Conclusions:

Reviewers Conclusions:

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*J. Gilmartin et al.***Study results****Dichotomous data**

Outcome	Intervention () number / total number	Intervention () number / total number

Continuous data

Outcome	Intervention () number / total number	Intervention () number / total number

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Appendix IV: Characteristics of included studies

Reference	Country	Design	Sample	Sex	Age	Primary QoL outcome /instrument	Intervention BC	Control group	Follow-up period after BC
Cintra <i>et al.</i> 2008 ⁴⁷	Brazil	Case-series study	16	F	40.1 years (mean)	Adaptive operationalized Diagnostic scale (AODS)	100% abdominoplasty	None	2-5 years
Coriddi <i>et al.</i> 2011 ⁴⁴	New York, USA	Quantitative survey Pre-and posttest design	49	F/M	45.8 years (mean)	Case series Instrument on functional outcomes, QoL	Abdominoplasty or Panniculectomy (and lower body lift 7%)	None	<2 years
Menderes <i>et al.</i> 2003 ⁴⁸	Turkey	Quantitative Pre-and posttest design	11	F/M	37.4 years (mean)	Questionnaire (including 28 questions from the Derri-ford appearance scale (DAS 59)	Abdominoplasty Reduction mammo-plasty Lateral thigh lift Gynecomastia Medial thigh lift Liposuction	None	2-5 years
Mondarressi <i>et al.</i> 2013 ⁴⁹	Switzerland	Quantitative Pre-and posttest design	98 BC* (group A)	F/M	38.6 (mean)	Prospective study Moorehead-Ardelt questionnaire (HR-QoL)	97% abdominoplasties (with 47% incisional hernia repair) 32% mam-moplasties 19% cruro-plasties 14% brachio-plasties 45% of patients had combined procedures	102 only had gastric bypass (group B)	<2 years
Song <i>et al.</i> 2006 ⁵⁰	Pittsburgh USA	Quantitative Pre-and posttest design	18	F/M	46 years (mean)	Five instruments PBIA, BISA, PBSQOI CBIA,HRQOL and Beck's Inventory (revised version) Body image and QoL.	100% body contouring procedures	None	<2 years
Steurz <i>et al.</i> 2008 ⁵¹	Austria	Case-controlled study	34 BC*	F/M	37.1 years (mean)	Five psychological questionnaires Assessing own body questionnaire Body perception Questionnaire Life satisfaction Questionnaire (10 QoL dimensions) HADS General questionnaire after surgery QoL	100% abdominoplasty	26 without abdominoplasty	<2 years

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(Continued)

Reference	Country	Design	Sample	Sex	Age	Primary QoL outcome /instrument	Intervention BC	Control group	Follow-up period after BC
Pecori et al.2007 ⁵²	Italy	Quantitative Pre-and posttest design	20	F	42.5 years (mean)	Prospective study Body Uneasiness Test (BUT)	Bariatric surgery Body contouring surgery	20 healthy lean controls	<2 years
Singh, D et al.2012 ⁵³	USA	Cross-sectional study	16	F/M	42 years (mean)	SF-36 Item Short Form Health Survey, QoL.	Bariatric surgery Body contouring surgery	27 in control group	? 2 years
Van der Beek et al. 2010 ⁴⁵	The Netherlands	Retrospective Survey	43	F/M	41.5 years (mean)	Retrospective Study OPSQ (questionnaire), QoL.	94% had single procedures 61% abdominoplasty or breast reduction/augmentation (25%)	None	<2 years

*BC, body contouring surgery; BISA, Body Image and Satisfaction Assessment; BS, bariatric surgery; CBIA, Current Body Image Assessment; HADS, Hospital Anxiety And Depression Scale; HRQoL, Health-Related Quality of Life; PBIA, Pictorial Body Image Assessment; NR, not reported.

Appendix V: Excluded studies and reasons for exclusion

Balagué N, Combescure C, Huber O, Pittet-Cuénod B, Mondarressi A. Plastic surgery improves long-term weight control after bariatric surgery. *Plast Reconstr Surg* 2013;132(4):826-33.

Reason for exclusion: Repeats the data reported by Mondarressi *et al.* 2013³⁷ included in this review.

De Kerviler S, Hüsler R, Banic A, Constantinescu MA. Body contouring surgery following bariatric surgery and dietetically induced massive weight reduction: a risk analysis. *Obes Surg* 2009;19(5):553-9.

Reason for exclusion: The reported data focuses on complications not QoL and does not answer the review question.

Hensel JM, Lehman JA, Tantri MP, Parker MG, Wagner DS, Topham NS. An outcome analysis and satisfaction survey of 199 consecutive abdomioplasties. *Ann Plast Surg* 2001;46(4):357-63.

Reason for exclusion: The reported data is not representative of the MWL population, alluding mainly to post-natal data (following pregnancy) and does not answer the review question.

Kitzinger HB, Cakl T, Wenger R, Hacker S, Aszmann OC, Karle B. Prospective study on complications following a lower body lift after massive weight loss. *J Plast Reconstr Aesthet Surg* 2013;66(2):231-8.

Reason for exclusion: The reported data focuses on complications following lower body lift and does not report QoL data that is pivotal to the review question.

Koller M, Schubart S, Hintringer T. Quality of life and body image after circumferential body lifting of the lower trunk: a prospective clinical trial. *Obes Surg* 2013;23(4):561-6.

Reason for exclusion: Study design alludes to a prospective clinical trial but no control group is included in the study yielding insufficient data for this review question.

Larsen M, Polat F, Stock FP, Oostenbroek RJ, Plaiser PW, Hesp WL. Satisfaction and complications in post-bariatric surgery abdominoplasty patients. *Acta Chir Plast* 2007;49(4):95-8.

Reason for exclusion: The reported data focuses on complications not QoL measures.

Lazar CC, Clerc I, Deneuve S, Auquit-Auckbur I, Milliez PY. Abdominoplasty after major weight loss: Improvement of quality of life and psychological status. *Obes Surg* 2009;19(8):1170-5.

Reason for exclusion: The validity of the instruments is not clear.

Merikli AF, Drake DB. Abdominal contouring in super obese patients: a single-surgeon review of 22 cases. *Ann Plast Surg* 2011;66(5):523-7.

Reason for exclusion: The reported data focuses on analyzing preoperative risk factors/comorbidities to determine risk factors and patient safety. Thus insufficient data is reported to answer the review question and QoL is downplayed.

Van Huizum MA, Roche NA, Hofer SOP. Circular belt lipectomy: a retrospective follow-up study on perioperative complications and cosmetic outcomes. *Ann Plast Surg* 2005;54(5):459-64.

Reason for exclusion: Patients scored cosmetic results on a visual analog scale but the scores are not reported in the study with insufficient data available to answer the review question.

Van der Beek ESJ, Geenen R, de Heer FAG, van der Molen AB M, van Ramshorst B. Quality of life long-term after body contouring surgery following bariatric surgery: sustained improvement after 7 years. *Plast Reconstr Surg* 2012;130(5):1133-9.

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Reason for exclusion: Author contacted and reported that the sample is the cohort of patients used previously in their 2010 study on QoL (included in this review). Thus, the 2010 data seemed the most appropriate to employ.

Migliori F, Rosati C, D'Alessandro G, Glacomo G, Cervetti S. Body contouring after bilopancreatic diversion. *Obes Surg* 2006;16(12):1638-44.

Reason for exclusion: This study focuses on a review of medical records, placing weighting on describing surgical techniques such as a thigh-lift, abdominoplasty with no PROM employed to measure QoL.