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The Longevity of the Health Benefits of Breast Reduction

by

Hosakere Subrahmanyam Aditya

MD • The University of Edinburgh • 2023

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Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

Hosakere Subrahmanya Aditya

07 May 2023

Edinburgh
Abstract

Aesthetic surgery is available to a small number of patients on the National Health Service (NHS) in Scotland, chosen from a large number of individuals who are referred for various procedures. The most popular and most frequently requested of all aesthetic procedures in the Scottish health board NHS Lothian is breast reduction surgery.

This thesis examines the duration of the health benefits of breast reduction surgery in those who undergo it. It contains a detailed introduction to the clinical syndrome of breast dissatisfaction and a description of the Scottish Government’s Exceptional Referral Protocol that governs the Lothian aesthetic surgery pathway. A systematic review follows of the published studies that report on the duration of benefits of breast reduction surgery. A cross-sectional study is described that used the validated patient reported outcome measure (PROM) BREAST-Q to assess the body image, quality of life and satisfaction of patients who underwent breast reduction surgery in NHS Lothian up to thirteen years ago.

It is hoped that the findings of the literature review and study that are described here will help clinicians, healthcare managers and policy makers alike reconsider the current approach to providing surgical care for those who suffer from the symptoms associated with having excessively large breasts.

Keywords: breast reduction; aesthetic surgery; outcomes; duration; BREAST-Q; cross-sectional study; systematic review
Lay Summary

It is common knowledge that aesthetic surgery, sometimes called cosmetic surgery, helps people look better and even feel better about how they look. In this thesis I describe the people who seek aesthetic surgery, the strict standards that the NHS in Scotland lays down to determine who gets surgery, and the way this system is organised in NHS Lothian.

The most frequently requested surgery in NHS Lothian is breast reduction surgery, which enables women who have excessively large breasts get smaller breasts. A group of junior colleagues and I looked at over a thousand scientific papers that describe studies of people who underwent breast reduction surgery, which has a reputation for helping people look and feel better and happier, to understand how long these benefits last. We did find papers that describe improvements in their quality of life, their self-esteem, sex-life and body image for three or more years. However, many of them are written in a way that it is impossible to be sure how long these benefits last.

My colleagues and I then asked a group of 115 women who had undergone this surgery in NHS Lothian between 2009 and 2021, and a smaller group of women waiting to go through it, to fill out a questionnaire called the BREAST-Q to describe their body image and quality of life. Through their responses they tell us that most of their problems with their breasts were resolved after surgery and that their lives and body image are better as a result. We learn also that patients who underwent this surgery return to feeling as well if not better than women without breast problems, and stay that way. Even patients who had their surgery thirteen years tell us that they still feel well.

I hope this thesis helps advance our understanding of how effective a treatment breast reduction surgery can be for women who suffer with large breasts. Perhaps more importantly, I hope it improves the way we help them.
This work is dedicated to the memory of my uncle, Prof H.Y. Mohan Ram, and his infectious joy of learning.
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• “The Psychiatry of Appearance”; RCPsych West Midlands Division, Winter Academic Meeting, Birmingham, December 2017

• The Psychiatry of Aesthetic Surgery, RCPsych Liaison Faculty Conference, London, May 2017

• “Body Image and Surgery”, Medicine for Psychiatrists Course, Cardiff, June 2018

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• An Evaluation of the Adult Exceptional Aesthetic Referral Protocol in NHS Lothian; With Ariel Ong, International Conference of the RCPsych, Edinburgh 2017

• ReCoVar: Reducing Costly Variation in The Assessment of Aesthetic Surgery: Scottish Improvement Leader Programme graduation, Edinburgh, 5 December 2018
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Glossary

Aesthetic surgery  In the Oxford English Dictionary, aesthetic surgery is defined as surgery or dentistry intended to restore or improve a person's appearance. Although it is a term that is used interchangeably with cosmetic surgery, aesthetic surgery will be the term used throughout this thesis.

Plastic surgery  Plastic surgery is described in the same dictionary as a branch of surgery dealing with the construction and reconstruction of superficial parts of the body that are defective, injured, or absent, and also using such procedures for cosmetic purposes. Plastic surgery therefore has a wider remit beyond aesthetics. Aesthetic surgeons are plastic surgeons.
Chapter 1.

Introduction

The awareness of and demand for aesthetic surgery in the UK has grown steadily over the last decade, a trend beginning to slow down and even go in reverse from before the onset of the Covid-19 pandemic. This growth has fueled an increase in the private provision for its delivery and perhaps the converse may be partly true too. The extraordinary increase in the use of social media in the same period, the perceived importance of appearance, campaigns by private providers to raise awareness of their work and changing attitudes all seem to have contributed to this rapid rise in the demand for aesthetic surgery.

The British Association of Aesthetic and Plastic Surgeons, a UK charity for the study and improvement of plastic surgery, made up of approximately 350 plastic surgeons, conducts an annual audit of the aesthetic procedures performed in the UK in the preceding year. Their data help us understand the trend of plastic surgery year on year. They show that in 2017, at the beginning of the decline in the overall number of aesthetic surgeries undertaken in the UK, there continued to be a rise in the number of breast surgeries. Of a total of 28315 aesthetic surgeries in both men and women, 12294 were breast surgeries, representing a 6% increase over the previous year. The most common of all surgeries across genders then as now was breast augmentation at 8251 procedures, followed by breast reduction at 4043 procedures. The year after, breast reductions continued to increase in number, peaking at 4299, even as breast augmentations began to fall. The numbers of most procedures have dropped since the pandemic.
At first glance, these may seem like mere figures on a balance sheet, of waxing and waning demand and supply of procedures that although surgical are considered by many to be more commerce than healthcare. Women (93% of all aesthetic procedures on were on women in 2021) seeking to go ever further to look better, the medicalisation of vanity. Over the same period, social commentators have repeatedly cited the growth of the cosmetic surgery industry as a sign of an increasingly sick society.

There is an alternative narrative. These are deeply distressed individuals, disabled by their appearance and anatomy, seeking relief from body dissatisfaction sometimes severe enough to be a disorder in its own right – dysmorphophobia or body dysmorphic disorder. They have turned to their National Health Service for help when unable to afford surgery privately. The NHS has had to race to get to grips with a demand so large that it has competed with more traditional plastic surgical areas such as cancer and burns care for resources – in waiting lists, clinics, wards and operating theatres alike.

Politicians, policy makers, health commissioners, hospital managers and senior clinicians have together struggled to create an equitable system to assess and manage waves of such troubled people. This has resulted in extremely different systems in each of the four nations that in addition to providing healthcare share one common goal, to manage the demand for aesthetic surgery without overwhelming its supply, and without disadvantaging patients with more traditional demands for healthcare such as cancer. Four disparate systems all seeking to ration care, in other words.
The NHS in Scotland dealt with this challenge in the latter half of the first decade of this century by adopting a national set of standards, now termed the Exceptional Referral Protocol (ERP), that meant surgery would only be offered to those who were most deserving, most likely to benefit from it. Over the next 15 years, this laudable aim has proved exceptionally difficult to achieve, not least because the ambition to identify those most likely to benefit from a procedure they have never been exposed to is not matched by clinicians’ ability to do so.

The challenges posed by having to assess and help these complex individuals have laid bare gaps in clinical knowledge, and the slim evidence base for the policies that govern aesthetic surgical care on the NHS in Scotland.

One such gap is knowledge of the effectiveness of aesthetic surgery. What does aesthetic surgery achieve? Clinical experience and numerous studies suggest that people report feeling very satisfied with the results of aesthetic surgery. How should clinicians, managers and commissioners assess the cost, even the value of their surgical care, both absolute and relative to other healthcare? If aesthetic surgery makes people happy, if such happiness may be measured and if that measure can be converted to a proxy of healthcare value such as quality adjusted life years (QALY), then we ought to first ask if that happiness lasts.

My research sets out to answer this question with reference to one of the most common aesthetic surgical procedures requested in the NHS in Scotland, breast reduction. Specifically, how long do the health benefits of breast reduction last?

I will attempt to answer that question in the following chapters through a systematic review of the literature, and a cross-sectional cohort study of women who have either had or are waiting to undergo breast reduction surgery in a Scottish health board. I hope to make the case that we have
hitherto under-estimated both the seriousness of body dissatisfaction as well as the value of breast reduction to this group of individuals.

In the rest of this chapter, I will expand on the context and need for this research, highlighting gaps in our knowledge as I go. I will start with describing the spectrum of body dissatisfaction including body dysmorphic disorder. I suggest that even the newest diagnostic criteria of body dysmorphic disorder are not specific enough for clinical application. I will very briefly describe the literature on the subject of the benefits of different aesthetic surgical procedures, which will provide context for the focus of my thesis on the longevity of the benefits of one group of procedures. I will detail the Lothian system for assessing patients referred for aesthetic surgery. This will show the rigour with which our study subjects were selected for surgery, as well as the reasons I chose to study breast reduction surgery.
1.1. Body dissatisfaction:

1.1.1. An Introduction to Body Image

A healthy body image

A healthy body image is one in which a person is comfortable with how they look, so that they are neither distressed nor disabled by their adjustment to it. This is an overly simplistic definition, and most people go through changes in their body image at the different stages of their lives. Even a healthy body image may vary from day to day in response to biological, psychological and social events, as symbolised by the term, “Bad hair day”.

Normative discontent

Rodin first coined the term normative discontent in the context of women’s preoccupation with weight (Rodin et al., 1984). Since then, the term has been used to describe a range of commonly occurring body image concerns in the general population, with the implication that something so common must be normative. The original paper describes the link between culture, “female sex role stereotypes”, and socio-culturally prescribed body ideals that lead to shame and other psychological harm. A norm is a standard defined by how prevalent something is but shouldn’t be confused with what is “normal”, or healthy.

Social Media

Social media platforms have influenced body image in a number of ways. The images that consumers view influence their body ideal, for example fueling a drive for thinness (Fardouly & Vartanian, 2015). Appearance comparisons on social media influence body image in young men and women (Kim & Chock, 2015).

Social media platforms don’t generate themselves as much as being beasts that needs feeding. They are fed well, by millions of people in every society, who upload not only accounts of happy life events, but images of themselves
at their best. This global phenomenon is associated with increasing body dissatisfaction (De Vries et al., 2016), even depression (Lin et al., 2016), anxiety (Vannucci et al., 2017; Woods & Scott, 2016) and lower self-esteem in the active and passive consumers of such media.

Public figures have been known to influence body ideals for millennia. Cleopatra of Egypt, for example, a woman whose appearance and fabled nose survives in collective memory across the globe, over a thousand years after her death (Royster, 2016). Hottentot sculptures predate her and evoke, although admittedly in far fewer people, an instant image of a particular body ideal. These are both examples of what are now described in social media as social influencers, people whose lives, appearances, are followed by thousands, even millions of others (Brown & Tiggemann, 2016). A modern example is Ms. Kylie Jenner, whose preoccupation with her lips and surgical remodelling were documented in the most popular reality shows on the planet, The Kardashians and a number of spinoffs (Cashmore, 2019). A body dissatisfaction that was in step with a global trend towards affecting a pout in selfies. Incredibly, Ms. Jenner, a multimillion follower Twitter and Instagram sensation, launched a successful billion dollar business in lip care products (Ward et al., 2018). Her business seems to be growing, despite her recent decision to no longer seek fillers to augment her lips. Such power to instantly influence the body ideal of millions is unprecedented.

**Pornography**

The ubiquity of internet pornography seems to have caused a change in how young people have sex. The knowledge of sex amongst adolescents and young adults is being sourced from the pornography that they consume. The increasing prevalence of violent sexual practices has been attributed to this. What is less well publicised is that the bodies that they view influence their body ideal (Owens et al., 2012).
Brazilians and Thigh Gaps

Changing social fashion trends seem to result in quick body ideal change, such as genital pubic waxing have led rapid changes in body ideals and leading to increasing dissatisfaction with genital appearance (Herbenick et al., 2010), in turn leading to a rise in the demand for aesthetic surgery, e.g. labiaplasty (Braun et al., 2017). An extreme and likely transient phenomenon is the focus on the thigh gap. Thigh gaps refer to the appearance of the upper thighs in jeans, in which the two thighs don’t abut as they leave the crotch, but have a space between them (Roberts, 2016). Requests in plastic surgery clinics for remodelling of upper thighs suggest that at least some people feel this an ideal that must be achieved surgically.

The social obligation to seek surgery

Why do people seek aesthetic surgery? Various studies have repeatedly identified a small number of putative factors. Body image problems figure frequently. People who seek surgery may be more likely to place a higher value on a good body image (Sarwer et al., 2003). There is good quality evidence showing that the rates of body dysmorphic disorder (BDD) are higher in patients seeking aesthetic surgery than in the general population, suggesting that BDD is leading some people to seek surgery (Sarwer et al., 1998). Teasing has been studied: while it is oft reported in clinical assessments as well as some studies, it is not clear how significant it is in driving people to surgery (von Soest et al., 2006). Similarly, self-esteem is low in pre-operative assessments: it has been shown to improve following aesthetic surgery (von Soest et al., 2006). However few studies demonstrate its importance as a motivating factor for aesthetic surgery. Education status (Zahiroddin et al., 2008) has been shown in studies to be different from the population norm, but the implications of this difference is unclear.
1.1.2. The relationship between body image, visible difference and distress

It would be intuitive, but wrong, to presume that the distress felt by an individual because of their body image is directly proportional to how different they look from their peers (Robinson et al., 1997). Figure 1 is an attempt to illustrate this concept. It isn’t even clear that it is directly proportional to how they think they are different. Clinical practice shows us that patients’ body distress is a product of many, among other factors, including of body image; the individual’s perception of how divorced this is from their body ideal; how important appearance is to them; mood states; social and occupational adjustment; other forms of comorbid symptom distress such as, including chronic pain.

Figure 1: The intuitive view of the relationship between visible difference and appearance distress.

This is a pictorial representation of a concept and the data points and units are for illustration only.
Sweet spot for aesthetic surgery

In assessments for the ERP, consideration is given to whether the patient's expectations are achievable. It is important to understand of whether their body dissatisfaction is reasonable, given their appearance. The idea being that the relationship between their body distress and visible difference will predict whether the individual is likely to respond well to aesthetic surgery. If the decisions of experienced clinical teams in the NHS were to be analysed on this basis, one would expect to find that the teams aim to find patients with exceptional visible difference and some (but not excessive) distress. Figure 2 is a pictorial depiction of these patients, with the “target” considered be the sweet spot. This may not be the same with private healthcare, where the aim of any screening is to not to limit access to surgery.

Figure 2: The "sweet spot" of aesthetic surgery

This is a pictorial representation of a concept and the data points and units are for illustration only.
1.2. Body dysmorphic disorder

1.2.1. Epidemiology

Body dysmorphic disorder is a relatively common condition. Estimates of prevalence rates in the general population vary: the largest studies report prevalence between 1.7% and 2.4% (Koran et al., 2008; Rief et al., 2006). Extremely high rates have been reported in patients seeking aesthetic surgery, e.g. 33% in a clinic for rhinoplasty (Picavet et al., 2011). It is thought to be as common in men as in women, akin to many of the Obsessive Compulsive and Related Disorders (OCRDs) (Phillips & Diaz, 1997). However, in clinics in the Lothians, the majority of patients who present are women. The mean age of onset in one study was around 16, and earlier onset is associated with a poorer prognosis, greater comorbidity and risk of suicide (Bjornsson et al., 2013). Patients in clinic may have suffered in silence for years, even decades before BDD is detected, if at all.

Aetiology

The causes of BDD are not known, although a number of factors have been identified as associated with its development. Maltreatment in childhood, cultural factors, and evidence of disordered neurodevelopment have all been highlighted (Feusner et al., 2010).

Diagnostic criteria

The two leading classificatory systems that most mental health professionals look to for diagnostic criteria are the Diagnostic and Statistical Manual V (denoting the fifth iteration) (American Psychiatric Association, 2013), and the World Health Organisation’s International Classification of Diseases - ICD10 (denoting the tenth iteration) (World Health Organization, 1992). Of these, the DSM V is the more recent revision, and a closer reflection of current evidence.
DSM V Criteria

The DSM V lists four diagnostic criteria, and four “specifiers”, terms which clarify the diagnosis further (American Psychiatric Association, 2013). These are reproduced verbatim below and considered in detail thereafter.

Diagnostic criteria

A. Preoccupation with one or more perceived defects or flaws in physical appearance that are not observable or appear slight to others.

B. At some point during the course of the disorder, the individual has performed repetitive behaviours (e.g., mirror checking, excessive grooming, skin picking, reassurance seeking) or mental acts (e.g., comparing his or her appearance with that of others) in response to the appearance concerns.

C. The preoccupation causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The appearance preoccupation is not better explained by concerns with body fat or weight in an individual whose symptoms meet diagnostic criteria for an eating disorder.

Specifiers:

1. With muscle dysmorphia: The individual is preoccupied with the idea that his or her body build is too small or insufficiently muscular. This specifier is used even if the individual is preoccupied with other body areas, which is often the case.

2. With good or fair insight: The individual recognizes that the body dysmorphic disorder beliefs are definitely or probably not true or that they may or may not be true.

3. With poor insight: The individual thinks that the body dysmorphic disorder beliefs are probably true.
4. With absent insight/delusional beliefs: The individual is completely convinced that the body dysmorphic disorder beliefs are true.

The DSM V criteria are a very marked improvement over their DSM IV predecessors. The biggest changes are the terminology in the first criterion, and the acknowledgement of a plurality of states of insight.

Criterion A:

DSM IV required a preoccupation with an "imagined defect": in clinical consultations, the use of the term "imagined" has hitherto caused much difficulty, and damage to the establishment of a clinical rapport. Without a rapport treatment is well-nigh impossible. Patients sometimes interpret the term to suggest that their problem is imaginary, when it is all too real and painful to them. They report their experience being undermined by their clinicians using such terms. So much so that in consultations. Alternative terms have been used to promote consensus between patient and clinicians on the diagnosis of BDD.

The revised terminology of “perceived defect” is vastly better, as it allows for a discussion of what the patient legitimately perceives, without suggesting that the problem is the patient’s imagination. From a clinician’s perspective it permits validation of a patient’s distress without risking collusion.

Some criteria attempt to quantify how much time someone spends each day thinking about their appearance concern. An hour a day and over puts the person in BDD territory.

There is no clarity as to who the “others” are to whom the “perceived defect” is not apparent. It would have helped if the standard is been raised to specialists in appearance, such as plastic surgeons, as otherwise the discussion in clinic is sometimes a disagreement between patient and
clinician along the lines of “but my family agree with me”. It seems important that the patient’s appearance is judged, in clinical practice, by those who are competent to do so. By definition, plastic surgeons have the most expertise in this field, and should be the gold standard to which all services aspire.

The advantage of consultant plastic surgeons assessing appearance is that the question of visible difference is not a binary one, in that the answer rarely takes a yes/no form. Instead, more commonly the issue is of whether the appearance is within common / acceptable norms as viewed by a consultant surgeon, and if not, how different the appearance is.

**Criterion B:**

Most patients with body dissatisfaction report “repetitive behaviours or mental acts”. The DSM V lists those most commonly experienced by those with BDD.

a. “Mirror checking”: many patients report mirror gazing, to the extent that they are unable to walk past a mirror without inspecting the body part that distresses them. Others describe avoiding mirrors, to the extent that they will not tolerate any at home, to avoid triggers to the same distress their mirror-gazing counterparts describe.

b. Selfies, other photographs: these aren't listed in DSM V, but are closely linked to mirror gazing. Like with mirrors, some patients spend an inordinate amount of time trying to take the perfect selfie, one in which their body focus looks less abnormal to them. While some avoid them altogether. The same applies to photographs others take. Family photographs at Christmas can be very stressful to some sufferers. There is an aspect to achieving / avoiding photographs that transcends the mirror analogy: the publication and sharing of them on social media has become so commonplace a social practice that like a body ideal, updating social media too has become a pressure on people. So that some describe feeling left out of social sets because they do not feel able to share photographs of themselves in social media.
c. Comparison: most of our clinic patients report comparing their appearance with that of others. In BDD, or severe distress associated with visible difference, sufferers frequently respond to the question, “how often do you come off worse?” with the answer, “Never”. This seems statistically improbable, testament to their distorted self-image and how little insight they may have into this.

**Criterion C:**

Body dissatisfaction has a very powerful effect on sufferers’ social confidence, influencing even their choice of partners (Tantleff-Dunn & Thompson, 1995). Patients describe daily difficulties such as choosing clothes that fit. This is a complaint that seems common to people with disparate concerns, irrespective of the surgery they have come seeking, e.g., breast augmentation, reduction, mammoplasty etc. They report distress associated with social contact that ranges from mild social anxiety to social anxiety so severe that it has generalised to severe agoraphobia and panic disorder (Fang et al., 2011).

**Criterion D:**

This criterion highlights the need to ensure the individual’s preoccupation with fat or weight are not better explained by a diagnosis of eating disorder. In practice, many patients who present with BDD spectrum symptoms give a history of eating disorder (Phillips & Kaye, 2007). It seems that in some, BDD is merely a different, more focussed manifestation of the previously generalised preoccupation with weight. In other words, that BDD is surely part of the same spectrum, albeit without the dangerous compulsion of calorie restriction.

**Insight:**

The second major revision is the addition of specifiers of insight. This is in keeping with changes made to all obsessive compulsive or related disorders. This is a radical change, as it challenges what was considered a fundamental
Tenet of psychiatric phenomenology. For decades, insight was described as the dividing wall that separated Obsessive Compulsive Disorder (and by extension the conditions now described as Obsessive Compulsive or Related Disorders, including BDD) from psychotic disorders (Eisen et al., 2004). Those who had insight into their obsessions and compulsions were deemed to have a neurotic disorder, and those who didn’t were described as delusional, or psychotic (Phillips et al., 2013). The evolution of diagnostic criteria to include a range of insight states means the concept of BDD now includes two major categories of mental illnesses, psychosis and neurosis.

ICD10 criteria, and likely changes in ICD11.

The ICD 10 criteria are so old, and being replaced by the new ICD11, that some authorities recommend they not be used (Phillips et al., 2010). With good reason: there are problems with the classification of the disorder, the criteria themselves, and the separation of non-delusional and delusional forms of the condition into different categories.

First, the location. In the ICD10 classification system, BDD is classed as a hypochondriacal disorder, itself a sub category of Somatoform Disorder. Somatoform disorder appears in the category of Neurotic, Stress-related and Somatoform disorders. The chapter in which the whole is contained is Chapter V, Mental and Behavioural disorders. The term hypochondriacal seems to offend as many patients that the DSM IV term “imaginary” used to do.

Next, the criteria. The central feature is described as “a persistent preoccupation”, in BDD’s case, with “normal or commonplace physical appearance interpreted as abnormal and distressing”. The diagnostic criteria for more typical hypochondriacal disorders (which are typified by an abnormal preoccupation with being unwell) are laid out in the same short paragraph that BDD is, with few features to discriminate it from related conditions. This
brevity comes at the cost of precision, which in turn hampers clinicians applying these criteria.

Finally, the retention of the time-honoured tradition of classing separately neurotic disorders those BDDs that are associated with insight (as above), and into psychotic disorders those that aren’t. The trouble with this splitting is that patients at opposite ends of the insight spectrum seem to benefit from being treated as if for obsessive compulsive disorder(Phillips, 2004). While there continue to be patients with a primary psychotic disorder who present with dysmorphophobic delusions, including all the features of BDD, who respond to antipsychotic treatment, the vast majority seem still to be better managed as complex OCD or OCRD. The concept of mono-symptomatic delusional disorder, so in vogue some decades ago, is now seldom thought to apply to BDD(Phillips & Dufresne, 2003).

It may be argued that such splitting doesn’t really matter, as long as patients are treated appropriately. However, it is precisely because treatment approaches are decided on diagnosis that it is so important to get this issue right. So that patients who are better offered psychological therapy and antidepressant medication are not treated with antipsychotics first line, and to a lesser extent, vice versa.

BDD has just been moved to be alongside the other Obsessive Compulsive and Related Disorders in the new ICD11, and map more closely onto the direction set by DSM V, bar muscle dysmorphia, which is unlikely to feature (Veale & Matsunaga, 2014). Early studies suggest that the ICD11 criteria along with clinical case vignettes have improved diagnostic accuracy(Kogan et al., 2020). It is too soon to decide how much of an improvement is discernible clinically.
1.2.2. Mapping BDD on the distress-visible difference spectrum

Body dysmorphic disorder is defined as a condition in which there is much distress, but little or no visible difference. In the chart discussed below, patients with BDD would therefore fall within the top right left-hand corner.

![Graph showing BDD on the distress-visible difference spectrum](image)

*Figure 3: Body Dysmorphic Disorder*

This is a pictorial representation of a concept and the data points and units are for illustration only.
1.2.3. BDD with Visible Difference, or BDD Plus

The diagnosis of BDD requires a judgement that the individual is preoccupied with an appearance that would be considered unremarkable by others. While this seems intuitively sensible, this immediately raises several questions in clinical practice: Where is the line between unremarkable and remarkable visible difference? Who is best placed to draw it, and using which criteria? What of those patients who are deemed by surgeons to have some visible difference, and yet have all the other features of BDD?

In clinical practice, there are a group of individuals who describe extremely high distress, and other psychosocial features that seem indistinguishable from those with BDD, but for the fact that the body area that they are concerned with seems to be more visibly different than those with BDD. For the purposes of this discussion, and perhaps for future research, I suggest we term these patients as exhibiting the features of BDD with Visible Difference, or BDD Plus.

It is difficult to delineate, with any validity, the boundary between “one or more perceived defects or flaws in physical appearance that are not observable or appear slight to others” and those “defects or flaws” that are obvious to others, particularly expert plastic surgeons. It is significant that many scales that are validated to identify BDD make no mention of the latter half of criterion A. In other words, while they assess for “preoccupation”, there is no requirement for objective external, or specialist assessment of the appearance of the body part that the individual is unhappy with. An individual who is preoccupied with a body area that appears very different to those of their peers, may have good reason to be preoccupied, and to wish to appear more like everyone else. A rating scale that does not require a judgment about this key issue cannot claim to diagnose BDD, or to make for a DSM-V diagnosis.
From both clinical practice and the literature, it is clear that individuals who look unremarkable, as well those who look different, may score identically on scales of appearance distress. In practice, the former group are likely to be diagnosed with BDD if their appearance distress is severe and disproportionate to their appearance. The latter group are more likely to be considered as suffering from a response to their “abnormal” appearance, and in the absence of obvious contraindications, more likely to be offered surgery. In fact, it is possible that this latter group is the most likely to be offered surgery, as their clinical presentation may seem the most amenable to surgical treatment. The rationale being that it is understandable for those who look different to feel different, even badly about their appearance. And the more different they look, the worse they may legitimately feel without their distress being termed abnormal, or excessive.

Some patients who both look different and report severe distress do not respond well to surgery. They would meet every criterion of BDD, save that they look different from others. One of the great clinical challenges in assessment is trying to differentiate this group of individuals from those whose distress is successfully ameliorated, if not extinguished, by aesthetic surgery.

**Response to surgery**

Some authors have suggested that those patients with BDD who respond well to aesthetic surgery should be understood as only suffering “apparent dysmorphia” (Corbella & Rossi, 1967). In other words, that they only seem to have BDD, but in fact do not, because they are helped by surgery. On the other hand, those that do not respond to aesthetic surgery are confirmed to be suffering “true dysmorphia”. This is an interesting idea, but seems flawed by the idea that the main test is the very intervention that those with BDD are advised not to undergo, viz. aesthetic surgery. Besides, a condition that can only be diagnosed by a patient’s response to elective and expensive surgery seems difficult to advocate. Such a “test” may cause harm to those who are
told that their dissatisfaction with surgery is proof that they are suffering a serious mental illness, and that they should therefore not have further surgery. Surgeons who are surprised at a patient being disappointed by competent surgery might recognise this patient group. This sub-group of patients has been depicted in the graph below, reflecting the overlap in symptom severity with BDD, but with more visible difference.

![Figure 4: “BDD Plus”](image)

This is a pictorial representation of a concept and the data points and units are for illustration only.
The literature of studies on the effects of aesthetic surgery on those diagnosed with BDD reveals that some respond very well to their surgery, to the extent that they no longer meet the diagnostic criteria for BDD. In other words, patients whose response to aesthetic surgery is so positive that they are “cured” of their apparent BDD (Veale et al., 2014). This flies in the face of all that has been previously presumed about BDD, and raises questions about its place at the head of a short list of absolute contraindications to aesthetic surgery. Inconvenient as this development is to current practice, it is important that it is not ignored. The reasons why some patients with BDD respond well to surgery, and others so badly, are surely worthy of more research.

An ancient concept of depression, now in disuse, divided patients into those with endogenous depression, i.e. that which comes from within, and reactive depression - alluding to those patients who become depressed in response to external events and stressors (Mendels & Cochrane, 1968). Might research show that some patients with BDD too might be thought of as having endogenous dysmorphophobia, while others may have a reactive form, e.g., in response to post-partum changes, age or injury? These are merely theories, and there is not much evidence to suggest that even were patients to cluster into endogenous and reactive BDD, that they would respond differently to aesthetic surgery. One of the reasons that the endogenous-reactive dichotomy was set aside in depression was poor construct validity (Young et al., 1986).

Another factor to consider is the difference in how patients experience and communicate distress in response to illness symptoms. In the same way that individuals rate an identically noxious stimulus differently in terms of self-rated pain scores, so might it be for BDD. Some patients will report severe pain in response to a stimulus others tolerate. Appearance distress is so subjective that in practice it is difficult to tell apart the rating questionnaires of those with
no visible difference, and those whose bodies look very different to those of their peers.

Finally, degree of visible difference does not predict response to surgery (Spector et al., 2008). Intuition suggests that those with minimal visible difference might do less well with surgery than those who look remarkably different from their peers. The literature does not support this intuitive conclusion, with there being no difference in the two groups. In the way that descriptions of pain cannot by themselves readily predict how someone will respond to analgesia, it is worth wondering whether the same applies to those with body dissatisfaction. In other words, it doesn’t follow that just because a patient feels unduly distressed by their appearance, that they will not be delighted with aesthetic surgery. Or that someone with less distress will do better.
1.2.4. Comorbidity and Differential Diagnosis

It is relatively rare in clinical practice to meet an individual who fulfils the criteria for only BDD, but no other mental disorder. Careful assessment reveals psychiatric comorbidity in most. As with all comorbidity, the direction of association between BDD and psychiatric comorbidity isn’t always clear, although it is worth considering whether one is secondary to the other. The common conditions encountered in clinical practice are considered below.

**Obsessive Compulsive and Related Disorders (OCRD)**

Obsessive Compulsive Disorder: in pre-surgical assessment, the presence of OCD in someone with body dissatisfaction should raise the clinical suspicion that their appearance concerns are either obsessional, or have the potential to evolve into obsessions. Although there is little in the literature addressing that addresses this topic, comorbid OCD should raise concerns about disappointment with aesthetic surgery (Mancebo et al., 2005).

**Other OCRDs**

These include hoarding, trichotillomania, and excoriation, or skin picking. They will be considered in more detail later. Although the other OCRDs are theoretically more commonly found in this population too, compulsive habits like nail biting are reported more often than the rarer trichotillomania (hair twirling) etc.
Eating Disorders

Eating disorders are not considered part of the OCRD spectrum although their diagnostic criteria overlap (Jolanta & Tomasz, 2000). BDD and eating disorders appear to be closer now with fewer differences than ever before. The change in the diagnostic criteria of BDD to allow a plurality of insight has certainly shifted the boundaries of BDD, until where they at least abut, if not overlap the criteria for eating disorders.

Many patients who seek aesthetic surgery report symptoms of eating disorder (Rosen & Ramirez, 1998). Some meet diagnostic criteria for an eating disorder. Others report a history of such symptoms, or treatment for a historical diagnosis. In clinic, many describe their appearance concern as unrelated to their eating disorder. That such patients presume there is no connection does not make it so. On detailed examination, a disordered body image appears to be the common root of both. This is true even of patients who describe having recovered from eating disorder. Patients who have recovered from anorexia nervosa are known to continue to have cognitive deficits, e.g. in emotion recognition (Oldershaw et al., 2010). It is possible, likely even, that cognitive recovery trails behavioural change, sometimes with lifelong residual deficits. Detection of active eating disorder symptoms is particularly important, as those with severe eating disorders may be more likely to meet physical criteria for aesthetic surgery and but also disappointed following surgery. Severe anorexia nervosa impairs breast development in pre-pubertal girls, and causes breast regression in women. Such patients are more likely to meet criteria for breast augmentation.
**Massive Weight Loss**

Bariatric surgery is resulting in increasing numbers of patients with massive weight loss, many of whom require / wish body contouring aesthetic surgical procedures (Sarwer et al., 2008). Their assessment is often challenging, not least because such patients may never have had a positive body image to restore (Al-Hadithy et al., 2014). Patients whose obesity warrants bariatric surgery often suffer from binge eating disorder (BED) and other forms of disordered eating. Those with BED and BDD have similar early experiences of trauma, teasing and body shaming (Grilo & Masheb, 2001). This relationship is significant for at least two major reasons. Bariatric surgery is a highly effective treatment for obesity, but may have no direct effect whatever on a patient’s disordered eating, and their relationship with food(Münzberg et al., 2015). This is a challenge for weight management services.

**Anxiety disorders:**

These are commonly found in patients with BDD (Hollander & Aronowitz, 1999). Patients who have these often believe that the anxiety disorder is secondary to their appearance concern and that surgery should result in a reduction in anxiety(von Soest et al., 2012). It is not unreasonable to speculate that some individuals whose primary anxiety disorders predated their appearance concerns may derive less benefit from surgery. It is important to at least flag these up to the patient and their surgeon as raising the risk of post-operative disappointment.

**Mood disorders:**

Persistent depressive symptoms are commonly reported in patients being assessed for aesthetic surgery (Biby, 1998). Many have been diagnosed in primary care with depression, and have a history of being treated for this.

Again, most ascribe the depression to their appearance concerns, and have hopes that their depression will lift in response to surgery. It is essential to identify those individuals whose appearance concerns are secondary to
severe depression, (based on a clear history of timelines), and to offer them adequate psychiatric treatment. There is a potential risk that their secondary appearance concerns, including BDD-level symptoms, will not respond to aesthetic treatment. In the AEARP, significant active depression is considered a contraindication to surgery. In practice, persistent or recurrent depressive disorders are the two mood disorders most commonly identified at assessment. It is relatively rare in NHS Lothian to see patients with bipolar disorders requesting surgery. There is no evidence that bipolar disorders protect patients from appearance concerns in general and BDD in particular.

It is especially important to assess past and present suicidal thinking and acts in patients with comorbid mood disorders, if only to understand the consequences of disappointment with aesthetic surgery.

**Personality Disorders**

1. **Obsessive Compulsive Personality Disorder (OCPD)**

Patients may suffer from both OCD and OCPD. The key differences between the two are the following: obsessions and compulsions occur in OCD, not in OCPD. The average sufferer of OCD has insight into the impact of the condition on their daily life. Those with OCPD often do not, and tend to be preoccupied with orderliness, including symmetry and to strive for this in their lives. OCPD is very common, and thought to occur in 28% of the population.

OCPD presents in this population as a desire for symmetry, e.g., in patients seeking bilaterally equal nares, or breasts. These individuals have a higher-than-normal standard for order in their lives, and it follows that this can easily extend to a desire for symmetry in their own bodies. It is important for assessing clinicians to understand this and to consider whether their desire for symmetry is reasonable. In those who have not otherwise met caseness for BDD, OCPD should act as a separate red flag to warn of disappointment (Zojaji et al., 2007).
2. Emotionally Unstable Personality Disorder:

In addition to a high rate of post-traumatic disorder, those with this condition also experience identity confusion. Body image difficulties are therefore common, and should be carefully evaluated. The risk of self-harm and suicide are so high that it is usually considered best that aesthetic surgery is avoided, at least until the patient is more stable (Pompili et al., 2005).

Autistic Spectrum Disorders (ASD) [38]:

The number of individuals diagnosed with ASD is increasing (Matson & Kozlowski, 2011). It is not clear whether this represents a true increase in population prevalence, or whether, as is more likely, this trend reflects increasing awareness and concern for ASD in the general population and in mental health professionals. ASD influences appearance concerns in several ways (Chasson et al., 2011). Akin to individuals with OCPD, there may be an expectation of body symmetry. A hallmark of ASD is relative inflexibility of thinking, or concreteness: this may manifest as an inability to appreciate how surgery may not deliver on their expectations. Black and white thinking sometimes makes it difficult for patients to accept a rejection of their request for aesthetic surgery.

CLINICAL EXAMPLE: A young man was referred for consideration of rhinoplasty. On examination his nose was prominent with relatively minor nasal septum deviation. He had a history of depressive disorder so severe that it was associated with self-harm, and he was convinced that this was secondary to his squint nose. He had decided that the only solution to his distress was aesthetic surgery. He did not agree with his clinicians that there was a risk of disappointment nor that such disappointment might lead to increased self-harm. He made a formal complaint when he was advised to return only after he had successfully undertaken more intensive psychiatric treatment.
**Psychotic disorders [40]:**

It is rare in clinical practice to come across a patient whose BDD is either comorbid with or secondary to a psychotic disorder. Nonetheless, it is essential to screen for active psychotic symptoms and for a history of psychotic disorder, particularly schizophrenia. Dysmorphophobic delusions have been noted in individuals with schizophrenia. An individual whose BDD-level appearance concern is a delusional component of a psychotic disorder is unlikely to respond well to aesthetic treatment, and should be offered psychiatric treatment instead (Phillips & Dufresne, 2000). Patients who present with non-delusional aesthetic concerns, with comorbid psychotic disorders, pose a challenge. Many people with psychotic disorders can lead an average life with the same thoughts and feelings as anyone else, despite their psychotic symptoms. There is no reason that patients with psychotic disorders might not have a similar range of aesthetic concerns. The relationship between a patient’s appearance concerns and their psychosis is important to assess, however, as the consequences of missing a delusional presentation can be very serious.

**CLINICAL EXAMPLE:** A man in his fifties was referred by his sector psychiatrist to the liaison psychiatric clinic in plastic surgery, with appearance concerns. At his appointment, he was asked how we could help him, to which he replied, “You can’t help me, it is clear I’ve come to the wrong place: I had hoped you would see me and instantly offer me surgery because I look like a monkey.” It emerged that he had only grown a beard to conceal this “fact” from others. He was being treated for schizophrenia, and was not regular with taking his medication. In addition to more traditional persecutory delusions, he had this fixed false belief about his appearance, a dysmorphophobic delusion with no insight. The belief had first surfaced months into his latest schizophrenic relapse in his late thirties, not having troubled him before (unlike in primary BDD, where the appearance concerns develop in teens and early twenties). On discussion with the surgical and mental health team, it
was agreed that his best hope was to comply with antipsychotic treatment. He disagreed with this recommendation, but returned to the care of his mental health team.

**Post-traumatic stress disorder [16].**

In one study, 78% of patients diagnosed with BDD reported maltreatment (including various forms of neglect and abuse) in childhood (Feusner et al., 2010). PTSD is a condition whose prevalence appears to be increasing as a result of increasing public awareness. The diagnosis requires exposure to one or more acute psychologically distressing events, and resulting recurrent intrusive memories and images (flashbacks) which are associated with anxiety symptoms so severe that the individual may avoid any reminders of the event. Associated symptoms may include nightmares. Although there is effective treatment in the form of condition-specific psychological therapies, e.g., Eye Movement Reprogramming and Desensitisation (EMDR), there are many patients who have either not sought treatment or not responded to it. A small number of patients are referred each year requesting aesthetic surgery to help attenuate unpleasant memories. There is no evidence that such expectations can be safely met with surgery, so most such requests are declined. Most, but not all, because such expectations may be covert, and not emerge during the course of assessment.

**CLINICAL EXAMPLE:** A woman in her forties was referred for the surgical reduction of her chin by her GP who was so keen she be helped that he attended the assessment appointment with her. On examination, she drew attention to a small but unremarkable submandibular pad of fat, and asked that this be removed. She gave a history of sustained abuse in childhood which had left her with a number of unpleasant memories. Among her distressing memories was of her abuser’s face, including his double chin. She had recently noticed with horror that she too was developing a double chin, which instantly reminded her of her abuser, and in turn of her abuse. Psychiatric evaluation revealed a full house of PTSD features, including
multisensory flashbacks (memories that included the memory of physical sensations, touch and smell, so vivid that she would feel she was reliving the original traumatic experience). Although there was also a full house of symptoms of BDD, any report of perceived ugliness was closely linked to the PTSD. She was desperately keen for this to be surgically addressed. While there was no doubt that her symptoms were genuine and distressing, there was no guarantee whatever that surgery would deliver on her expectations. Or that looking at the resulting scar or other reminders of surgery wouldn’t then trigger flashbacks. As it was clear that surgery could not be expected to meet her unreasonable, if understandable, expectations, her request for aesthetic surgery was declined and she was urged to remain in psychiatric treatment. She was a patient who was highly deserving of help, but neither this entitlement nor her resistance to psychological treatment justified offering her aesthetic surgery.

**Body Integrity Identity Disorder (BIID):**

This is an ill-understood and fortunately rare condition (Bayne & Levy, 2005). It is not even at all clear that it is a single condition, and it has not been included in the DSM V. It is likely to be included in the new ICD11 as Body Integrity Dysphoria. It is unusual to see a “pure” form of this condition. Most patients demanding amputation in NHS Lothian are seeking a permanent solution to a temporary or chronic painful and disabling condition, e.g., chronic regional pain syndrome (CRPS). The case below reflects our experience that surgery should not be offered to someone who desires but does not otherwise require limb amputation.

**CLINICAL EXAMPLE:** A 19-year-old university student was admitted to the regional burns unit with severe burns to his left ankle. He was referred for urgent psychiatric evaluation when it became clear he had caused the injury himself, after months of planning. At interview he denied any suicidal thoughts or intent, but reported being so convinced that he would be “better off” without his right foot, that he had researched ankle injuries, and had deliberately,
damaged his Achilles tendon and distal tibia with the application of a flame and a breeze block, so that “surgeons would then be forced to amputate it”. To the team’s surprise, a series of interviews of both the patient and his family revealed no other sign of past or active mental disorder, specifically neither psychosis nor personality disorder, the most common conditions associated with such serious self-harm. Over the course of several months, his plastic surgeons were able to salvage his foot, using a Gracilis graft to reconstruct his Achilles tendon. Although he did well with physical therapy, he continued to seem determined to “complete the job” when he returned home, using other means. He was admitted to a psychiatric inpatient unit and remained there for several more months. No clear alternative diagnosis emerged, and over the following years was able to function without further self-harm.

**Gender Dysphoria:**

This is a condition in which an individual feels there is a “mismatch” between their biological sex and their gender identity. The awareness of this is rapidly growing, along with a public movement to classify this not as a disorder, but as a variant of normal identity. There is little in the literature that reflects our experience of individuals with undisclosed gender dysphoria seeking aesthetic surgeries such as breast reduction. In NHS Lothian, care is taken to ensure a referral for surgery from someone with gender dysphoria is not treated as a request for aesthetic surgery (Selvaggi & Bellringer, 2011). Requests for procedures to remove / de-emphasise sexual identity should be described as requests for gender reassignment, and are better coordinated by specialists in a gender identity clinic. In practice, gender dysphoria is not always obvious, even to the individuals themselves, and requires experience and expertise to identify.

**CLINICAL EXAMPLE:** a referral for breast reduction was declined because physical criteria were not met. The patient’s breasts were neither large enough nor disproportionate to their body. The decision of the team was appealed by the GP, whose letter was accompanied by a lengthy letter from
the patient. In it were the words, “I hate my breasts so much that I want them cut off”. Added to this clinical picture was a history of deliberate self-harm to the breasts themselves, in the form of self-inflicted lacerations. At interview, it became clear that the patient’s desire was not breast reduction, but bilateral mastectomy. On more detailed evaluation, a picture emerged of gender dysphoria, which had not hitherto been identified by the referring clinicians. The referral was redirected to the gender identity clinic, so that the individual could be offered specialist help.

Functional Neurological Disorders:

Functional syndromes are those in which a patient’s symptoms are thought to be caused not by structural pathology, but abnormal functioning of the central nervous system (Stone, 2016). A common example is a patient with chronic fatigue, characterised by profound tiredness that may wax and wane but does not remit, and is not apparently caused by physical disease. In the majority of patients, these symptoms are genuine and disabling (Fatemi et al., 2012). Most specialists are aware that psychological factors play a role in causation and maintenance and there is no evidence that these symptoms are imaginary. Indeed, most sufferers report being offended by medical reassurance to the effect that “there is nothing wrong”, when their symptoms are proof to them of the very opposite. The plastic surgery service regularly gets referrals for patients who request either breast reduction or abdominoplasty to help them cope with fatigue and related disability. The theory being that with less excess body fat to carry around, the fatigue might improve. There is no evidence in the literature that surgery will achieve this goal, and some clinical evidence that patients who undergo such “symptomatic” treatments may have a higher-than-average rate of subjective complications, as well as disappointment with the whole endeavour.
Long Term Conditions:

A number of patients who suffer from disabling conditions request aesthetic surgeries e.g., abdominoplasty to help improve their mobility. Occasionally, the referrals for such patients are couched along the lines of surgery being a reward for someone who has coped with significant adversity. While this is understandable, it is important to exercise care when patients over attribute to appearance symptoms that are in fact due to their primary medical disorders.

CLINICAL EXAMPLE: A 45-year-old mother of three was referred for bilateral breast reduction, despite clearly falling short of the required physical standards for such surgery. Her referring GP cited her primary progressive multiple sclerosis, and commented that as there was little else the healthcare system could do to help her with that, we should consider her request for aesthetic surgery favourably. The decision of the multidisciplinary aesthetic surgery team was that while the patient was deserving of all the help she could get, it would not be wise to offer aesthetic surgery to help her feel better.
1.2.5. **Diagnostic Assessment**

Any assessment to diagnose body dysmorphic disorder should comprise the following elements:

**History**

**Examination:**

a. Physical examination by an expert, viz. a consultant plastic surgeon or someone working under their supervision.

b. Mental State Examination: by a consultant psychiatrist or someone working under the supervision of such a clinician.

**Investigations:**

a. Medical photography: to aid and to record findings

b. Rating scales for body image, e.g. the Cosmetic Procedure Screening Questionnaire - COPS (Veale et al., 2012)

c. Diagnostic scales for BDD, e.g. Body Dysmorphic Disorder Questionnaire BDDQ (Phillips, 1996)

d. BDD symptom severity scales, e.g. BDD Yale Brown Obsessive Compulsive Scale BDD-YBOCS (Phillips et al., 1997), and the BDD Symptom Scale-BDSS (Wilhelm et al., 2016)

e. Rating scales for quality of life (QoL): e.g. SF36 (Brazier et al., 1992), however there are criticisms that generic QoL scales are not sensitive enough to detect changes attributable to body image. There is a growing trend of using body part specific scales that aim to measure both patient satisfaction and quality of life, e.g. the BREAST Q (Cano et al., 2013).

f. Mood scales, such as the Hospital Anxiety and Depression Scale, or the Primary health Questionnaire-PHQ9 (Cameron et al., 2008).
1.2.6. Treatment

Communicating the diagnosis

This is often the trickiest aspect of making a diagnosis of BDD. Some patients feel relieved by a diagnosis that finally helps them make sense of their longstanding symptoms, and gives them the hope of improvement with appropriate treatment. The majority of patients with BDD who request surgery do not welcome the diagnosis, particularly when they discover that BDD is considered a contraindication to surgery. The common responses range from denial, to protest, to appeals, and occasionally, complaints. It is likely that patients who present to a surgical service with BDD have less insight into the fact that their troubles constitute a mental disorder, than those who haven’t identified surgery as a solution to their appearance concerns. It seems the vast majority of those with BDD are unlikely to present to a mental health service at all, and when they do, it is more likely that their presentation is for a comorbidity such as depression, rather than the primary BDD. A number of patients with longstanding BDD who have contact with mental health services have never revealed their appearance concerns in these contacts. When their records are reviewed, there is no evidence that their mental health professionals have ever asked, or been told, of the severity of body dissatisfaction. So that a “new” diagnosis of BDD may come as much as a surprise to their mental health team as to the patient.

Limiting iatrogenesis

Iatrogenesis is the unintended harm caused to a patient by their healthcare. In BDD, avoidable aesthetic surgery that leaves the patient worse than before would count as iatrogenic harm. Neither the best intentions of the treating surgeon nor any amount of hope on the patient’s part protects against this. The best hope of avoiding such harm is in the careful assessment and identification of BDD in a patient seeking aesthetic surgery(Sweis et al.,
2017). Seeking explicit highly informed consent from all patients helps too. The majority of patients with BDD seem willing to give consent to even high-risk procedures, on the grounds that, to quote a patient, “anything would be better than the status quo”. Every patient, irrespective of their presenting difficulties and mental health status, must be warned of the small but significant risk of disappointment in response to surgery, not matter how expertly this is performed.

**Bibliotherapy, self-help.**

There are several excellent books designed to help sufferers get a better understanding of their condition, and of ways to start the process of recovery (Phillips, 1996). There are websites, support groups and other resources that may similarly help.

**Psychological therapy**

A number of therapies have been used to help patients with BDD. Most are a modification of cognitive behavioural therapy (CBT), which is thought to be effective, although not definitely better than generic psychological therapy (Harrison et al., 2016). It is unclear how long these benefits last. As with all psychological therapy, what seems to matter more than the model of therapy is the quality of engagement between the therapist and patient, and the expertise of the therapist. A significant obstacle to therapy in our clinical experience is that most patients seeking surgery do not have any hope that a psychological intervention can help them. Some feel frankly insulted by the suggestion that their problem resides not in the offending body part, but in their minds. The next obstacle is that most plastic surgical services, particularly those using the ERP, focus on whether or not a patient is likely to benefit from surgery. In practice, few therapists have either the experience or confidence required to help those with BDD, so that most therapy that is offered tends to be generic, with a therapist who doesn’t have the specialist expertise required. Unsurprisingly, there are a number of treatment failures. There is new evidence that OCRDs as a group may require more intensive
therapy than hitherto thought. Most CBT is offered on a weekly basis, with some homework. The is that conditions like OCD that are being reinforced every day that the patient suffers them, are unlikely to be easily extinguished: they may need daily intensive therapy, sometimes on a residential basis, for any shifts in thinking and behaviour to occur (Storch et al., 2008).

**Biological treatments**

A. Medication:

In theory, drugs are considered second line treatments in Obsessive Compulsive Related Disorders (OCRDs), to be offered after trials of psychological therapy, or to augment these. In BDD, they are joint first line along with CBT, and are considered essential in those with suicidal thoughts and depression (Phillips & Hollander, 2008). In practice, the delays in accessing psychological therapy, as well as the intensity of symptom distress are such that many patients are offered medication trials before they embark on psychological therapy.

i. Antidepressants:

Evidence for the use of antidepressants is both specific to BDD, as well as extrapolated from their use in OCD and OCRD. The two drugs for which there is most evidence are:

- **Fluvoxamine:** this is a selective serotonin reuptake inhibitor (SSRI), which in higher doses is effective in OCD and OCRD (Phillips et al., 2002).

- **Clomipramine:** this is a tricyclic antidepressant (TCA) that has a long history of effectiveness in OCD, and has been shown to be effective in one of the few randomised controlled treatment trials in BDD (Hollander et al., 1999).
ii. Antipsychotics:

Historically, most patients with BDD would have been offered an antipsychotic, on the premise that their condition was a form of psychosis. The most popular choice for the treatment of mono-symptomatic delusional disorder, as BDD was then considered, was Pimozide, a drug that has fallen into disuse due to its adverse effects. It has more recently been shown to be no superior to placebo in an admittedly modestly powered study (Phillips, 2005). Antipsychotics are not merely effective in those with delusions and hallucinations. They have other effects. The commonest use of antipsychotics is in fact not for psychosis, but other conditions (Alexander et al., 2011). In lower doses, antipsychotics are used as sedatives to alleviate anxiety and psychological distress. It is likely that many patients with marked symptom distress may experience a reduction in the intensity of their symptoms with a trial of low dose antipsychotics (Rashid et al., 2015). Such a response shouldn’t be confused as proof that they were psychotic in the first place (a post-hoc ergo proper hoc error). There is some evidence for olanzapine augmentation in severe treatment resistant BDD (Nakaaki et al., 2008).

Finally, a small number of patients present with BDD that is either the most prominent feature of a psychotic disorder, or an element of a more complex disorder such as schizophrenia. It is absolutely appropriate for such patients to be offered trials of antipsychotics. Even in these patients though, a sub-optimal treatment response to antipsychotics should raise the question of whether they too may benefit from antidepressants and psychological therapy.

iii. Benzodiazepines:

These are sedatives, and as such may help attenuate symptoms, or at least the distress associated with body dissatisfaction (Phillips et al., 2006). They are addictive however, and care must be taken to avoid prescription for daily
use that exceeds a fortnight. In other words, these are better used as required for acute distress, rather than for daily use.

iv. **Ketamine:**

There is some weak evidence that this may help alleviate symptoms in OCD, and improve response to psychological therapy (Martinotti et al., 2021).

**Novel biological treatments:**

i. **Transcranial Magnetic Stimulation (TMS):**

The therapeutic and targeted use of magnetic fields has a number of applications in neurology and psychiatry, and has relatively recently been used in treatment-resistant patients with OCRD to improve their response to psychological therapy (Trevizol et al., 2016). There is growing evidence for its use in BDD (van Paridon et al., 2022).

ii. **Transcranial Direct Current Stimulation (tDCS):**

This is the application of focussed electric fields to the brain for the same desired effect as TMS, viz. improvement of chronic symptoms and improved response to conventional treatments such as psychological therapy (Hossain et al., 2022).

iii. **Deep brain stimulation (DBS):**

There are case reports that report benefit (Baldermann et al., 2016).

**Social Interventions**

Most of these fall within the remit of the psychological therapies discussed above. There are however a number of primarily social interventions that are worth considering in patients with BDD. These include the cessation of certain social activity that enhances the distress associated with body dissatisfaction, and the promotion of other pursuits that lead to healthier social connections that do not depend on appearance. An example of the former is to advise a
holiday from social media, particularly Facebook and Instagram, which are known to heavily feature unrealistic images and increase the likelihood of unfavourable comparison, as well as depression. Healthier pursuits include team sports, which emphasise health above appearance, in addition to having beneficial biological antidepressant effect.

1.2.7. Prognosis

The growing body of evidence for various treatments offers much hope for the future. Severe BDD, like other OCRDs, is extremely disabling, distressing, and difficult to treat. The long term outcomes are not good (Thiele & Hamalian, 2015). Remission rates are low (Phillips et al., 2012), with very high rates of comorbidity, especially depression. Increased suicide rates may be testament of how helpless some sufferers feel. It isn’t clear what to make of the evidence that suggests that some sufferers of BDD may benefit from surgery to the extent that they no longer meet caseness. As suggested above, perhaps some patients who seem to have BDD actually don’t, but instead experience abnormally high distress levels that then respond to surgery.
1.2.8. **Gaps in our knowledge**

Notwithstanding all that has just been described, there is much about the body dissatisfaction spectrum that remains unclear. The threshold at which body dissatisfaction- which is so common as to be termed normative, crosses over into body dysmorphic disorder remains arbitrary. The relationship between degree of body dissatisfaction and good surgical outcomes is also a mystery. The DSM V diagnostic criteria for BDD are a welcome and significant improvement over the last version. The new criteria however are not precise enough for use in aesthetic surgery, and do not offer any more of a prediction of poor prognosis than their predecessor. The cornerstone on which BDD has hitherto been termed an absolute contraindication to aesthetic surgery has been somewhat undermined by a series of studies that show that some patients with BDD respond very well to aesthetic surgery, to the extent of being “cured” of it.

Having considered body dissatisfaction in all its forms, we will now review the literature for the benefits ascribed to aesthetic surgery.
1.3. A literature review of the benefits of aesthetic surgery

Even a cursory review of the literature on aesthetic surgery brings up a wealth of studies reporting mostly positive outcomes for those who undergo it. The range of aesthetic surgical procedures that patients rated in these studies is wide, as is the number of benefits attributed to them. Some studies are easier to discount than others, for example those whose conclusions are based on rating scales with questionable validity, e.g. the rhinoplasty study below reporting improvements in personality (Hay & Heather, 1973). Many however are designed and conducted well enough to make it difficult to dismiss their authors’ reports. Some of these studies are listed in the following tables, grouped by procedure, with comments on their strengths and limitations.

This is not a systematic review of the literature: that features in the next chapter with a narrower focus. This review of the literature was undertaken early in the research, as a broad scoping exercise.
### 1.3.1. Rhinoplasty / Septorhinoplasty

Some who undergo rhinoplasty and septorhinoplasty seem to experience improvements in their mood (Dinis et al., 1998). The numbers in the cited study are small, and the follow-up time only months. There is more robust evidence of improved quality of life (Fatemi et al., 2012), from an excellent prospective study using validated rating scales, alas over only 6 months. Body image, at least of the face, has been demonstrated (Klassen et al., 2014). The limitations of these studies should be put into context of the clinical difficulty in conducting such studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedure</th>
<th>Number</th>
<th>Age in years</th>
<th>Gender</th>
<th>Study Design</th>
<th>Fill duration months</th>
<th>Psychosocial Measures</th>
<th>Scale</th>
<th>Improvement</th>
<th>Negative Psycho-Social Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>May et al. 1973</td>
<td>Rhinoplasty</td>
<td>17</td>
<td>Mean 23.4</td>
<td>12 Female, 5 Male</td>
<td>Prospective</td>
<td>Mean 24 (minimum 6)</td>
<td>Personality, Personal Illness, Attitude</td>
<td>Hydromed Obsessive Questionnaire, the five Positive Scales and the Personal Illness Scale of the Symptom Sign Inventory</td>
<td>18 out of 17 Improved 13 &quot;unqualified success&quot; Reduced hostility Improved personality to &quot;more resilient&quot;</td>
<td>1 &quot;technical failure&quot;, 3 with &quot;some complaints&quot;</td>
</tr>
<tr>
<td>Dinis et al. 1998</td>
<td>Septorhinoplasty</td>
<td>25</td>
<td>Mean 29.5</td>
<td>9 female, 16 male</td>
<td>Prospective</td>
<td>mean FU - 4 month</td>
<td>Psychosocial functioning, Desirability</td>
<td>Beck's Depression Inventory, SCL-90</td>
<td>Reduction in SCL-90 (reduction in distressing symptoms) was statistically significant - p&lt;0.05 52% reported feeling more desirable Reduction in depression in 3/6</td>
<td>Depression worse in 1</td>
</tr>
<tr>
<td>Klassen et al. 2014</td>
<td>Rhinoplasty</td>
<td>23</td>
<td>Not described</td>
<td>Not described</td>
<td>Prospective</td>
<td>4</td>
<td>Psychological function, Social function</td>
<td>FACED</td>
<td>Improved psychological and social function</td>
<td>Not described</td>
</tr>
<tr>
<td>Fatemi et al. 2012</td>
<td>Rhinoplasty</td>
<td>75</td>
<td>Mean 38.06</td>
<td>Female: (61.33 % female, 18.67 % male)</td>
<td>Prospective</td>
<td>6</td>
<td>QOL</td>
<td>SF36 v2, Nasal obstructive symptoms evaluation (NOSE), Rosenberg (RISE)</td>
<td>On SF 36 all patients showed improvement, significant in role of emotion, vitality, physical functioning and bodily pain.</td>
<td>Not described</td>
</tr>
<tr>
<td>Lohuis et al. 2015</td>
<td>Rhinoplasty</td>
<td>110</td>
<td>Mean age 34.4</td>
<td>16 males (14.0%) and 94 females (85.4%)</td>
<td>Prospective</td>
<td>12</td>
<td>Body image</td>
<td>Ulcer Questionnaire (UQ)</td>
<td>Improvement in mean scores from 14.91 to 6.54 to p&lt;0.05</td>
<td>Not described</td>
</tr>
</tbody>
</table>

**Table 1: Rhinoplasty / Septorhinoplasty studies**
1.3.2. Facial rejuvenation

Those who brave facial rejuvenation surgery feel years younger (Friel et al., 2010): in this study, this was measured by an unvalidated questionnaire created by one of its authors, and administered retrospectively to their patients: although the follow-up period was long at 12 years, the response rate was below 30%. Greater satisfaction levels were reported in those “currently being treated for depression” as opposed to those who weren’t in one curious study of short duration (Hessler et al., 2010). Improved quality of life was reported over three years in a study that lumped rhinoplasty and “surgery for the aging face” using validated scales over three years (Litner et al., 2008). Only one rare study reported no change in self-esteem (Jacono et al., 2016). The best studies in this group have very short periods of follow-up.

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedures</th>
<th>Number</th>
<th>Age in years</th>
<th>Gender</th>
<th>Study Design</th>
<th>FU duration months</th>
<th>Psychosocial Measures</th>
<th>Scale</th>
<th>Improvement</th>
<th>Negative Psycho-Social Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litner et al 2008</td>
<td>Facial surgery and Rhinoplasty</td>
<td>95</td>
<td>Mean 40</td>
<td>62 females (66%) and 11 males (12%)</td>
<td>Prospective</td>
<td>3</td>
<td>Body image</td>
<td>DermF NS</td>
<td>Patients in both groups improved. Older patients did best. Men had higher pre-surgical appearance distress but larger improvements.</td>
<td>N/A described</td>
</tr>
<tr>
<td>Friel et al 2010</td>
<td>Face Lift</td>
<td>86</td>
<td>Mean 48.3</td>
<td>65 female, 4 male</td>
<td>Retrospective</td>
<td>Mean 144</td>
<td>Satisfaction</td>
<td>Body image</td>
<td>Oseray, Facial Satisfaction Questionnaire</td>
<td>61/67% reported facial appearance improvement of &quot;good or above expectations&quot; at 1 yr. and 61/66% still felt so after average 12.5 yrs of follow-up</td>
</tr>
<tr>
<td>Hessler et al 2010</td>
<td>Facial Surgery</td>
<td>51</td>
<td>Mean 50</td>
<td>Female 36/80%, Male 15/16%</td>
<td>Prospective</td>
<td>4 to 6</td>
<td>Optimism, Resilience, Satisfaction</td>
<td>Life Orientation Test—Revised (LOT-R) Facial Plastic Surgery Outcomes Questionnaires (FPSQO)</td>
<td>1. FPDOS improved in all 2. Eighty-two percent indicated a satisfaction level of 5 or higher</td>
<td>N/A described</td>
</tr>
<tr>
<td>Jacono et al 2016</td>
<td>Face Lift (Rhytidectomy)</td>
<td>50</td>
<td>Mean 58</td>
<td>42 Female, 2 Male</td>
<td>Prospective</td>
<td>6</td>
<td>Self Esteem</td>
<td>Rosenberg Self Esteem Scale (RSES)</td>
<td>No significant change</td>
<td>N/A described</td>
</tr>
</tbody>
</table>

Table 2: Facial surgery studies
1.3.3. Breast augmentation

Breast augmentation is followed by improved sexual function six months after surgery (Guimaraes et al., 2015). Improved self-esteem has been reported soon after surgery (Figueroa-Haas, 2007). So has body image, but only 6 weeks after augmentation in one otherwise excellent study (M. Coriddi et al., 2013). A longer term retrospective study extended to ten years, but only sought satisfaction ratings, which were high (Gryskiewicz & Leduc, 2014). Quality of life is recorded as improved at 12 months (Pérez-San-Gregorio et al., 2016). Women in an extraordinarily robust study which followed 455 patients up to 6 years after surgery reported improved sexual attractiveness, but not self-esteem (Murphy et al., 2009). Taken together, the breast augmentation studies are also short on follow-up, with some notable expectations.

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedures</th>
<th>Number</th>
<th>Age in years</th>
<th>Gender</th>
<th>Study Design</th>
<th>FU duration months</th>
<th>Psychosocial Measures</th>
<th>Scale</th>
<th>Improvement 1</th>
<th>Negative Psycho-Social Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figueroa-Haas 2007</td>
<td>Breast augmentation</td>
<td>54</td>
<td>Mean 33</td>
<td>All female</td>
<td>Prospective</td>
<td>1 to 2</td>
<td>Self-esteem, Sexual Function</td>
<td>RSE, Female Sexual Function Index (FSFI)</td>
<td>Improved self-esteem and sexual function (all six domains - desire, arousal, lubrication, orgasm, pain)</td>
<td>Nil described</td>
</tr>
<tr>
<td>Murphy et al 2009</td>
<td>Breast Augmentation</td>
<td>455</td>
<td>Median 34</td>
<td>100% female</td>
<td>Prospective</td>
<td>72</td>
<td>body image, self-esteem and GOL</td>
<td>RSE, SF-36, Body Esteem Scale and Rowland's scale</td>
<td>High satisfaction rates (88% in first month and 85% at 6 years) Improved body image and sexual attractiveness No change in general self-esteem and GQOL</td>
<td>Nil significant</td>
</tr>
<tr>
<td>Coriddi et al 2013</td>
<td>Breast augmentation</td>
<td>150</td>
<td>Mean 35.9</td>
<td>All female</td>
<td>Prospective</td>
<td>1.5</td>
<td>Satisfaction = Body image, * Psychological well-being</td>
<td>BREAST_Q</td>
<td>Improved psychosocial function (to 94% from 51%) and sexual (81%) from baseline of 45% well-being, satisfaction with breast appearance - body image 79% (61% baseline)</td>
<td>Physical wellbeing briefly fell post op (pain) but then normalised</td>
</tr>
<tr>
<td>Gryskiewicz, J. 2014</td>
<td>Bilateral breast augmentation</td>
<td>670</td>
<td>Mean 33.5</td>
<td>All female</td>
<td>Retrospective</td>
<td>12</td>
<td>GQ, and Satisfaction</td>
<td>Brest-Q</td>
<td>Mean Breast-Q score 76 indicating satisfied</td>
<td>Nil described</td>
</tr>
</tbody>
</table>

Table 3: Breast augmentation studies
1.3.4. **Abdominoplasty and genital surgery**

Abdominoplasty leads to improved quality of life in one retrospective study with low response rates using robust scales (Papadopulos et al., 2012). Labiaplasty improves sexual satisfaction and genital self-image, as reported in one study up to 24 months following surgery (Goodman et al., 2016). In general, abdominoplasty studies report significant satisfaction rates.

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedures</th>
<th>No.</th>
<th>Age in years</th>
<th>Gender</th>
<th>Study Design</th>
<th>PM duration months</th>
<th>Psychological Measures</th>
<th>Scale</th>
<th>Improvement 1</th>
<th>Negative Psycho-Social Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tani Basso</td>
<td>Abdominoplasty</td>
<td>30</td>
<td>Median 37</td>
<td>All female</td>
<td>Prospective</td>
<td>2</td>
<td>Body image, General psychological functioning</td>
<td>Improvement in body image, physical self-consciousness during sex; NS reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papadopulos</td>
<td>Abdominoplasty</td>
<td>65</td>
<td>Mean 47</td>
<td>95% female, 11% male</td>
<td>Prospective study</td>
<td>76</td>
<td>OSI- Self-esteem Scale, Rosenberg Self-Esteem Scale, Freiburg Personality Inventory</td>
<td>General life satisfaction showed a significant improvement (p &lt; 0.006)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>et al (2012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Body image increased regarding satisfaction with the abdomen (p &lt; 0.01)</td>
<td></td>
</tr>
<tr>
<td>Goodman et al.</td>
<td>Female genital</td>
<td>130</td>
<td>Mean 32.74</td>
<td>All female</td>
<td>Prospective case-controlled study</td>
<td>24</td>
<td>Body Image, Sexual self-image, Sexual Satisfaction</td>
<td>Body Image scores dropped to control by 1 and 2 years, genital self image improved over control, sexual satisfaction and body esteem improved in those who completed these</td>
<td>NS described</td>
<td></td>
</tr>
<tr>
<td>et al (2016)</td>
<td>plastic/surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Table 4: Abdominoplasty and genital surgery studies*
1.3.5. Breast reduction

The procedure associated with the most biological as well as psychosocial benefits in the literature is breast reduction, or reduction mammoplasty. Patients in studies of it describe being in less pain (Freire et al., 2007), moving more easily (Mazzocchi et al., 2012). Some feel less anxious (Chahraoui et al., 2006). Others report such improved self-confidence in a study that authors titled their paper “Surgery for the psyche” (Hollyman et al., 1986). Again, most of these studies follow their patients up for a very short time.

| Study               | Procedures                 | Number | Age            | Gender | Study Design | PU duration months | Psychosocial Measures                                                                 | Scale                                                                 | Improvement 1                                                                                     | Negative Psycho-Social Outcome |
|---------------------|----------------------------|--------|----------------|--------|--------------|--------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Hollyman et al. 1986| Reduction mammoplasty      | 8      | Mean 22.4 years| All female | Perspective  | 6                  | Mood, Self-esteem, Body Perception                                                          | Crown-Crisp Experimental Index (CCEI)                                         | Improved self-confidence, femininity, sexual attractiveness                                      | Nil described                                                                   |
| Chahraoui et al. 2006| Reduction mammoplasty      | 30     | Range 21 to 57 years | All female | Perspective  | 4                  | Anxiety QOL                                                                                   | Subjective QOL, QOL, Psychological Distress with GHQ12, Anxiety with State-Trait Anxiety Inventory (STAI) | Reduction of state and trait anxiety, increased QOL                                         | Nil described                                                                   |
| Turner et al. 2010  | Reduction mammoplasty      | 24     | Mean age 39.21 ± 9.92 | 100% female | Perspective  | 5 months         | Temperament, Character Traits, Self-esteem                                                          | TCI and RSE                                                                  | Increase in RSE after surgery, p<0.01                                                      | Nil described                                                                   |
| Volkman et al. 2014 | Reduction mammoplasty      | 59     | Mean age 44 years | 100% female | Perspective  | 6                  | Breast-related symptoms                                                                        | Breast-Related Symptoms Questionnaire (BRSQ), HRQOL                          | SGOS experienced reduction in breast-related symptoms                                      | Nil described                                                                   |
| Quinones et al. 2015| Breast augmentation and reduction | 48    | Mean 25.9 (BMI): 22.24 (BMR) | All female | Perspective  | 6                  | Sexual Function                                                                             | Quick-F (sexual quotient female version) - Brazilian                        | Improved in both groups                                                                      | Nil reported                                                                    |

*Table 5: Breast reduction studies*
1.3.6. Lessons from the literature review

Although the search strategy was robust, as mentioned at the outset, this was not intended to be a systematic review. While it is included here as context, it provided invaluable pointers to the gaps in our knowledge.

It is worth starting with the strengths, before considering the limitations of the included studies. Taken together they make a strong case for the psychological, social and to some extent biological benefits of aesthetic surgery. Practically every study reports an improvement in either the patient’s health or the patient’s satisfaction with their health, with the odd exception in which the changes in patients were not statistically significant. Body image, self-esteem, mood and anxiety levels, sexual function, quality of life have all been described as improved.

Studies of breast surgery seem the most numerous, and those of breast reduction the most positive in their reports of benefits. The first is to be expected given the sheer number of patients seeking breast surgery, while the second - the positive results - warrant further investigation.

Soberingly, no factors emerge from the literature that may reliably be used to predict positive outcomes of aesthetic surgery in individual patients. There is no evidence that pre-surgical levels of distress or disability correlate with the outcomes of surgery. Most interestingly, there is little evidence to support the application of most of the physical criteria in the ERP.

There are limitations aplenty. These studies are observational, but this is to be expected and excused. The time between surgery and when the outcome measure was completed is rarely clear. Missing data, the absence of comparators, information and non-response bias bring up the rear.
There are few studies that report a deterioration in one or more psychosocial attribute. Self-harm and suicide are mentioned in several papers as a risk, but few of the studies report any. This is not altogether surprising as suicide is a rare event, and better studied in larger data sets.

The most striking feature of all seems to be the surprisingly short follow-up periods in many otherwise excellent studies. Practical difficulties in clinical research no doubt explain this feature, but it leaves unanswered the important question, how long do these benefits last?
1.4. **The Exceptional Referral Protocol (ERP)**

1.4.1. **A brief history**

Prior to 2005, all referrals would go to the plastic surgery department to be seen and managed by the consultants within the department. These consultant plastic surgeons would occasionally seek the opinion of a consultant psychiatrist or senior psychologist for patients whose mental health they had concerns about.

- In 2008-9, the Scottish Government invited bids for funding for service innovations that would reduce the waiting times for aesthetic surgery. NHS Lothian’s successful bid was for a service innovation designed by two senior consultant plastic surgeons and me.

The main changes that this model brought in were:

- The creation of a multidisciplinary team (MDT) that would meet weekly.

- Routine physical examination for all patients by a plastic surgery nurse specialist, to address legitimate concerns that a judgment of body image could not be made without an objective assessment of the patient’s appearance.

- The provision of consultant plastic surgery sessions to this MDT: this change was intended to address concerns that mental health professionals were making decisions about plastic surgery referrals, without the surgical expertise that this process required.

- In 2011, the EARP was revised with a renewed emphasis on patients meeting both physical and psychological criteria, and termed the Adult Exceptional Aesthetic Referral Protocol (AEARP). The pathway resembled the flowchart below.
In 2018, on the basis of a further quality improvement project supported by the Scottish Government, it was decided to pilot changing the order in which patients were assessed to ensure their physical attributes would be assessed before psychological assessment. This entailed two other changes:

- A. Screening of referrals: The point was to ensure the referral of every patient was first screened to ensure they met the basic eligibility criteria for aesthetic surgery (particularly a Body Mass
Index of between 19-27 kg/m2). This included a decision to write back to referrers who hadn’t provided the required data at the time of the initial referral.

- B. Replacing physical examination with medical photography:
  Medical photography had been found to be equal / superior to physical examination in clinic. A decision was taken that eligible patients were therefore to be offered medical photography to save them waiting for a trip to a hospital clinic. The specific change to be tested was the invitation of patients, not for a clinical assessment, but for medical photography, and to see if this could be achieved. The plan was to invite every eligible patient to undergo medical photography at an NHS facility nearest to their home, as an alternative to more traditional physical examination by a plastic surgery nurse specialist at St John’s Hospital, the main Lothian site for plastic surgery, located 20 miles to the west of Edinburgh. The aim here was to save the patient a delay for an appointment, as well as the journey out to Livingston.

In 2019, the Scottish Government released the latest iteration of the referral criteria, now termed the Exceptional Referral Protocol (ERP), which makes no substantive changes to most criteria.

These changes and the current Lothian ERP pathway are depicted in the following flowchart, and are described below.
Figure 6: The Current Lothian AEARP Pathway
1.4.2. The Lothian Pathway:

**Referral:**

Patients are referred for aesthetic surgery to the plastic surgery department either by their General Practitioners (GPs) through NHS Lothian’s electronic referral system (SCI Gateway) or by secondary care clinicians, usually surgeons in other departments (e.g., breast surgery), by letter. The AEARP guidelines are hosted on NHS Lothian’s referral information system, RefHelp, to aid referrers.

**Triage 1:**

These referrals arrive in amongst all other plastic surgery referrals and are badged as aesthetic by a consultant plastic surgeon, in the first of two triages.

**Triage 2:**

These referrals then go to the team secretary who prints them off and brings them to the MDT meeting each week.

**MDT meeting:**

At the weekly MDT meeting, all referrals are discussed.

- The completeness of each referral is considered: should more information be required; the team secretary writes to the referrers requesting this. From this stage on, patients are discharged if found to not meeting criteria or noted to have a contraindication to surgery.

- The team secretary also sends a medical photography referral form to the patient so they can get photographed in their local NHS hospital and let the secretary know.

- When the photography is complete, the medical images are viewed by the consultant plastic surgeon attending the meeting, and a decision is made as to whether the patient is likely to meet physical criteria. If the
surgeon thinks so, the patient is sent an appointment to undergo a psychological assessment by the team psychologist. If the surgeon is unsure, they request a second surgical opinion – whereupon the other consultant surgeon in the team reviews the same images and a decision is made. If the decision is that the patient does not meet the AEARP’s physical criteria for surgery, then the referral is declined, without the patient being put on a waiting list for psychological assessment.

- One outcome of requiring medical photography review was that only patients with exceptional physical criteria would be advanced to the next stage, viz. psychological assessment. This single step ensured that by definition no one would be offered surgery with “perceived defects or flaws in physical appearance that are not observable or appear slight to others”. In other words, no one with potential BDD could advance to surgery. These changes were so successful that they were implemented in NHS Lothian, and have inspired similar changes in other Scottish health boards.

- When the psychologist has assessed the patient, a decision is made as to whether they meet the AEARP’s psychological criteria too – in which case they are referred to one of the department’s consultant plastic surgeons for a surgical consultation. If the patient is considered to be contraindicated, then they are not offered surgery.

**Specialist endorsement:**

For certain procedures, it was decided that medical photography would not suffice, and specialist assessment would be required, e.g., labiaplasty, blepharoplasty etc. For these, a specialist referral was introduced, so that patients required the approval of a subject expert in order to be considered to meet physical criteria, e.g., an ophthalmologist confirming visual field impairment in patients requesting blepharoplasty.
Psychological Assessment:

The AEARP requires that patients should have severe and persistent distress associated with their appearance, and none of the specified contraindications, including BDD. The assessing psychologist is meant to cover these issues, and to report back to the MDT with their findings and recommendations.

Psychiatric assessment:

The team liaison psychiatrist’s role is to deal with complex patients that cannot be managed by the psychologists, to give advice to the psychologists where such advice is sought, and advise the consultant plastic surgeons on difficult cases. In practice, much of this work is done in the MDT meetings, during discussions of cases. The psychiatrist also guides the response to complaints to Lothian Health Board. Finally, the psychiatrist is often asked to see complex patients by surgeons in other departments for patients who are being considered for appearance-altering surgeries that are not primarily aesthetic, e.g., septorhinoplasty in patients with functional nasal obstruction.

Collaborative decisions:

Clinicians report back to the MDT with their assessment findings. This allows for the whole team to take a balanced view of the patients’ needs and their risks. It also allows for the discharge / diversion of those patients in whom a contraindication is identified.

Communicating outcomes:

Once a decision is made, a letter is sent to the referrer, signed by one of the team clinicians, but on behalf of the MDT, so it is clear that the decision has been multidisciplinary and shared.
**Appeals / Complaints:**

It is not uncommon to receive appeals from patients / referrers. As all relevant data have already been collected, it is relatively simple for different clinicians to re-examine these, without having to trouble the patient to return for further consultations. Unless there are new material facts, or a change in the clinical picture, most appeals do not result in a change in the MDT decision. Complaints have been rare since the MDT model was adopted, and are similarly managed by asking clinicians who are not familiar with the case to re-examine the clinical data.

**Data:**

Data on the referrals for aesthetic surgery to NHS Lothian have been collected from 2008-2016, and again from May 2018. Subsets of these data have been audited from time to time. The complete data set itself has not previously been analysed in its entirety. These data have been hosted on an Excel spreadsheet, on a shared NHS drive. Those who have access to this database are members of the Lothian aesthetic surgery multidisciplinary team, and from time to time, junior doctors and medical students assisting in different audit projects.

**Audits:**

Over the last 15 years, a number of audits have been undertaken of the Lothian service, largely for quality improvement. Some of the results from these audits are presented together below, as they will help illustrate the gaps in knowledge that prompted this research. The largest of these audits was a review of 5432 patients referred for aesthetic surgery from 2009-2015. Although the number of referrals each year have fallen through the pandemic, the profile of referrals has not changed substantially, so that the audit findings are still relevant.
Age

Patients in their 20s and 30s are most frequent, but the average age is surprisingly high (Figure 7). As seen in the literature, patients may suffer with poor body image for years before seeking aesthetic surgery. N = 5429, M=40, SD=12.98.

Figure 7: Age at referral
Sex

The majority of patients who seek aesthetic surgery are women. Although gender confirmation surgery is offered in NHS Lothian, this is delivered through a different pathway and is not considered aesthetic surgery. The gender mix of 600 patients sampled in 2015 was 489 females (81%) and 111 males (19%). With BDD being equally distributed between these two genders, it is instructive that there is such an over-representation of women (Figure 8).

Figure 8: Gender
**Procedures sought**

Breast Surgery, particularly breast reduction, is the most commonly requested. Figure 9 shows the referrals in 2015 by the requested procedure.

*Figure 9: Procedures sought by patients in 2015*
Physical criteria:

1663 (30.61%) patients met the physical criteria for aesthetic surgery on the NHS between 2008 and 2015.

In an audit of patients assessed between January and April 2018, 34 requests for surgery were declined. Of these, 33 were rejected on physical grounds and only one on psychological grounds (Figure 10). This discovery influenced us to change the order of assessments to ensure all patients were physically screened first, and only listed for psychological assessment if they met the physical criteria.

Figure 10: Pareto chart of reasons for turning down referrals at triage
High BMI

The number of patients who were found to have physical contraindications, including being above the BMI cut-off for surgery, added up to 606 (11.16% of all patients referred). The total number of patients whose Body Mass Index (BMI) was either above or below the BMI cut-offs permitted by the AEARP guidelines was 747 (13.75% of the total). The yearly figures are displayed in the Figure 11.

![Figure 11: Number of patients with high BMI](image)

The figure of those with high BMI is higher than the total number of patients with contraindications, suggesting that at least some of the patients with a high BMI were not recorded as contraindicated. This explains the fact that a small number of patients each year were offered surgery even though their BMI may have counted as a contraindication. A small number of these were whose massive weight loss meant they had lost 50% or more of their original body weight, and therefore qualified despite being still overweight.
1.4.3. Psychological Assessment

Total

Between 2008 and 2015, 3808 patients who were referred for aesthetic surgery underwent psychological assessments. This amounts to 70% of all the patients referred for aesthetic surgery (Figure 12). The referrals of the remaining 30% were mostly accounted for by those who rejected without any assessment being needed, e.g., in the presence of a contraindication being obvious in the referral letter. A small fraction of referral went “straight to surgeon” if the referral reason was not for aesthetic reasons.

Figure 12: Number who received a psychological assessment
“Redundant” assessments.

The number of patients who underwent psychological assessments in whom either a physical contraindication was found, or in whom no physical indications were identified totalled 3321. This represents 85% of all those psychologically assessed, or 60% of the total number of patients referred for aesthetic surgery (Figure 13). These patients would not qualify for surgery, no matter what the finding on psychological assessment. In other words, psychological assessment had no role in the fate of their request for surgery (which would be declined on physical grounds).

Figure 13: “Redundant” psychological assessments
Which begs the first question, why were they assessed? The answer is that these patients were likely triaged for psychological assessment first, so that they were psychologically assessed before being physically examined. As the findings of both would have been discussed at the same multidisciplinary team meeting, the discovery that the physical criteria were either not met, or a physical contraindication identified (most likely a high BMI) would have followed the discussion of psychological assessment. The assessing psychologists would not have known of this at the time of their consultation with the patient.

![Figure 14: Physical assessment outcomes in psychologically assessed patients](image)

From the patient’s perspective, would it be fair to describe these assessments as surplus to requirements, or redundant? The average psychiatric / psychological assessment is designed to produce a list of diagnoses, or a descriptive formulation respectively, with a suggested management plan. The AEARP psychological assessment was designed to produce a binary outcome, and answer to the question, “Yes, or No”, to the patient’s request for surgery. A patient could describe it as redundant if that was all they derived
from the process, and if there were neither the diagnostic formulation, nor management / recovery plan that suggested other routes to recovery.

**Psychology assessment audit results:**

56 letters from the team psychologists were audited. One letter was excluded as it was from the team psychiatrist. The letters followed a proforma listing the presence of absence of physical and psychological indications and contraindications, followed by an indication of the decision of the MDT. None contained the mention of a psychiatric diagnosis, psychological formulation or recommendations of healthcare other than aesthetic surgery. This confirmed the hypothesis that these assessments were redundant and offered patients no value.

![Psychological Indications: prevalence and outcome](image)

*Figure 15: Psychological indications - prevalence and outcome*
**Psychological Contraindications**

The number of patients found to have psychological contraindications to surgery were 376 (7% of all referrals, or 11.38% of those patients who were psychologically assessed). Figure 16 depicts this.

Most patients are considered psychologically suitable. This reflects the evidence that the majority of those who wish and undergo aesthetic surgery are likely to describe satisfaction with it. There concept of “psychological indication” does not have any discriminatory value, and does not lend itself to serve as a rationing tool. Every patient in every aesthetic surgery clinic describes distress and disability associated with their dissatisfaction with their body. The psychological equivalent to the concept of exceptional physical criteria would be (and is often taken to be) severe distress and disability associated with appearance. However, there is little evidence from this data set that such distress and disability may be measured in a manner that patients can then be ranked by it, and even more, separated on that basis.

*Figure 16: Psychological contraindications*
Psychological contraindications - outcomes:

185 (49%) of the 376 patients found to be psychologically contraindicated were referred for surgery (Figure 17).

Figure 17: Outcomes of patients with psychological contraindications
In other words, nearly half of all patients considered to be psychologically unsuited for surgery were offered an appointment with a surgeon. This is an extremely concerning figure, and difficult to adequately explain. Some of this number may have been patients with pressing physical indicators, but psychological contraindications, and perhaps some uncertainty in the psychologists. These would have been sent to surgeons with a letter warning of the psychological findings.
Those who met AEARP criteria

1507 (27.74% of all patients referred between 2008 and 2015) met both physical and psychological criteria were referred to consultant plastic surgeons for a consultation and the majority of these underwent surgery unless the surgeon decided it wasn’t in the patient’s best interests.

Figure 18: Number of patients who qualified for aesthetic surgery
1.4.4. Lessons from clinical experience, a literature review and audits of the referral system

Each of the three preceding sections illustrate knowledge gaps in the others. Taken together, these gaps highlight areas for future research. In particular, the need for us to understand of the value of aesthetic surgery.

Our clinical experience shows us that the new DSM V diagnostic criteria for body dysmorphic disorder are a significant step forward, making it easier for us to understand and help these highly disabled individuals. However, they remain too imprecise for use in an aesthetic surgical service. Audits show us what we have long suspected, that neither these criteria nor our clinical skills enable us to identify those most or least likely to benefit from surgery. The literature confirms to us that we are not alone, clinicians everywhere are unable to predict patients’ response to surgery.

The literature indicates a variety of benefits and high satisfaction rates reported by the majority of those who undergo such surgery. There are however limitations in most of these studies. Chief amongst these is a lack of clarity as to how long these benefits last. Is the satisfaction and pleasure of a better-looking body merely akin to the pleasure of owning a new car, so destined to wane in time? Or is it more sustained and more meaningful, thereby transforming people’s lives for the better?

There is a contrast between the evidence in the literature that the majority of those who undergo aesthetic surgery benefit from it, and the small numbers who meet NHS Scotland’s stringent criteria. There is insufficient evidence in the literature to support ERP criteria. This casts doubt on whether the system we have in place serves the best interests of the patient.

As to our clinical system, the ERP has been implemented efficiently in NHS Lothian. It is an effective tool to help assess large numbers of patients and ensure that aesthetic surgery is only offered to an exceptional minority of
those who wish it. The latest iteration of the pathway ensures that no one with 
body dysmorphic disorder is at risk of being offered surgery.

Alas, the effect of this efficiency is that a large proportion of patients are not 
offered surgery because they do not meet ERP criteria. The literature no 
longer supports such exclusion, if ever it did. As the evidence shows, we do 
not know how to select from a group of people keen to have aesthetic surgery 
a small group of those most likely to benefit from it. Nor are we reliably able to 
predict those who are unlikely to benefit, or who may be harmed by their 
experience.

Notwithstanding good intentions, our audits suggest many patients are 
undergoing psychological assessments that add little value to them. We 
therefore ought to question the current practice of requiring hundreds of 
patients every year to submit to assessments with more face validity than 
construct validity.

In order for us to know whether the NHS in Scotland should loosen the criteria 
and its purse-strings and offer aesthetic surgery to more people than it 
currently does, we need to better understand the value of such surgery. Value 
implies benefit over time, so it seems essential to understand how long the 
benefits of aesthetic surgery last.

I intend by way of the systematic review and cross-sectional study described 
in the next few chapters to answer this question for the one procedure that 
clinicians, the literature and our referral data all describe as the most popular, 
and possibly associated with the most positive outcomes: breast reduction or 
reduction mammaplasty.

2.1. Abstract

2.1.1. Background

Women who undergo reduction mammoplasty for aesthetic reasons report improvements in the physical, psychological and social aspects of their health. However, little is known as to the duration of these positive changes following surgery. This review was undertaken to answer the question, how long do the psychosocial benefits of reduction mammoplasty last?

2.1.2. Methods

For this systematic review, we searched MEDLINE, EMBASE, Web of Knowledge and forward and backward citations for studies published between the inception of these databases and 29 May 2022. All studies of breast reduction in adults that were either published in or translated into English were included, without date restrictions. We included studies that measured changes in mental health, appearance and quality of life using validated rating scales with time scales that exceeded a year. We excluded studies where breast reduction was undertaken as the treatment of disease, e.g. therapeutic mammoplasty for cancer; studies in which breast reduction was undertaken as part of breast reconstruction; studies of unilateral breast reduction, or combined breast reduction and augmentation; studies that included children and adolescents; studies that included surgery for gynaecomastia or gender reassignment; studies that reported exclusively physical outcomes such as of pain and mobility; studies that did not use validated rating scales; studies that reported outcomes lasting a year or less. Evidence from the included studies was synthesised in a descriptive manner. The quality of the evidence was assessed with the Cochrane risk of bias tool.
2.1.3. Results

The abstracts of 1041 studies were screened. 807 of these were irrelevant. 234 full text studies were assessed for eligibility and 226 excluded. Data were extracted from the remaining 8 studies. The risk of overall bias was moderate to high. The certainty of evidence ranged between moderate to very low. The results of the included studies are described in descending order of their certainty of evidence. Four included studies reported improvements in quality of life for three years; one study described improved self-esteem function for two years; four studies reported enhanced sexual function for up to three years; five studies described improved body image for between two and twelve years; one study claimed to have found anxiety and depression with very low certainty of evidence.

2.1.4. Discussion

The psychosocial benefits of breast reduction surgery for aesthetic reasons may last for many years. However, the quality of the published studies limits how certain we can be of this. Future research should compare the change in the reported outcomes of reduction mammoplasty over time.

Collaborators:

This chapter is the result of work done in collaboration with Dr. Polly Chapman (PC), Dr. Nimesh Jayasuriya (NJ) and Dr. Tsz Man Li (TML).
2.2. Rationale:

The numbers of people seeking to undergo aesthetic surgery to alter their bodies is rising. This is a reflection of changing knowledge, attitudes and availability. While private surgical establishments are growing in response to meet these demands, public healthcare systems, such as the National Health Service in the UK, are having to develop sophisticated systems to ration the supply of surgery (Breuning et al., 2010). The methods used to decide who gets surgery amongst those who apply have varied in how evidence-based they are. It is likely that the demand on services has outstripped the evidence needed to design and implement a fair system to ration care.

The value of aesthetic surgery is therefore of interest not only to individuals who may be considering it, but also healthcare providers and commissioners. At an individual level, patients are keen to understand if the benefit of any procedure is worth the cost to them. Hospital managers care about this too, but with a view of how much resource to devote to meeting the demands on their service. Healthcare commissioners and policy makers involved in the design and delivery of public healthcare systems are likely to have a wider perspective, with an interest in the value of such surgery relative to other healthcare costs: they may have questions about the opportunity cost of investing in aesthetic surgery, with a limited budget in which this will vie for funding alongside more traditional services such as cancer care.

The growth of the supply of aesthetic surgery has been followed by an increase in scales to assess people’s body image, and appearance-related distress and disability. There is no shortage of publications dealing with the validation of these scales. Some of these scales have been used more than others, and a few have become as popular as to earn the recommendation of surgical societies as potential patient-reported outcome measures, or PROMs.
PROMs have featured in many recent publications as validated methods of establishing the outcomes of aesthetic surgery. They have for example confirmed to many plastic surgeons their impression that patients who undergo breast reduction for aesthetic reasons are extremely pleased with the results. Other studies have thrown light on the range of benefits experienced and reported by these patients, from psychological to physical to social.

The measurable benefits of aesthetic procedures such as breast reduction have been used as an indication of its value. Recent studies have even converted these benefits into metrics traditionally associated with health economics, such as quality adjusted life years, or QALYs. Some authors calculate that the QALY associated with breast reduction for aesthetic indications is comparable to that of more established essential surgical procedures such as hip replacement (Tykka et al., 2010).

One would expect that such academic activity would include studies on the durability of these reported benefits over time. Many plastic surgeons express the opinion that in their clinical experience, breast reduction patients remain satisfied for years, returning only for revisions when age and other insults have altered the result of surgery. At the same time, most publications pertaining to breast reduction appear to describe post-operative benefits with short follow-up periods. Although the above-mentioned studies of QALYs give the impression of having assessed long term outcomes, on closer reading their calculation of QALYs have been achieved by extrapolating short term outcomes over time, on the presumption that these benefits are sustained.

While there may be little doubt as to the positive and wide-ranging benefits described by patients who undergo breast reduction surgery, the value of the procedure to patients, healthcare providers and commissioners alike must surely depend on whether these benefits are sustained over time.
Studies on the effects of retail therapy describe “mood repair” as the goal of buying new things to feel better (Atalay & Meloy, 2011). There is evidence that such purchases may be associated with quick gratification, and the implicit suggestion that the positive effects on mood are not sustained. It would seem only logical that patients and healthcare providers should understand whether the positive outcome of aesthetic surgery is akin to the mood elevation associated with the purchase of a new car, or something more sustained.

The few papers on this subject do not adequately address this gap in the knowledge. We therefore systematically reviewed the evidence to ascertain the duration of the reported psychosocial benefits of bilateral breast reduction.

2.3. Objectives

How durable are the psychosocial benefits of aesthetic breast reduction surgery beyond the first year? The objective of this study is to evaluate the duration of psychosocial changes (e.g., mood, self-esteem, body image, sexual function, quality of life) that patients report more than a year after undergoing breast reduction surgery for aesthetic reasons.

2.4. Eligibility criteria

2.4.1. Population

We included studies of adult women (age ≥ 18 years) undergoing breast reduction surgery for aesthetic reasons and other symptoms of breast hypertrophy, excluding those with diseases of the breast such as cancer.

2.4.2. Intervention

We considered all studies identified by the search if they included time scales of the breast reduction surgery and follow up beyond 1 year following surgery,
used validated rating scales and reported the statistical significance of any changes. We included prospective and retrospective studies, cohort and randomised controlled studies, even case studies. We did not include letters and conference abstracts. Examples of studies we excluded included studies in which outcomes were purely surgical e.g., scar healing or predominantly physical, e.g., pain or mobility. We excluded studies that used un-validated questionnaires and scales. We excluded studies that assessed changes for a year or less following surgery. We excluded studies of groups of patients of whom some were under 18 years of age. We excluded studies that included women who underwent surgery in relation to a breast disease. E.g., breast reconstruction following cancer.

2.4.3. Comparators

We considered studies irrespective of whether they used comparators.

2.4.4. Outcomes

Studies that we included had to report on at least one psychosocial outcome, such as mood and anxiety, self-esteem, body image, sexual function and quality of life. We included studies that assessed for “satisfaction”, however defined, but reported it in non-dichotomous terms. We included those studies that used validated rating scales for the outcomes of interest. We applied no initial language restrictions but our search was for abstracts in English and for papers for which there was an English translation.
2.5. Information sources

On 29 May 2022, HA searched 2 health databases, the names and date range of which are in Table 6. Between May and July 2022, we performed backwards and forward citation searching: we searched the reference lists of publications included for full-text review to identify studies that we may have missed out in the first round. We looked for the full-text papers through Google Scholar and Sci-Hub. The final search was run on 3 July 2022.

<table>
<thead>
<tr>
<th>Database</th>
<th>Dates covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovid</td>
<td></td>
</tr>
<tr>
<td>Medline and EPub Ahead of Print, In-Process and Other Non-Index Citations, Daily and Versions</td>
<td>1946 to present</td>
</tr>
<tr>
<td>Embase</td>
<td>1947 to present</td>
</tr>
</tbody>
</table>

Table 6: Information sources
2.6. Search strategy

The search strategy was developed after a number of different approaches were tried on OvidSP. The search strategy was vetted by an academic librarian. The search terms used on MEDLINE(R) and EPub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily, and Embase Classic+Embase (1947 to 2022 July 01) are listed in Table XXX.

Trial and error revealed that some of the search terms that seemed intuitive to include either did not increase the yield (e.g., the term “surgery”), or else reduced the number of publications identified (e.g., including timescale and synonyms of follow-up as required terms in abstracts). Details of study design were similarly omitted from the search terms. The final strategy proved to strike the best balance between identifying all relevant publications and weeding out those of no relevance to this systematic review.

Formulating an exhaustive list of psychosocial factors proved challenging, not least because it was difficult to satisfactorily define the limits of the term “psychosocial”, or “psychological” and “social”. Many papers do not cite psychological or social outcomes in the title, or even the abstract: an effort was made to look for studies in which the outcomes of interest may have been incidentally collected and reported on: quality of life outcomes in studies of surgical technique, for example.

Although it was tempting to use the “NOT” function to exclude studies of adolescents, cancer etc., it was avoided for fear of ruling out important papers. It is likely that this was an unnecessary precaution.

The search strategy was discussed with surgical colleagues and an academic librarian, but no formal process such as the Peer Review of Electronic Search Strategies (PRESS) checklist was used (McGowan et al., 2016).
MEDLINE(R) and EPub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily were searched via OvidSP. The database time range was 1946 to the present. Embase Classic+Embase (1947 to 2022 July 01) was also searched with the same search terms. The databases were last searched on 3 July 2022.

1. (breast reduct* or reduction mammoplast* or reduction mammaplast*).ti,ab.

2. Depression/ or obsessive behavior/ or stalking/ or self-injurious behavior/ or self-mutilation/ or suicide/ or suicidal ideation/ or suicide, attempted/ or suicide, assisted/ or suicide, attempted/ or stress, psychological/ or criminal behavior/ or dangerous behavior/ or drinking behavior/ or alcohol drinking/ or binge drinking/ or drug-seeking behavior/ or harm reduction/ or exp health behavior/ or social behavior/ or aggression/ or "rejection (psychology)"/ or shyness/ or social adjustment/ or social conformity/ or social desirability/ or social discrimination/ or social distance/ or social dominance/ or social identification/ or social isolation/ or social marginalization/ or social skills/ or social stigma/ or stereotyping/

3. (QoL or "quality of life").ti,ab.

4. (Mood* or depress* or mania or manic or happy or happiness or satisfied or satisfaction or dissatisfied or dissatisfaction or unhappy or unhappiness).ti,ab.

5. (Anxiety or anxious or distress or affect* or irritable or anger or angry).ti, ab.

6. (obsess* or preoccup* or dysmorph*).ti,ab.

7. (Psychological or social).ti,ab.

8. (Disabilit* or impairment*).ti,ab.

9. Or/ 2-8

10. 1 and 9

11. remove duplicates from 10

Table 7: Search strategy
2.7. Selection process

Four reviewers worked together on this systematic review. Two reviewers (HA and either NJ or PC) screened each record (title/abstract) and each report retrieved. Each reviewer worked independently of the other and were unaware of the decision of the others at each stage of screening. Disagreements were resolved by discussion at the end of each stage.

Notes were appended to certain publications to confirm information and to clarify doubts about the application of the search strategy.

English language full-text translations were sought for papers that were published in other languages but possessed an English abstract. Publications that were not available in English were excluded.

2.8. Data collection process

References of publications identified through OvidSP were exported to EndNote. These references were then uploaded to Covidence version 2.0, to enable multiple reviewers to work on the references. Covidence 2.0 facilitated the review, noting different decisions, prompting the need for conflict resolution at key stages, and maintaining a PRISMA flow chart by keeping score. Covidence 2.0 also provided a template to extract the data from the included publications and to assess their quality.

Machine learning classifiers were not used at any stage of this systematic review. Although both OvidSP and Covidence 2.0 enabled the deduplication of the references, all decisions were made by the three reviewers.

Crowdsourcing was not used for screening.
2.9. Data Items

2.9.1. Outcomes

While screening full text papers for inclusion, we looked for studies that reported psychological outcomes such as satisfaction, body image, self-esteem, anxiety and depression and other psychological and psychiatric symptoms / conditions; social outcomes such as quality of life, occupation; Biological outcomes like sexual function, pain, mobility.

Once we included our final set of studies, we collected the following data items: year of publication, country of study, study design, number of patients, response rate, description of the study population including age, comparators if any, the exclusion criteria in the study, the details of the validated scales used, whether pre-operative measurements were taken, the details of follow-up particularly including duration; finally, details of the reported outcomes – which in the included papers were body image, quality of life, sexual function, self-esteem and anxiety and depression. The results of each study were collated, with special attention of the reporting of time and any evidence of the follow-up or duration of each outcome.

Any measure of psychological and social function was eligible to be included provided it was validated. Studies were excluded on the basis that they did not use validated measures. We accepted papers that reported results in a variety of ways, summative scores, sub-scale scores etc. Studies had to report a follow-up of over 12 months in order to be included. When papers reported several points at which outcomes were measured, the last measurement was considered.

We expected that some studies would report for several outcomes, both psychological and social. Specifically, we anticipated studies:

- Reporting multiple outcomes – e.g., depression and self-esteem
• Using multiple methods or tools e.g., Hospital Anxiety and Depression Scale (HADS) and Short Form (SF-36) health survey

• Using a mix of validated and non-validated tools: e.g., studies using SF-36 to ascertain quality QoL, but a bespoke, non-validated scale to report on satisfaction.

• Reporting at multiple time points – e.g., 1, 2 and 3 years.

Where multiple outcomes were reported, we included all that were measured using validated instruments. Where multiple time points were described, we took the last time point. We included papers that reported time in ranges.

2.9.2. Other variables

We collected data on:

• The report: authors, year and source of publication

• The study – sample, study design, the absence of breast disease, outcomes of interest, psychosocial outcomes, measures, length of follow-up

• The participants: demographic details, breast reduction surgery for aesthetic indications, the absence of breast disease

• The intervention: exposure to breast reduction for aesthetic indications
2.10. Study risk of bias assessment

We assessed the risk of bias in the studies we included using the Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) (Sterne et al., 2016). We took further guidance from the Risk Of Bias in Non-randomized Studies of Exposure (ROBINS-E) (Higgins J, 2022). ROBINS-I addresses seven domains of risk of bias:

Bias:

- of confounding
- due to selection of participants
- in classification of interventions
- bias due to deviations from intended intervention
- bias due to missing data
- in measurement of outcome
- in selection of the reported result.

One author, HA, applied the tool to each included study and made judgements of risk of bias, recording the decisions and supporting information for the other reviewers to approve or differ on. We then followed guidance for ROBINS-I and arrived at an overall summary “Risk of Bias” judgement (low, moderate, severe, critical risk) for each outcome (Sterne et al., 2016). The overall Risk of Bias for each individual study was considered to be the highest level that the study gained in any domain that was assessed.
2.11. Effect Measures

Our focus was on length of follow-up, so the main effect measure of interest was time.

2.12. Synthesis methods

2.12.1. Processes

The potential number of outcomes being measured and reported on was large, and the validated measures used were numerous. The synthesis method we chose was to categorise the reported outcomes into four:

- Quality of Life (QoL)
- Body Image
- Sexual Function
- Self-Esteem

We initially anticipated that some measures might be represented in more than one study e.g., QoL using BREAST-Q, and hoped to synthesise these together where possible. However, as we will describe below, this was easier said than done.

2.12.2. Data preparation

The included reporting bias of the included studies was so significant as to preclude algebraic manipulation to derive standard deviations, standardised mean differences to permit the comparison of unlike variables.
2.12.3. **Tabulation methods**

We display data on a Summary of Findings table. This has been structured by outcome domain, but studies have been ranked from low to high risk of bias to highlight the most trust-worthy evidence.

We did not expect to attempt a meta-analysis, given our study question, and given the small number and heterogeneity of reported outcomes and measures. We do however describe the findings of each included paper with reference to the outcome of interest and certainty of evidence, to give a clear picture of the evidence of the duration of that benefit beyond one year.

Beyond the analysis of quality of the studies, no other methods were used to analyse heterogeneity. No sensitivity analyses were necessary.

2.13. **Reporting bias assessment**

We used the Risk of Bias due to Missing Evidence in a synthesis (ROB-ME) tool to guide our assessment of the risk of reporting bias. The Current ROB-ME tool is a preliminary version, in anticipation of an approved version being released. The tool provides guidance in making judgements about missing results in the studies included in the synthesis. The judgement options are either low risk, some concerns, or high risk. We judge the risk of bias due to missing evidence in our synthesis to be in the “Some Concerns” range due to the fact that there are some missing or potentially missing results in our included studies but there is unlikely to be a notable change to the synthesized effect estimate. We believe that the missing results are unlikely to alter the direction of the effects, but we cannot be sure that missing results might not significantly impact the size of the effects. In other words, we concede the possibility that others may judge this evidence to be in the high-risk range.
### 2.14 Certainty assessment

One reviewer (HA), assessed the certainty of the evidence, and three others (PC, NJ, and TML) checked its plausibility and accuracy. We used GRADE considerations – risk of bias, consistency of effect, imprecision, indirectness and publication bias) to assess the certainty of the evidence in each publication included in the review. Where appropriate we included other considerations that might raise the certainty of evidence, such as publication bias, large effect and plausible confounding. We prepared a “Summary of findings” table using GRADEpro GDT software and guidance found in section 14.2 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2019). Table 8 depicts the summary of findings. We explained the reasons for upgrading or downgrading certainty in the footnotes.

#### Table 8: Summary of findings

<table>
<thead>
<tr>
<th>Quality of Life (follow-up: mean 5 years; assessed with: SF-36)</th>
<th>Impact</th>
<th>Certainty</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 observational studies</td>
<td>serious</td>
<td>not serious</td>
<td>not serious</td>
</tr>
<tr>
<td>1 observational studies</td>
<td>serious</td>
<td>not serious</td>
<td>not serious</td>
</tr>
<tr>
<td>Self-Esteem (assessed with: FSFI, BREAST-Q (Sexual Well-Being))</td>
<td>Impact</td>
<td>Certainty</td>
<td>Importance</td>
</tr>
<tr>
<td>4 observational studies</td>
<td>very serious</td>
<td>not serious</td>
<td>not serious</td>
</tr>
<tr>
<td>5 observational studies</td>
<td>very serious</td>
<td>not serious</td>
<td>not serious</td>
</tr>
</tbody>
</table>

**Explanations**

- Quality of life is improved out to 3 years per Blomqvist et al, the paper with moderate risk of bias due to missing data. Eibenagely et al (21 +6 months) and Hermans et al (mean 25.3 months) report benefit for shorter durations. Cogliandro et al claim the longest potential range of follow up of 10 years and a reported mean of 5 years, but missing data make it impossible to infer improved QoL for that period.
- Hermans et al describe an average length of follow up of 25.4 months as well as improved Rosenberg Self-Esteem scale scores, but do not provide data to enable a more precise inference other than the post-operative mean was higher than the pre-operative one.
- Jank et al report improved sexual function out to three years following surgery; Cervac et al report follow-up of ‘at least 12 months’, but possibly up to 4 years, with no way of knowing. Eibenagely et al report “21+ 6 months”, Cogliandro et al five years of follow-up.
- Missing data limit inference and raise the risk of bias to very serious levels, downgrading certainty by two steps.
- Carty et al report administering breast QoL scales to patients operated upon up to over twelve years earlier, and only 15% response rate in the earliest patients. With no way of knowing how these earlier patients scored wrt the whole sample, we cannot infer with confidence. Hermans et al and Eibenagely et al report improvements for two years. Cogliandro et al report five years of improvement but with severe risk of missing data. Grant et al report positive change but over a wide range of time, five to nine years, with no clarity as to relationship between scores and time. Even if we admit a large effect, the missing data limit confidence.

**References**


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**Table 8: Summary of findings**

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2.15. Study Selection

2.15.1. Results

We found 1053 records in databases. After removing duplicates, we screened 1041 records, from which we identified 234 full-text papers. We reviewed these and finally included eight papers (Blomqvist & Brandberg, 2004; Carty et al., 2012; Cerovac et al., 2005; Cogliandro et al., 2017; Elfanagely et al., 2021; Glatt et al., 1999; Hermans et al., 2005; Janik et al., 2019). We then performed forward-and-back search using the references of the included studies. However no new publications were found through this method. The numbers at each stage are depicted in Figure 19.
Referral

Secretary checks BMI is listed in referral

Secretary sends patient medical photography invitation, and notes if and when they are done

Surgeon views images in weekly

Majority of referrals rejected as physical criteria not met

Psychological assessment, but only for patients who are physically indicated

Surgeon

*Figure 19 Flowchart of results*
2.15.2.  **Studies which were excluded**

We excluded two studies that met many but not all our criteria.

i.  “Impact of increasing age on breast reduction surgery: A single-centre analysis” is a German study with 25 study participants over the age of 60 and who completed the CSQ-8 up to sixteen months after surgery. The CSQ-8 is a scale that only measures satisfaction with the quality of surgical care so we excluded it (Braig et al., 2016).

ii. “Quality of Life After Breast Reduction Surgery: A 10-Year Retrospective Analysis Using the Breast Q Questionnaire Does Breast Size Matter?” is a study from the USA in 2012 with 178 participants who underwent in a ten-year time period. Although the authors mention in their “methods” section that they mailed all patients the BREAST-Q questionnaire, they only report on a single scale, the “satisfaction with outcome” scale, with neither comparators nor any explanation of why they did not report on the results of the other scales, if they had them. Although we included studies which suffered from high reporting bias this level of missing data made any inference impossible.
## 2.16 Study Characteristics

Table 10 contains the characteristics of interest of each included study.

<table>
<thead>
<tr>
<th>Paper number</th>
<th>Lead Author</th>
<th>Year Published</th>
<th>Country of Study</th>
<th>Study Type</th>
<th>Patients (n)</th>
<th>Response rate</th>
<th>Age</th>
<th>Validated Scale(s)</th>
<th>Follow up duration/range</th>
<th>Health outcomes measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pioro E. Jamik</td>
<td>2019</td>
<td>Poland</td>
<td>Cross-sectional</td>
<td>28</td>
<td>37.10%</td>
<td>39 ± 8</td>
<td>Female Sexual Function Index (FSFI), Sexual</td>
<td>12 to 36 months' (mean, 23.56)</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Lennart Blomqvist</td>
<td>2004</td>
<td>Sweden</td>
<td>Prospective</td>
<td>39</td>
<td>80%</td>
<td></td>
<td>SF-36</td>
<td>3 months</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Matthew J. Barry</td>
<td>2012</td>
<td>USA</td>
<td>Retrospective</td>
<td>279</td>
<td>26.10%</td>
<td>38.7 ± 13.2</td>
<td>Breast Q</td>
<td>Range 12 years (1995-2007)</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Sanja Carovac</td>
<td>2004</td>
<td>UK</td>
<td>Retrospective</td>
<td>80</td>
<td>89%</td>
<td>36.7 years (range, 20 to 70 years)</td>
<td>HAQ, PSFI</td>
<td>At least 12 months (range 12-48)</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>A. Capistrano</td>
<td>2017</td>
<td>Italy</td>
<td>Retrospective</td>
<td>291</td>
<td>100%</td>
<td>43</td>
<td>Breast Q</td>
<td>5 years</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>6</td>
<td>Omar Elfringel</td>
<td>2021</td>
<td>USA</td>
<td>Prospective</td>
<td>78</td>
<td>48%</td>
<td>39.5 ± 25 years</td>
<td>Breast Q</td>
<td>21 ± 6 months</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>7</td>
<td>Brian Gillett</td>
<td>1997</td>
<td>USA</td>
<td>Retrospective</td>
<td>81</td>
<td>55%</td>
<td>37.89 ± 15.37 years</td>
<td>Body Dysmorphic Disorder Examination Self Report, Breast Cancer Rating Scale (BCRS)</td>
<td>58.66 ± 44.31 months</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Boukje Hermans</td>
<td>2005</td>
<td>Netherlands</td>
<td>Cross-sectional</td>
<td>94</td>
<td>89.40%</td>
<td>37.7 (13.2)</td>
<td>SF-36, TQ-50, Rosenberg Self Esteem Scale, Self consciousness Scale, Derndford Appearance Scale 59</td>
<td>25.3(7.4)</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>

*Table 9: Study Characteristics*
2.17 Risk of bias in studies

The risk of bias for each included study is presented in Table 11, along with justification for each risk of bias judgement. Missing data and selection of the reported results were the commonest reasons for studies scoring higher on risk of bias. Confounding in these observational studies was presumed to be a moderate risk across the board, rather than a study-specific weakness. The domain-level judgements for every included study are depicted as “traffic light” plots in Figure 19.

<table>
<thead>
<tr>
<th>Lead Author</th>
<th>Confounding</th>
<th>Selection of participants</th>
<th>Classification of interventions</th>
<th>Deviations from intended interventions</th>
<th>Missing data</th>
<th>Measurement of outcomes</th>
<th>Selection of the reported result</th>
<th>Overall</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piot E. Jank</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Validated instruments (SF36, BREAST-Q sexual wellbeing, SGI-LF, used correctly), cross sectional cohort study comparing pre and post-BPH group, time range 12-36 months, numbers not reported out against the, not done if post-operative (SGI) group of 37%</td>
</tr>
<tr>
<td>Lemnati Bramquid</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Serious</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Prospective 3 year study with pre and 3 year follow up, SF36 subscores described in change and percentage, but absolute scores not reported - serious - missing data</td>
</tr>
<tr>
<td>Matthew J. Carty</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Critical</td>
<td>Critical</td>
<td>Retrospective, between January 1985, and December 31, 2007, BREAST-Q reporting only Satisfaction With Breast and Outcomes - highly vague</td>
</tr>
<tr>
<td>Sofia Cervaci</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Serious</td>
<td>Low</td>
<td>Critical</td>
<td>Critical</td>
<td>FSFI done but reported in sections, no totals, SHG done but similarly not reported as expected. HAOS reported in uncollectable form</td>
</tr>
<tr>
<td>A cogliandro</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>100% response rate, categorised by breast hypertrophy and asymmetry with corresponding means BREAST-Q scores but no comparator or effect of analytic statistics, homo the “moderate for missing data”, highly imprecise time range 10 years, mean 5</td>
</tr>
<tr>
<td>Omar Elhagolgy</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Matched with propensity scores) prospective study with pre- and post-BREAST-Q, but let down by missing data confounding reporting.</td>
</tr>
<tr>
<td>Brian Glatt</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Noncompliance taken from another study and depicted as “normal”, time range very wide, 58.88 ± 4.31 months</td>
</tr>
<tr>
<td>Bougie Hernans</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Cross-sectional with minimum 2 year follow up, unclear to range, multiple instruments (SF36, EQ-5D, RSE DAS-59), v positive outcomes but certainly limited by incomplete reporting, missing SD for SF-36 and DASS reports</td>
</tr>
</tbody>
</table>

Table 10: Risk of Bias
The domain-level judgements for every included study are depicted as “traffic light” plots in Figure 19.

<table>
<thead>
<tr>
<th>Study</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janik 2019</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Blomqvist 2004</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Glatt 1997</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cogliandro 2017</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Hermans 2005</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Elfanagely 2021</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Carty 2012</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td>↓</td>
</tr>
<tr>
<td>Cerovac 2004</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>X</td>
<td>+</td>
<td>+</td>
<td>↓</td>
</tr>
</tbody>
</table>

Domains:
- D1: Bias due to confounding.
- D2: Bias due to selection of participants.
- D3: Bias in classification of interventions.
- D4: Bias due to deviations from intended interventions.
- D5: Bias due to missing data.
- D6: Bias in measurement of outcomes.
- D7: Bias in selection of the reported result.

Judgement:
- Critical
- Serious
- Moderate
- Low

*Figure 20: Risk of bias traffic light plot*
The distribution of risk-of-bias judgements within each domain in the form of weighted bar plots is shown in Figure 21.

Figure 21: Risk of bias domains
2.18. Results of synthesis

2.18.1. Quality of Life

Four studies that were included measured QoL. These are described below as a group, in ascending order of risk of bias. Quality of life is improved out to 3 years per Blomqvist et al, a study rated as moderate risk of bias due to missing data. Hermans et al (mean 25.3 months) reports benefit for a shorter duration. Cogliandro et al claim the longest potential range of follow up of 10 years and a reported mean of 5 years, but missing data make it impossible to infer improved QoL for that period. Figure 22 is a chart of the reported outcomes of each study displayed alongside risk of bias and certainty.

Figure 22: Results: Quality of Life
2.18.2. **Sexual function**

Four studies looked at sexual function, using the Female Sexual Function Index (FSFI) (Janik et al, Cerovac et al) and sexual wellbeing scale of BREAST Q (Cogliandro et al, Elfanagely et al). With moderate certainty of evidence, improvements in sexual function may last three, and possibly five years (Cogliandro et al., 2017; Janik et al., 2019). Figure 23 depicts this.

FSFI is a validated score with a cut-off score of 26.55 for FSD. A lower score indicates a more severe sexual disorder. Janik et al reported an increase in mean FSFI of 27.4(9.1) from 21 (11.4) in their post-op group comparing with their pre-op group (p=0.03), when Cerovac et al reported a mean of 20.1 (SD not reported) in their post-op participants. Cerovac et al also found positive correlation between the participants’ sexual function and post-op outcome (p=0.001). Cogliandro et al showed a higher reported sexual wellbeing from post-op participants, who had more asymmetry or more severe breast hypertrophy pre-BBR (no statistical significance reported). Elfanagely et al found an increase in sexual wellbeing score in post-op patients.

Janik et al used a number of validated instruments in a cross sectional 2-cohort study comparing pre- and post- surgery groups, over a time range of 12-36 months. A lack of detail of time since surgery and a low response rate in the post-operative (BRG) group of 37% together keep this study from being exceptional.
Figure 23: Results: Sexual function
2.18.3. **Body Image**

Five studies including 893 participants studied body image. With low certainty of evidence, they report improved body image for up to 12 years. Figure 24 depicts this.

Three of the five studies used selected sections of BREAST-Q and used different reporting methods ranging from raw scores (Cogliandro et al., 2017) to percentage change of scores (Elfanagely et al., 2021) to univariate comparison of Rasch converted scores (Carty et al, 2012). The first two studies examined the correlation between the BREAST-Q scores and patient’s demographics and surgical aspects of care. Elfanagely et al showed that BREAST-Q scores significantly improved post-surgery. The other two studies used different validated questionnaires: the Body Dysmorphic Disorder –Self Rated (BDDE-SR) (Glatt et al., 1999), and the Derriford Appearance Scale (DAS59) (Hermans et al., 2005). Glatt et al reported a significant decrease in BDDE scores post-operatively ($t(60) = 23.33$, $p<0.001$), reflecting improved body-image. Hermans et al found that patients in a pre-operative group more self-conscious and more embarrassed, in more pain, distress and physical disability than the post-operative group ($p<0.001$).

![Figure 24: Results: Body Image](image-url)
2.18.4. **Self-esteem**

Hermans et al investigated the effect of breast reduction on participants using a battery of rating scales, including the Rosenberg Self-Esteem (RSE) Scale in 94 participants and 71 women waiting for breast reduction, showing an increase in RSE score in the post-operative group (p<0.001) for a mean time of 25 (sd 7.4) months, indicating an increase in self-esteem post-BBR (Hermans et al., 2005). There is so little information on how long after surgery these post-operative patients may have been surveyed that inference about the duration of benefit is practically futile.

2.18.5. **Risk of reporting bias in syntheses**

We judge the risk of bias due to missing evidence in our synthesis to be in the “Some Concerns” range due to the fact that there are some missing or potentially missing results in our included studies but there is unlikely to be a notable change to the synthesized effect estimate. We believe that the missing results are unlikely to alter the direction of the effects, but we cannot be sure that missing results might not significantly impact the size of the effects. In other words, we concede the possibility that others may judge this evidence to be in the high-risk range.
2.19. Certainty of evidence

Assessments of certainty of evidence

Evidence of moderate certainty indicates that following breast surgery, QoL improves for up to five years, self-esteem for up to two years. Low certainty evidence suggests sexual function may be improved for three years and body image may be enhanced for up to twelve years. The evidence for the first two outcomes was downgraded one step, for serious risk of bias from missing data, and likely confounding. The evidence for the latter two outcomes was downgraded two steps for very serious risk of bias, again for missing data confounding. The summary of findings table already depicted in Figure 8 is reproduced here as it presents this information in greater detail and judgements explained in the footnotes (Table 11).

Table 11: Assessments of the certainty of evidence
2.20. Discussion

2.20.1. Interpretation of the results

The included studies are remarkable for several reasons.

The first is how few met even our relatively low standards for inclusion. We found sixty additional studies that we had to exclude because they did not follow patients up beyond 12 months.

The second is the low certainty of evidence, which sets a limit to how much we can infer from the studies.

That said, from the excellent study by Blomqvist et al it appears that there is evidence that those who undergo breast reduction experience or in any case report improved quality of life for at least three years. The other studies that measured QoL in some form support this, but their imprecision with respect to time makes it difficult to infer longer term benefits.

Similarly, there is convincing evidence from Janik et al that women report improved sexual function following breast reduction for a period of 3 years. The other studies suggest that sexual function benefits may last even longer.

The group of studies that report on body image suggest it may be improved for up to 12 years. The missing data of the reporting of time since surgery makes it difficult to be certain that patients are indeed better for that long, much as we would like to infer that.

The final publication is one that is tantalising for the significant burden of anxiety and depression that was discovered in patients 3 years following breast reduction surgery (Cerovac et al., 2005). In the absence of a baseline, the authors readily accept that it is impossible to understand whether these scores reflect dissatisfaction with healthcare, or an independent process. The limitations of the publication are such that it is not possible to draw inferences,
other than there was a considerable amount of anxiety and depression in their patients some years following surgery. That it is one of the only publications that reports this, even among studies of shorter duration, is cause for some wonder.

2.20.2. **Limitations of the evidence**

All the studies included were observational studies. Although this study design itself would be classed as a limitation in traditional Risk of Bias scales such as the ROB 2.0 which would penalise these studies for not being randomised controlled studies, more modern risk of bias assessments of non-randomised studies such as ROBINS-I are less harsh on their limitations.

1. Time between surgery and the completion of the outcome measure:
   Most studies reported this as a range, such that it is impossible to deduce a relationship between reported outcome and the time since surgery. e.g., Cogliandro et al 2017: “With due approval from the ethics committee of our university, 414 patients who were seen in consultation for breast reduction surgery between 2005 and 2015 performed by the same team were asked to fill out BREAST-Q surveys”. They themselves state that the BREAST-Q was published in 2009, long after their first enrolled patients were operated on. Later in the paper, they state that the mean length of follow-up was five years. Nowhere do they state that this was a retrospective study, although it must have been. Even if we presume that the authors must have known this number for every patient, they did not report it in their publication. In fairness to the authors and their studies, this omission may have been because their research questions were different to ours. Few postulated the possibility that the outcomes they measured might change over time.
2. Missing data: most papers reported their results in ways that prevented even basic statistical analysis, let alone a meta-analysis for the outcomes we were interested in.

3. The absence of comparators: some studies measured outcomes in patients who had undergone breast surgery, but cited no comparators, so that inferences of change and significance were not possible.

4. Information bias: most PROMs rely on self-report and are therefore at risk of recall bias. As some of these studies surveyed patients several years after their surgery, this is a limitation. It is not clear however that recall bias would influence patients to be overly positive in their self-assessments. “Gratitude” bias might, however, have that effect.

5. Non-response bias: many of the studies suffer from low response rates to surveys, well below the 70% threshold that is quoted. There is a risk that those who did not respond were substantively different from the responders, reducing the certainty of the evidence.

2.20.3. Limitations of the review processes

We dually screened all titles and abstracts, and thereby believe we missed few relevant studies. However, a single review author (HA) rated risk of bias and rated certainty of evidence. The other authors checked the plausibility of decisions. As this step was not dually and independently carried out, we may have inadvertently introduced some risk of error. However, this is unlikely, and we are confident that the conclusions of our study are sound. In addition, we limited the publications we included to only those that were either published in English, or for which we were able to source translations. We may have missed relevant studies published in other languages.
2.20.4. **Implications of the results for practice and policy**

The findings of this review suggest that some of the biological, psychological and social benefits of breast reduction may last well beyond the first year following surgery. Notwithstanding their limitations, the included studies report improvements in body image, self-esteem, sexual function and overall quality of life.

In addition, the findings of this review reflect extremely positive outcomes of breast reduction surgery that are in keeping with the results of studies of shorter duration.

The implications for practice must include the importance of incorporating patient reported outcome measures (PROMs) in routine surgical healthcare, and in following them up for much longer than is currently the norm.

Authors of some studies of shorter duration have converted short term outcome measures into quality-adjusted-life-years (QALYs) to justify their value. The findings of our study partly support their extrapolation.

In this connection, our findings might signal to policy-makers the importance of continuing to provide breast reduction surgery as a procedure that improves much more than the body image.

**Implications for future research**

The impressive number of studies that report positive health outcomes of breast reduction surgery up to 12 months after surgery is not matched by studies of longer duration. The studies included in this review suffer from several limitations that impair the certainty of evidence. While this is disappointing, it reflects the enormous scope for future research.

Numerous questions remain unanswered and should form the basis of future studies with fewer limitations. Are the various benefits reported in these studies sustained or do they decay over time? Although this review
tantalisingly suggests that benefits may last much longer than a year in some women, their limitations are such that we remain uncertain. It is time for studies to focus on the longevity of these benefits in the majority of those who undergo it, because only then might we be able to understand the full value of this surgery.

2.21. Support

This systematic review was done without financial support. Academic librarian support was provided through the University of Edinburgh. I sought guidance by the PRISMA 2020 extended checklist in the structure of this chapter (Page et al., 2021).

2.22. Competing interests:

None to declare

3.1. Abstract:

3.1.1. Introduction:

There is convincing evidence in the literature to show that individuals who undergo breast reduction surgery report improvements in their psychological and social health. However, few studies focus on how long these benefits last. The Patient Reported Outcome Measures In Surgical Evaluation – Breast Reduction (PROMISE-BR) study is a cross-sectional cohort study that aims to help bridge this gap in our knowledge.

3.1.2. Methods:

Of 317 patients who had undergone breast reduction in our service between 2009 and 2021, we contacted and enrolled 150 individuals and invited them to complete the post-operative BREAST-Q using an online survey. We also contacted and enrolled 32 women who were waiting for breast reduction surgery in our service and invited them to complete the pre-operative BREAST-Q questionnaire online. We reviewed the electronic patient records of these patients to ascertain their dates of birth, dates of surgery and postcode. The Quality Improvement Team of the Lothian plastic surgery service approved this study.

3.1.3. Results:

115 out of a total of 150 (77%) enrolled women completed the online post-operative BREAST Q questionnaire. 21 of 32 (72%) women waiting for breast reduction surgery completed the pre-operative BREAST-Q
questionnaire. The mean scores of the post-operative cohort were significantly higher than the scores of the pre-operative cohort (P<0.001). The BREAST-Q scores did not correlate significantly with the time between surgery and the survey. The mean scores of the post-operative cohort did not differ significantly from the published norms. Some scores of women who were less than three years after their surgery were significantly higher than both the normative and the scores of women who had undergone surgery more than three years previously.

3.1.4. Discussion

Our study shows that the biological, psychological and social distress and disability reported by women who wish breast reduction surgery resolve after surgery. These women experience a quality of life and satisfaction rates superior to their unaffected peers for the first three years following surgery, and then either equal to or superior to their unaffected peers thereafter, at least for 13 years. The results of our study suggest that if body dissatisfaction associated with breast hypertrophy were considered a condition with biological, psychological and social impairment and disability, then breast reduction surgery might now be considered its potential cure.

Collaborators:

This chapter is the result of work done in collaboration with Dr. Tsz Man Li, (TML), Dr. Polly Chapman (PC), Dr. Nimesh Jayasuriya (NJ) and Mr. Hilal Bahia.
3.2. INTRODUCTION

3.2.1. Background:

Individuals who undergo aesthetic surgery do so with expectations of a variety of physical, psychological and social benefits. Studies show that most patients describe their expectations as having been met following surgery. This is particularly true of breast reduction surgery, which is described by most plastic surgeons as the procedure with the best satisfaction rates among all aesthetic surgeries.

Individuals who undergo breast reduction surgery for aesthetic reasons describe improvements in their physical health, self-esteem, body image, relationships and sexual health, occupational prospects and quality of life (QoL), both general QoL as well as appearance related QoL.

Breast reduction surgery has been shown to improve women’s physical well-being, reducing reported pain levels, analgesic use, and sexual function and increasing mobility. Women describe improved psychological functioning, with reduction in symptoms of anxiety and depression and enhanced body image. Social function is also described as improved.

A growing number of studies use patient reported outcome measures (PROMs) to assess breast-specific QoL measures such as the BREAST-Q which is a validated scale that assesses the impact and effectiveness of breast surgery on patients. Few studies set out to measure how long these benefits last. The longest prospective studies only follow patients up for 1-3 years. There are some retrospective studies that report longer-lasting satisfaction rates, but unfortunately few of these use validated PROMS.
3.2.2. Objectives:

The main objective of this study was to determine whether any of the benefits of breast reduction surgery are sustained beyond the three years reported in the literature.

1. Hypothesis 1: the BREAST-Q scores of patients who have undergone breast reduction for aesthetic reasons will be inversely proportional to the number of years since their surgery.

2. Hypothesis 2: Normative BREAST-Q scores will be higher than the scores of women who have undergone breast reduction surgery, and these scores in turn will be higher than those waiting for breast reduction.
3.3. METHODS

3.3.1. Study Design:

This is a cross-sectional cohort study. We compared the BREAST-Q scores of women who had undergone breast reduction surgery between 2009 and 2021 with published normative BREAST-Q scores of women with no history of breast surgery or cancer and the BREAST-Q scores of a group of women waiting to undergo the same surgery (Mundy et al., 2017).

3.3.2. Setting:

This study was based in NHS Lothian, a Scottish NHS health board based in Edinburgh, UK. The study subjects were all women who met the Exceptional Referral Protocol (ERP) for breast reduction surgery. We enrolled two groups, one who had already undergone breast reduction surgery and the other was waiting for this surgery.

The majority of those who had undergone surgery had it done in NHS hospitals such as St John’s Hospital, Livingston or the Golden Jubilee University National Hospital in Clydebank. The rest had their surgery in a private hospital such as the Spire Murrayfield Hospital in Edinburgh. Patients’ NHS health boards funded their surgery, irrespective of where they had it done. The surgeries undertaken in private hospitals were funded as part of an NHS waiting list initiative. The surgeons who operated on these patients were mostly from the plastic surgery department in NHS Lothian.

The Quality Improvement Team of NHS Lothian’s plastic surgery department approved the PROMISE-BR study.
3.3.3. Participants:

Eligibility criteria:

Participants were women aged 18 years and over who had met the Exceptional Referral Protocol (ERP) criteria for breast reduction in NHS Lothian and had undergone the procedure between 1 January 2009 and 31 December 2021.

Sources and methods of selection and follow-up: We identified patients from the referral database maintained in the department of all patients who were referred for aesthetic surgery as well as NHS Lothian’s electronic records of patients coded as having undergone breast reduction surgery. 317 patients were considered eligible to be invited to take part in the study.

We sent all eligible patients a letter of invitation to complete an online questionnaire, with a follow-up call. We enrolled all patients who were contactable in the study, whether they completed the questionnaire, declined to do so, or did not communicate a decision. By contactable we mean those who we know received the invitation letter because they either completed the online questionnaire, responded to our telephone calls, or got in touch to opt-out of the study.

Matching criteria and numbers:

The pre-operative participants were waiting for breast reduction surgery in our department, having met the same ERP criteria as the post-operative women. Of the 70 patients eligible, we were able to contact (and therefore enroll) 32, and to invite them to complete the pre-operative version of the BREAST-Q questionnaire online.
Exceptional Referral Protocol (ERP) Criteria for Breast Reduction (See Appendix):

1. General criteria: Patients who are 16 years and over; There is significant impairment of function that can be improved by surgery; the patient has significant and prolonged psychological distress and associated impairment in functioning related to the perceived problem and is likely to benefit from aesthetic surgery.

2. There are no absolute contraindications, such as a major life event within the preceding twelve months; an episode of self-harm within the previous two years; there is a previous diagnosis of body dysmorphic disorder; the patient currently has a major depressive disorder, psychotic disorder, eating disorder, obsessive compulsive disorder or addiction.

3. Breast specific criteria: BMI must be between 20-27 kg/m². Breasts must be in “massive disproportion to body habitus”. Intertrigo, asymmetry of breasts> 1 cup size would be considered supportive factors.
3.3.4. **Variables:**

Only patients who had or were waiting for breast reduction through the AEARP pathway were included in the study.

Patients who were under the age of 18, underwent combined reduction–augmentation procedures or whose reduction was considered a therapeutic mammoplasty for cancer, were all excluded. We excluded women whose breast reduction was a revision of previous surgery. We excluded men who had received surgery or wished surgery for gynecomastia, as plastic surgeons consider surgery for gynecomastia and the outcomes vastly different from those of BBR in women. Gender affirming surgery is provided through an alternative service, not the through the AEARP pathway in NHS Lothian. We therefore excluded individuals with gender dysphoria who either underwent breast reduction surgery or were waiting for it in the study period.

**TABLE of Exclusion Criteria**

<table>
<thead>
<tr>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt; 18</td>
</tr>
<tr>
<td>Revision procedures</td>
</tr>
<tr>
<td>Combined reduction-augmentation</td>
</tr>
<tr>
<td>Therapeutic mammoplasty</td>
</tr>
<tr>
<td>Gynecomastia surgery</td>
</tr>
<tr>
<td>Gender dysphoria</td>
</tr>
</tbody>
</table>

*Table 12 PROMISE-BR exclusion criteria*

The variables of interest for this study include:

- Age at surgery
- BMI (recorded either at referral or surgery)
- Index of multiple deprivation.
3.3.5. Data sources/measurement:

We gleaned demographic variables such as age, BMI from the patients’ electronic patient records. We entered the patients’ postcode into a Scottish Government website (www.simd.scot) to derive their Scottish Index of Multiple Deprivation (SIMD). One patient appears to have had an English postcode at the time of surgery, so we used the English Index of Multiple Deprivation (IMD) for them instead.

We gained the BREAST-Q scores of each respondent from the Jisc online survey system, an approved and secure online survey system.

The BREAST-Q Reduction/Mastopexy module

This is a widely used and validated PROM used in cosmetic surgery settings. It mainly measures health and appearance-related quality of life and satisfaction. It contains a number of scales that may be used independently of each other.

There are published normative data generated by 1206 women from an online community (the Army of Women) who completed the BREAST-Q Reduction module. At the time they completed the module, women were over the age of 18 and without breast cancer or a history of breast surgery. We intended to compare the BREAST-Q scores of the two groups of women in our study with these published scores.

The pre-operative BREAST-Q questionnaire contains four scales, each with its own questions, and a set of Likert scale answers, each with its own raw score:

i. Psychosocial well-being
ii. Physical well-being
iii. Sexual well-being
iv. Satisfaction with breasts.
The post-operative BREAST-Q questionnaire contains nine scales, including the four above, satisfaction with outcome and four scales that together measure patients’ healthcare experiences. Each of these scales contains several questions and a Likert-type set of answers to choose from.

i. Psychosocial well-being  
ii. Physical well-being  
iii. Sexual well-being  
iv. Satisfaction with breasts  
v. Satisfaction with outcome  
vi. Satisfaction with surgeon  
vii. Satisfaction with information  
viii. Satisfaction with medical team  
ix. Satisfaction with office staff

**Rasch measurement system:**

A raw score (called sum score) is first calculated for each scale. This is the sum of the scores of the individual answers for item/question within the scale. Taking the help of conversion tables, this sum score is then converted to the equivalent Rasch transformed score (range 0-100).

For all BREAST-Q scales, a higher score represents greater well-being or satisfaction.

We took a decision not to use the last two scales, viz. satisfaction with medical team and satisfaction with office staff. Although these might prove potential confounders, they seemed less relevant to the hypotheses we were testing.
3.3.6. Bias

We predicted that this study might be vulnerable to the following three biases common to cohort studies:

**Confounding:**

We recognised that there might be a number of potential confounders of the association between scores and time since surgery, and so measured the correlations between them using ordinal logistic regression.

**Selection bias:**

As NHS patients, the study participants did not have to pay for their surgical care. They are different in this respect to patients who access and fund their own private care. We calculated and compared the SIMD scores of those who we enrolled into the PROMISE-BR study and those who we did not, to see if they differed by social class.

**Information bias:**

The BREAST-Q relies on self-report and is therefore at risk of recall bias. We hoped that using an impersonal online system reduced this risk. We assured pre-operative patients that this information would not affect their prospects of surgery and many opted for us to share their BREAST-Q scores with their clinical team. We have clinical experience of some pre-operative patients exaggerating their distress to convince the clinical team of their meeting AEARP standards and of the need to be fast-tracked to surgery. We presumed this risk would be lower with the post-operative group.
3.3.7. Study Size

Two factors determined the sample size:

1. The number of cases operated on during the study period.
2. The number of eligible patients that we were able to contact.

3.3.8. Quantitative Variables

The most robust study in our systematic review found that women continued to experience improved quality of life scores three years following surgery (Blomqvist & Brandberg, 2004). This influenced our decision as to whether to categorise patients into groups based on time since surgery. We decided to do both, to analyse individual patient scores as well as the means of patients on either side of the three-year point following surgery.

Each section of the BREAST-Q has multiple questions, and these are grouped together for a summative score of each attribute being measured, e.g., the first section in the post-op BREAST-Q is about psychosocial well-being. The stem question has 9 sub-questions. The responses to the 9 are added and analysed as indicative of the person’s psychosocial well-being. However, this grouping is part of the BREAST-Q design, and it has been validated as is. In adopting this grouping, we have merely used the BREAST-Q as it was intended.

Subgroups and Interactions: each of the scales of the BREAST-Q (three for well-being or QoL and five for satisfaction in the post-op questionnaire, and three and one respectively in the pre-operative questionnaire) were analysed against time since operation and the other candidate variables.
3.3.9. Statistical Methods

Most of the BREAST-Q scores were skewed because appreciable numbers of women gave maximum scores, so non-parametric methods were used. We used Spearman rank correlation and Mann-Whitney for testing association between scores and other quantitative or binary variables respectively. We tested differences from normative data with Wilcoxon signed-ranks tests. We compared laterality between those contacted and not contacted by a chi-squared test. Multiple ordinal logistic regression was used with more than one explanatory variable, and piecewise linear regression was used to examine possible non-linearity in the relationship between scores and time since operation, using a cut-off of 3 years. Data were analysed using SPSS version 25.

<table>
<thead>
<tr>
<th>Test</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman rank correlation</td>
<td>Association between scores and other quantitative variables</td>
</tr>
<tr>
<td>Mann-Whitney</td>
<td>Association between scores and binary variables.</td>
</tr>
<tr>
<td>Wilcoxon signed-ranks tests</td>
<td>Differences from normative data</td>
</tr>
<tr>
<td>Chi-squared test</td>
<td>To compare laterality between those contacted and those not contacted</td>
</tr>
<tr>
<td>Multiple ordinal logistic regression</td>
<td>Used with more than one explanatory variable</td>
</tr>
<tr>
<td>Piecewise linear regression</td>
<td>To examine possible non-linearity in the relationship between scores and time since operation, using a cut-off of 3 years</td>
</tr>
</tbody>
</table>
3.3.10. **Missing data**

We incorporated a forcing function in the survey design, a prompt that encouraged patients to submit questionnaires only once they had answered every question. Even so, one patient omitted a question from the post-operative BREAST-Q and we excluded her from the analysis.
3.4. RESULTS

3.4.1. Participants

Post-operative participants

Of the 317 women known to have had surgery over the period in question, we were able to contact 150 of whom 115 (77%) completed the survey. The 115 responders did not differ significantly from the 35 non-responders in age at operation, BMI, SIMD or the percentage of unilateral operations. The 150 who we were able to contact were significantly younger at the time of surgery than the 167 whom we could not, but did not differ significantly in SIMD or the percentage of unilateral operations.

---

**Figure 25: Post-operative participant numbers**
**Pre-operative Participants**

Of the 32 women enrolled into our pre-operative cohort, 21 (65%) completed the preoperative BREAST-Q survey. The responders did not differ significantly from the non-responders in BMI or SIMD.

*Figure 26: Preoperative participant numbers*
3.4.2. **Descriptive Data**

All BREAST-Q scales were converted to a range of 0-100 using the conversion tables based on Rasch analysis, except for the Satisfaction with Nipples scale which was simply a sum of the raw scores.

**Main Results**

Table 1 shows some results for the 115 responders. The percentages of women scoring the maximum (and hence the degree of skewness) varied between scores. There was no significant difference from the normative value for the three well-being scores, but the Satisfaction with breasts score was significantly higher (P<0.001). None of the scores correlated significantly with the time between the operation and the survey.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Range</th>
<th>Mean (sd)</th>
<th>Normative</th>
<th>Correlation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial well-being</td>
<td>0-100</td>
<td>70 (23)</td>
<td>68</td>
<td>-0.14</td>
<td>0.21</td>
</tr>
<tr>
<td>Sexual well-being</td>
<td>0-100</td>
<td>58 (25)</td>
<td>55</td>
<td>-0.06</td>
<td>0.59</td>
</tr>
<tr>
<td>Physical well-being</td>
<td>0-100</td>
<td>75 (18)</td>
<td>76</td>
<td>-0.17</td>
<td>0.13</td>
</tr>
<tr>
<td>Satisfaction with breasts</td>
<td>0-100</td>
<td>72 (20)</td>
<td>57</td>
<td>-0.14</td>
<td>0.21</td>
</tr>
<tr>
<td>Satisfaction with nipples</td>
<td>5-20</td>
<td>16 (4)</td>
<td>n/a</td>
<td>-0.07</td>
<td>0.55</td>
</tr>
<tr>
<td>Outcome</td>
<td>0-100</td>
<td>83 (20)</td>
<td>n/a</td>
<td>-0.01</td>
<td>0.93</td>
</tr>
<tr>
<td>Information</td>
<td>0-100</td>
<td>76 (17)</td>
<td>n/a</td>
<td>0.11</td>
<td>0.29</td>
</tr>
</tbody>
</table>

*Table 13 Results for each BREAST-Q scale from the postoperative cohort*

Results for each BREAST-Q scale. Figures shown are mean (sd) score, Spearman rank correlation coefficient with time since operation and significance of this.
Psychosocial well-being:

This scale is an index of body image and social confidence. It contains nine questions that ask about confidence in social settings. To illustrate this, here is an example from the nine questions: “With your breasts in mind, in the last week, how often have you felt confident in a social setting?” The options to choose from for answers include: “none of the time, a little of the time, some of the time, most of the time, or all of the time”.

The scatter plot and all the others that follow are made using composite Rasch-transformed sum scores of the corresponding post-operative BREAST-Q questionnaire scale. The post-operative trend line is a visual guide that is not precisely mathematically accurate.
Sexual Well-being

This scale asks five questions about sexual attractiveness, sexual confidence and comfort during sex.

One of these questions is, “Thinking of your sexuality, how often do you generally feel comfortable / at ease during sexual activity?” There are five answers to choose from, ranging from “None of the time” to “All of the time”.

Each data point represents a Rasch-converted score of the sum score of the scale. In turn, the sum score is the sum of the raw scores from each of the individual responses to five questions in this scale. The post-operative trend line is a visual guide that is not precisely mathematically accurate.

Figure 28 Scatter plot of well-being
Physical well-being

This scale measures of pain, energy levels and difficulty during various activities such as running, sleeping etc. It asks fourteen questions and gives three answers to choose from for each.

One question asks after a common symptom of breast hypertrophy, pain in the upper back and shoulders: “In the past week, how often have you experienced shoulder pain?” The answer choices are “None of the time, some of the time, or all of the time”.

The Rasch conversion is of the sum score of the responses to these fourteen questions.
Satisfaction with breasts

Figure 30 Scatter plot of satisfaction with breasts

Satisfaction with Breasts: thirteen questions ask about breast appearance including size, symmetry and the respondent’s opinion, and offers four answer options to choose from, ranging from “very dissatisfied” to “very satisfied”.

E.g. “With your breasts in mind, in the past week, how satisfied or dissatisfied have you been with how your breasts look in clothes?”

The post-operative module of the BREAST-Q contains additional questions pertaining to the patient’s opinion of the location of their scars.

Each data point in this chart is from the Rasch-conversion of the sum score of the scale responses.
This is one of the five scales from the post-operative BREAST-Q module.

Five questions assess the appearance and position of and sensation in the nipples in the post-operative module of the BREAST-Q. This scale is not in the pre-operative module, and there are consequently “before” scores to compare neither from our pre-operative patients nor published norms from the Army of Women study.

There were significant correlations of +0.27 (P=0.004) and +0.27 (P=0.003) between Satisfaction with nipples and respectively age at operation and age at survey. Ordinal logistic regression showed that the association between satisfaction with nipples and time since operation remained non-significant after adjusting for these variables.

Satisfaction with Nipples scale is simply a sum of the raw scores, not Rasch-converted like the other BREAST-Q scales.
Potential confounders

Age at operation, BMI, SIMD and unilateral/bilateral operation were potential confounders of the association between scores and time since operation, but most correlations between these and scores were not significant. The exceptions were correlations of +0.27 (P=0.004) and +0.27 (P=0.003) between Satisfaction with nipples and respectively age at operation and age at survey. Ordinal logistic regression showed that the association between satisfaction with nipples and time since operation remained non-significant after adjusting for these variables.

Correlation between BREAST-Q scores and potential confounding variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>Age at surgery</th>
<th>SIMD</th>
<th>BMI</th>
<th>Unilateral/bilateral</th>
<th>Time since surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial well-being</td>
<td>0.35</td>
<td>0.11</td>
<td>0.21</td>
<td>0.79</td>
<td>0.68</td>
</tr>
<tr>
<td>Sexual well-being</td>
<td>0.85</td>
<td>0.54</td>
<td>0.59</td>
<td>0.98</td>
<td>0.71</td>
</tr>
<tr>
<td>Physical well-being</td>
<td>0.76</td>
<td>0.12</td>
<td>0.13</td>
<td>0.95</td>
<td>0.75</td>
</tr>
<tr>
<td>Satisfaction with breasts</td>
<td>0.19</td>
<td>0.14</td>
<td>0.21</td>
<td>0.23</td>
<td>0.99</td>
</tr>
<tr>
<td>Satisfaction with nipples</td>
<td>0.004*</td>
<td>0.62</td>
<td>0.10</td>
<td>0.06</td>
<td>0.35</td>
</tr>
</tbody>
</table>

*p ≤ 0.05, ** p ≤ 0.001

Table 14 Correlation between BREAST-Q scores and potential confounding variables
Categorising results by time since surgery

Although none of the linear correlations between the eight scores and time since operation was significant, we undertook further investigation of these relationships based on the *a priori* hypothesis that satisfaction might be high immediately after the operation and gradually decline over the next few years before reaching a plateau. A figure of 3 years was chosen for the point at which the scores might plateau, based on the choice of follow-up used by Blomqvist and Brandberg. There were 13 and 102 women with times of less than or greater than 3 years, respectively. A figure of one year was also considered, but with only two women with a time less than this, the power to detect differences would have been very low.

The simplest approach was to compare the scores of those with time since the operation fewer than or greater than 3 years, and the results are shown in Table 2. Psychosocial and Sexual well-being and Outcome scores were significantly higher in the earlier period, while Physical well-being and Satisfaction with breasts also showed the same trend but not significant statistically. The comparisons to the normative values in each group separately were also consistent with a decline during the first 3 years in the well-being scores, but not in the Satisfaction with breasts score.
<table>
<thead>
<tr>
<th>Scale</th>
<th>&lt; 3 years</th>
<th>&gt;3 years</th>
<th>P-value 1</th>
<th>P-value 2</th>
<th>P-value 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial well-being</td>
<td>85 (16)</td>
<td>68 (23)</td>
<td>0.006*</td>
<td>0.008*</td>
<td>0.84</td>
</tr>
<tr>
<td>Sexual well-being</td>
<td>77 (20)</td>
<td>55 (24)</td>
<td>0.003*</td>
<td>0.006*</td>
<td>0.79</td>
</tr>
<tr>
<td>Physical well-being</td>
<td>82 (12)</td>
<td>74 (18)</td>
<td>0.19</td>
<td>0.086</td>
<td>0.78</td>
</tr>
<tr>
<td>Satisfaction with breasts</td>
<td>80 (16)</td>
<td>71 (21)</td>
<td>0.15</td>
<td>0.003*</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

*p≤ 0.05, **p≤ 0.001

Table 15 BREAST-Q Scores of post-operative participants less than or more than 3 years after surgery

Table 2. Mean (sd) scores for women surveyed less than or greater than 3 years after the operation. P-values shown are for (1) difference between the two groups, (2) difference from normative in the < 3 years group and (3) difference from normative in the > 3 years group.
Simply comparing groups before and after 3 years follow-up is not consistent with a model of continuous change in attitudes, and piecewise linear regression offers a more realistic scenario in which the rate of change over time varies between the two time periods. Significant greater slopes before than after the 3-year cut-off were found for Social and Sexual well-being at P=0.017 and 0.012 respectively, and these were also significantly different from zero in the < 3-year group. No significant differences in slope before and after 3 years were found for the other six scores, nor were any of the slopes in the > 3-year group significantly different from zero.

Figure 32: Comparison of post-operative and normative scores before and after three years of surgery
3.4.3. Comparing Post-operative with pre-operative scores and normative data

Data on the four scores with normative comparators was also collected on 23 pre-operative patients, and the mean values were 27, 28, 32 and 18 respectively for Social, Sexual and Physical well-being and Satisfaction with breasts, all significantly less than both the post-operative group as well as the normative means at P<0.001.

Figure 33: Comparing Post-operative with pre-operative scores and normative data
Chapter 4. DISCUSSION

4.1. Key Results

Women in the PROMISE BR study who have undergone breast reduction surgery continue to experience health benefits for up to 13 years. There is no evidence that these benefits are lost over time. In short, both our hypotheses were disproved.

For the first three years following surgery, their psychological and social well-being, sexual function and body image are higher than the normative levels derived from the Army of Women. After three years, these return to the normative levels.

The psychological, social and sexual wellbeing of the post-operative women in our study remain indistinguishable from their normative “controls” for the rest of the study period, with no further drop in levels.

Body image following breast reduction surgery, specifically satisfaction with breasts, continues be higher than average for up to years

The body image and quality of life of women waiting for breast reduction surgery is extremely poor.
4.2. Limitations:

We do not have a baseline pre-operative BREAST-Q measurement for the post-operative group. We compared their post-operative BREAST-Q scores with two control groups, our pre-operative cohort, as well as with normative data. This leaves the study open to the risk of control selection bias: our controls may not be well matched enough to our “cases” in order for us to presume that the responses of the pre-operative patients accurately represent how our post-operative patients may have scored were we to have surveyed them before their surgery years earlier. However the pre-operative scores published by other authors reassure us that our pre-operative scores are comparable to theirs (Michelle Coriddi et al., 2013).

Then there is the risk of non-contemporaneous control bias. We selected pre- and post-operative patients from different points in a long queue stretched out in time over thirteen years. We do not believe the impact of this reduces the validity of the conclusions we may draw from the results. Their separation in time before and after a common exposure is precisely what we wished. In addition, they do however serve very well as controls. We are particularly fortunate that women waiting in our service for surgery agreed to describe their poor body image and low quality of life. They may not yet have undergone surgery, but in they resemble our post-surgical cohort more closely in other respects than the women from whom the normative scores were collated, useful though the norms are.

A weakness of this study (and other observational studies) is the low contact rate, and to a lesser extent the response rate, which was surprisingly high. However, it is reassuring that those contacted don’t appear to be too biased, except in age which not surprising: the older patients are more likely to have died or lost touch, and in any case, age doesn’t seem to be a serious confounder for most of the scores.

Another limitation of cross-sectional studies is the potential for recall bias in our pre-operative cohort and our post-operative group. Both groups of women have
been identified through the AEARP system which decides who is eligible to receive NHS funded surgery and then delivers it. Together they are women who either currently wish or have wished in the past to have smaller breasts and applied to an NHS system with no certainty of whether they would be offered surgery.

The AEARP system may appear and even be robust, equitable and fair to those managing and delivering the care, but must seem arbitrary to those who assessed on it and whose fervent desire for life-changing surgery is declined. Although we make every effort to ease the stress that women experience whilst being assessed for eligibility, we must admit the risk of individuals feeling anxious that they may be weighed and found wanting.

This is in contrast to a private healthcare system in which such women are entitled to undergo surgery because they both wish it and are paying for it. The minority of patients who are advised not to undergo surgery by their private surgeons, usually on health grounds are also likely to be given this disappointing news quickly, so there is no period of uncertainty and anxious waiting.

This context raises the risk of recall bias in two opposing directions, both of which might theoretically impact our results by leading us to overestimate the beneficial results of breast surgery. We do not however believe they did. Nonetheless, they are worth considering, as are the steps we took to prevent them and limit their impact.

The most important element of the decision of the aesthetic team to decide to offer aesthetic surgery is whether there is evidence that the patient meets exceptional physical criteria: in women who wish breast reduction the sheer mass and disproportion of their breasts to the rest of their body is the single most important deciding factor. Although it is important for them to describe resultant distress and disability, decisions do not depend on how strongly or plaintively they make their case. However, patients do not know this, perhaps because we do not make it clear enough to them prior to assessment. As previously
mentioned, we are aware that this requirement of the AEARP of exceptional criteria sometimes misleads patients into believing it is up to them to convince us of their distress, disability and perhaps most importantly, of how deserving they are of surgery. This has led patients to exaggerate symptoms to convince the assessing team to offer surgery, and even to prioritise them on a surgical waiting list. We cannot rule out the possibility that our pre-operative study subjects may have amplified their answers.

However, as mentioned above, pre-operative BREAST-Q scores in publications by from private surgical services in which patients did not have to prove their eligibility for surgery are similarly low (Michelle Coriddi et al., 2013). We therefore deduce that exaggeration is less likely than we originally feared.

As to women who have already had surgery, in addition to the more traditional recall bias of simply failing to remember, we concede the risk of gratitude bias. Perhaps they recall how exceptional their offer of surgery was, and how pleased they were with it. Perhaps they wish to reassure us that they care they received was worth it to them, and that we should continue to offer it to others.

The PROMISE-BR study limited these risks of recall bias in three ways. We made it clear to our pre-operative study subjects that their participation in this study would make no impact whatever on their surgical prospects. In other words that participation would neither improve their chance of receiving surgery and quickly nor hinder their prospects in any way.

Furthermore, we asked all participants the same questions in the same way, by using an online survey system.

Finally, the questions in the BREAST-Q pertain to the women’s current body image and current quality of life, so that they are not required to recall historical details. This reduces the risk of one of the more common causes of traditional recall bias, forgetting.
4.3. **Interpretation:**

We have exhaustively considered above the potential limitations of the study. It is time to consider what the results might mean, with reference to the literature and our clinical experience.

Most plastic surgeons describe their breast reduction patients as their most satisfied and grateful. The literature tells us that that practically every study published of the outcomes of breast reduction surgery found that patients were very satisfied with the results. The women of PROMISE-BR tell us that too, through their post-operative BREAST-Q scores. Interestingly, although we did not dwell on the results of the scale on satisfaction with surgeons, study participants gave them so many maximum rating cores that they skewed the data.

Our clinic patients describe years of pain, discomfort, self-consciousness and diffidence. They feel anxious and sad and do not like the way they look. They cannot find clothes and underwear that fit them. They feel unable to take their children to baths or beaches in summer. They do not feel confident in their relationships and have limited sex lives but lack the confidence to demand more from themselves and others.

We learn from the literature that women who have their breasts surgically reduced experience a whole host of positive life changes in the first year: they like their bodies; they become more confident; they feel less low and anxious; they have richer sex lives; they suffer less pain and move more easily. They rate their lives highly in terms of their health and in general quality.

The literature is less plentiful and robust with respect to how long these changes last. We identified studies that described some of these for periods much longer than a year. Unfortunately, the limitations of the evidence for each outcome was such that we can only say with reasonable certainty that a study showed
improved quality of life and another study better sexual function, each for a follow-up period three years.

The symptoms of breast hypertrophy are biological, psychological and social. Our study supports the findings of others that breast reduction surgery is an effective treatment for these symptoms.

Our study design demonstrates that the benefits of breast reduction last for years, up to thirteen years out from surgery. This must mean that breast reduction is a powerful therapeutic intervention that offers enduring benefits. Perhaps more powerfully than other studies, our study suggests that breast reduction is a treatment that offers not just relief, but a remission of the symptoms of breast hypertrophy.

4.4. Generalisability

Our study population are women who have either undergone, or are waiting to undergo, breast reduction surgery in the NHS in Scotland. None of them have paid or will have to pay for their surgical care.

We believe that the result of this study is certainly generalizable to other NHS services. There is no reason as to why they should not be generally generalizable to other contexts.

4.5. Implications for the future:

We can interpret the results of this study in two opposing ways.

If we consider the body dissatisfaction, the distress and disability of women with breast hypertrophy as a medical disorder, the results of the PROMISE- BR study suggest that breast reduction surgery might be its cure.

However, if we consider aesthetic surgery a service or product, our study participants as customers, surgery a product and the surgeons its providers, then
we may conclude that the women in the PROMISE-BR study are happy customers who remain satisfied 13 years after their purchase, or transaction.

We believe that the first analogy is closer to the truth of these women and their remarkable responses. What we have learned from our clinical practice, literature review and the results of this study is that almost every element of the second analogy does a disservice to them and all those who suffer as they have.

The majority of the people we see in our aesthetic surgery assessment clinics with breasts that are too large for them have often coped with severe body dissatisfaction and shame for years before plucking up the courage to seek help. They do not seek to resemble celebrities. They seek instead to look and feel “normal” and to move without pain and go about their daily lives, wearing clothes that fit them, unhindered by the fear that their bodies set them apart from society.

They do not view their symptoms and disability as an aesthetic issue, and object to our describing their request for surgery as aesthetic. We get appeals from general practitioners accusing us of having mistaken patients’ breast discomfort, back pain and body dissatisfaction as “merely” aesthetic.

The results of our systematic review and this study now leads us to wonder whether we too have underestimated both the suffering of these patients and the extraordinarily therapeutic effect of breast reduction surgery.

The language we use illustrates the problem. In the vernacular, the adjectives aesthetic and cosmetic are synonyms to modify the noun surgery. We suggest that one of the ways that they modify it is by devaluing the intentions of those who seek it. The Cambridge Dictionary defines aesthetic in its adjective use as relating to the enjoyment or study of beauty. However, it defines the word cosmetic more negatively, as “used to describe a small change, etc. that is made in order to make something seem better than it was before, and that does not really affect its basic character”; or alternatively, as “relating to a substance or treatment that is used to improve someone’s appearance”.

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If we selectively abstract the most negative of those definitions, then the words cosmetic and aesthetic used interchangeably represent the superficial or even frivolous. We often dismiss any treatments, even surgery prefaced by these adjectives as superficial, unnecessary. Those who seek these treatments run the risk of as seeming focused on something that does not really matter.

The stigma of invisible disability is a concept has not new but is only now slowly gaining acceptance (Davis, 2005). Many who merit a blue badge to permit them to park closer to the entrance of public buildings do not appear disabled. Yet we recognise their right to those badges, their right to receive benefits that make it easier to cope with their conditions.

Psychiatrists still quote Talcott Parsons, who described famously described illness as deviance (Parsons, 1975). He advanced four postulates of the sick role, which he described as simultaneously bestowing privileges as well responsibilities on an ill person (Pflanz & Rohde, 1970). The benefits being that it was not the responsibility of the unwell person to assume the sick role, and that while they were unwell, they were exempt from their duties. At the same time, the sick person had to try to get well, to seek and to accept appropriate medical care for their ailment.

In the face of the evidence of the biological, psychological and social distress and disability that women with breast hypertrophy suffer, might it not be time to view their body dissatisfaction a condition, a disorder, even an illness? Having done so, then to permit their adoption of a sick role, with both the rights and responsibilities that Parsons described nearly half a century ago?

Validating these patients’ sick role will have implications on clinical care, healthcare policy and research.

The findings of our study demand a prospective study with more detailed baseline assessments, a commitment to annual review of patients who have undergone breast reduction, and perhaps other “aesthetic” procedures.
We have much to learn. For example, why does the mass of excised breast tissue not correlate with satisfaction scores?

Body dysmorphic disorder definitely exists, so it is important we do not throw the proverbial baby out with the bath water. We are not advocating surgery for all with severe body dissatisfaction.

We have often mentioned psychological therapy as an effective alternative to surgery for those with body dissatisfaction. Our clinical experience is that these patients are often resistant to the idea of talking therapy for what to them is a problem that has only one solution, surgery. Our study seems to vindicate those whose breasts are too large.

It seems high time for a prospective trial comparing the effects of surgery and psychological therapy in this patient group. Might surgery prove superior to psychotherapy for most people with a condition that we have so far considered predominantly psychological?

### 4.6. Other Information

**Funding:**

All those who have worked on this study, save our statistician, are employees of the same NHS health board. Additional funding was neither required nor sought.
References


Appendix
A1

The Exceptional Referral Protocol (ERP)

The procedures included in this protocol are NOT routinely offered by NHSScotland and can only be provided on an exceptional case basis in line with the guidelines contained in this protocol.

Please Note

- Patients should only be referred following a clinical assessment where there is a symptomatic or functional issue amenable to treatment.
- All cases will be judged against agreed criteria on an individual basis.
- Referral does not necessarily mean that treatment will be offered. This must be communicated to the patient before the referral is made.
- Referrals missing key information required for the assessment will have to be returned for completion before the referral can be considered.
- A photographic assessment may form part of the pathway and may require attendance at a local NHS facility. The patient should be aware of this requirement before referral.
- This pathway does not cover the primary treatment of trauma or cancer.
The Exceptional Referral Protocol (ERP)

<table>
<thead>
<tr>
<th>Physical criteria: All must be met.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impairment of Function</strong></td>
</tr>
<tr>
<td><strong>Body Mass Index (BMI)</strong></td>
</tr>
<tr>
<td><strong>Psychological Distress: Must be met.</strong></td>
</tr>
</tbody>
</table>

**Contraindications**

<table>
<thead>
<tr>
<th>Significant Major Life Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a patient has had a major life event in the previous 12 months e.g. birth, relationship breakdown or a significant bereavement etc.</td>
</tr>
</tbody>
</table>

Referral is contra indicated where:

- a patient has had an episode of self harm within the last two years;
- there is a previous diagnosis of body dysmorphic disorder;
- the patient has a disproportionate view of the problem following your examination;
- the patient currently has:
  - a major depressive illness;
  - an active delusional or schizophrenic illness;
  - an eating disorder;
  - obsessive compulsive disorder;
  - substance abuse problem.
Appendix
A3

The Exceptional Referral Protocol (ERP)

Breast Reduction

Procedures not routinely provided by NHSScotland
Surgery to reduce breast size.

Clinical Psychology
All approved referrals will be seen by a specialist Clinical Psychologist.
Patients undergoing reconstructive surgery may not require psychological assessment. This decision will be at the discretion of the surgical team.

BMI
Greater than or equal to 20 and less than or equal to 27.
BMI less than or equal to 35 may be considered in patients undergoing a planned programme of reconstructive surgery.

Considerations for treatment
Indications for referral
- Massive disproportion to body habitus.
- Intractable intertrigo.
- Asymmetry greater than 1 cup size.
- Significant psychological distress combined with one of the above.

Contraindications for referral
- Simple cosmetic reduction.
- Breast reduction is not a treatment for breast pain.
- Surgery to reverse the normal ageing or post-involutional changes will not be supported.

Waiting Times
These patients are not subject to the 18 Weeks Referral to Treatment Standard.
Some patients may be subject to guarantee times within other pathways.

Treatment for these conditions is not routinely offered by NHSScotland and can only be provided on an exceptional case basis in line with the guidelines contained in this protocol.
Appendix B2 BREAST-Q Psychosocial Well-Being

<table>
<thead>
<tr>
<th>With your breasts in mind, in the past week, how often have you felt:</th>
<th>None of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Confident in a social setting?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Of equal worth to other women?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Good about yourself?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Self-assured?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Confident in your clothes?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f. Accepting of your body?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. That your appearance matches who you are inside?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h. Confident about your body?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i. Attractive?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Note to Investigators: This scale can be used independently of the other scales.

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## BREAST-Q™ - REDUCTION MODULE (PRE- AND POSTOPERATIVE) VERSION 2.0: SEXUAL WELL-BEING

Thinking of your sexuality, **how often** do you generally feel:

<table>
<thead>
<tr>
<th></th>
<th>None of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Comfortable/at ease during sexual activity?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. Confident sexually?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Satisfied with your sex life?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Sexually attractive in your clothes?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Sexy when unclothed?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Note to Investigators:** This scale can be used independently of the other scales. The following statement can be added to the stem to provide an opportunity for the patient to decline completing this scale. ‘The following questions ask about your sexual well-being. If you are uncomfortable answering these questions or do not feel that they apply to you, please check the box and skip the questions that follow.’

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## BREAST-Q™ - REDUCTION MODULE (PRE- AND POSTOPERATIVE) VERSION 2.0: PHYSICAL WELL-BEING

In the past week, how often have you experienced:

<table>
<thead>
<tr>
<th></th>
<th>None of the time</th>
<th>Some of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.  Headaches?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b.  Pain in your breast area?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c.  Lack of energy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d.  Difficulty doing vigorous physical activities (e.g. running or exercising)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e.  Feeling physically unbalanced?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f.  Shoulder pain?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g.  Difficulty sleeping because of discomfort in your breast area?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h.  Neck pain?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>i.  Painful gouges or grooves in your shoulders from your bra straps?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>j.  Feeling physically uncomfortable?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>k.  Rashes under your breasts?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>l.  Back pain?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>m.  Arm pain?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>n.  Pain, numbness or tingling in your hands because of your breast size?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

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Appendix B5 BREAST-Q Pre-Operative Satisfaction with Breasts

<table>
<thead>
<tr>
<th>BREAST-Q™ REDUCTION MODULE (PREOPERATIVE) VERSION 2.0: SATISFACTION WITH BREASTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>With your breasts in mind, in the past week, how satisfied or dissatisfied have you been with:</td>
</tr>
<tr>
<td>a. How your breasts look in clothes?</td>
</tr>
<tr>
<td>b. How your breast size matches the rest of your body?</td>
</tr>
<tr>
<td>c. The size of your breasts?</td>
</tr>
<tr>
<td>d. The shape of your breasts when you are wearing a bra?</td>
</tr>
<tr>
<td>e. How equal in size your breasts are to each other?</td>
</tr>
<tr>
<td>f. How comfortably your bras fit?</td>
</tr>
<tr>
<td>g. The shape of your breasts when you are not wearing a bra?</td>
</tr>
<tr>
<td>h. How you look in the mirror <strong>clothed</strong>?</td>
</tr>
<tr>
<td>i. How your breasts sit/hang on your chest?</td>
</tr>
<tr>
<td>j. How normal your breasts look?</td>
</tr>
<tr>
<td>k. How you look in the mirror <strong>unclothed</strong>?</td>
</tr>
</tbody>
</table>

**Note to investigators:** This scale can be used independently of the other scales.

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Appendix B6 BREAST-Q Post-Operative Satisfaction with Breasts

<table>
<thead>
<tr>
<th>BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0: SATISFACTION WITH BREASTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>With your breasts in mind, in the past week, how <strong>satisfied or dissatisfied</strong> have you been with:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>a.</strong> How your breasts look in clothes?</td>
</tr>
<tr>
<td><strong>b.</strong> How your breast size matches the rest of your body?</td>
</tr>
<tr>
<td><strong>c.</strong> The size of your breasts?</td>
</tr>
<tr>
<td><strong>d.</strong> The shape of your breasts when you are wearing a bra?</td>
</tr>
<tr>
<td><strong>e.</strong> How equal in size your breasts are to each other?</td>
</tr>
<tr>
<td><strong>f.</strong> How comfortably your bras fit?</td>
</tr>
<tr>
<td><strong>g.</strong> The shape of your breasts when you are <strong>not</strong> wearing a bra?</td>
</tr>
<tr>
<td><strong>h.</strong> How you look in the mirror <strong>clothed</strong>?</td>
</tr>
<tr>
<td><strong>i.</strong> How your breasts sit/hang on your chest?</td>
</tr>
<tr>
<td><strong>j.</strong> How normal your breasts look?</td>
</tr>
<tr>
<td><strong>k.</strong> The location of your scars?</td>
</tr>
<tr>
<td><strong>l.</strong> How your scars look?</td>
</tr>
<tr>
<td><strong>m.</strong> How you look in the mirror <strong>unclothed</strong>?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Very Dissatisfied</th>
<th>Somewhat Dissatisfied</th>
<th>Somewhat Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a.</strong> How your breasts look in clothes?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>b.</strong> How your breast size matches the rest of your body?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>c.</strong> The size of your breasts?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>d.</strong> The shape of your breasts when you are wearing a bra?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>e.</strong> How equal in size your breasts are to each other?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>f.</strong> How comfortably your bras fit?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>g.</strong> The shape of your breasts when you are <strong>not</strong> wearing a bra?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>h.</strong> How you look in the mirror <strong>clothed</strong>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>i.</strong> How your breasts sit/hang on your chest?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>j.</strong> How normal your breasts look?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>k.</strong> The location of your scars?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>l.</strong> How your scars look?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>m.</strong> How you look in the mirror <strong>unclothed</strong>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Note to Investigators:** This scale can be used independently of the other scales.

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### BREAST-Q™ REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0:
SATISFACTION WITH NIPPLES

In the past week, how **satisfied or dissatisfied** have you been with:

<table>
<thead>
<tr>
<th></th>
<th>Very Dissatisfied</th>
<th>Somewhat Dissatisfied</th>
<th>Somewhat Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How high or low your nipples are on your breasts?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. How your nipples are lined up in relation to each other?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. The shape of your nipples and areolas?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. How your nipples and areolas look?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e. The amount of sensation (feeling) in your nipples?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Instructions:** These questions should be considered as stand-alone. Thus, the patient’s response is taken as the score for each item. Higher scores reflect a **better outcome**.

**Note to Investigators:** This scale can be used independently of the other scales.

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Appendix B8 BREAST-Q Satisfaction with Outcome

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree</th>
<th>Somewhat Agree</th>
<th>Definitely Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Having surgery was the right decision for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. I would encourage other women in my situation to have breast reduction</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>surgery.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. I would do it again.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. Overall the surgery was a positive experience.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. Having surgery changed my life for the better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f. I have no regrets about having surgery.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g. The outcome perfectly matched my expectations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h. It turned out exactly as I had planned.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Note to Investigators: This scale can be used independently of the other scales.

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### BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0: PATIENT EXPERIENCE: SATISFACTION WITH INFORMATION

How satisfied or dissatisfied were you with the information you received from your plastic surgeon about:

<table>
<thead>
<tr>
<th>Question</th>
<th>Very Dissatisfied</th>
<th>Somewhat Dissatisfied</th>
<th>Somewhat Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How the surgery was to be done?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. Possible complications?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. Healing and recovery time?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. How to choose a breast size that would suit what you wanted?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e. The potential for loss of sensation in your nipples?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f. What size you could expect your breasts to be after surgery?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>g. Potential for loss of blood supply to your nipple area?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>h. How to care for your incisions after surgery?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>i. What you could expect your breasts to look like after surgery?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>j. What the scars would look like?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>k. How the surgery could affect future breast cancer screening (e.g. mammogram, self-examinations)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>l. Options to help with scarring?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>m. How the surgery could affect breast-feeding? (only answer if applicable)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Note to Investigators:** This scale can be used independently of the other scales. Depending on the use of this scale, you may wish to add the following statement to the stem for clarity: ‘These questions ask about the surgeon who performed your most recent surgery.’
**B10 BREAST-Q Satisfaction with Surgeon**

**BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0:**
**PATIENT EXPERIENCE: SATISFACTION WITH SURGEON**

These questions ask about your plastic surgeon. Did you feel that he/she:

<table>
<thead>
<tr>
<th>Question</th>
<th>Definitely Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Definitely Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Was professional?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. Gave you confidence?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. Involved you in the decision-making process?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. Was reassuring?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e. Answered all your questions?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f. Made you feel comfortable?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>g. Was thorough?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>h. Was easy to talk to?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>i. Understood what you wanted?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>j. Was sensitive?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>k. Made time for your concerns?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>l. Was available when you had concerns?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Note to Investigators:** This scale can be used independently of the other scales. This scale is exactly the same across all BREAST-Q Postoperative Modules. Depending on the use of this scale, you may wish to add the following statement to the stem for clarity. "These questions ask about the surgeon who performed your most recent surgery."