

RUNNING HEAD: Systematic review of interventions to improve body image

Efficacy of psychosocial and physical activity-based interventions to improve body image among women treated for breast cancer: A systematic review

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Abstract

Objective: Body image concerns warrant attention among women who have undergone treatment for breast cancer, due to their significant consequences for psychological and physical health, and interpersonal relationships. This paper systematically reviews the effectiveness of interventions on body image outcomes among this group, in order to inform healthcare provision and strategic directions for research.

Methods: Fourteen electronic databases were searched for articles published between 1992 and 2017 that evaluated interventions with women who had undergone treatment for breast cancer in controlled trials with at least one body image measure. Data were extracted and studies were assessed for their methodological quality using the Cochrane Collaboration tool for assessing risk of bias.

Results: Twenty-one articles evaluating 26 interventions met inclusion criteria. Nine interventions significantly improved body image at either post-test *or* follow-up ($ds = 0.15$ - 1.43), with none reporting sustained effects across all time points. Effective interventions comprised psychotherapy, psychoeducation, or physical activity, were delivered at different treatment stages, and mostly adopted a multi-session, face-to-face, group format. However, only four interventions were evaluated within methodologically rigorous studies and are therefore recommended for use by health professionals aiming to improve the body image of women at different stages of treatment for breast cancer.

Conclusions: To advance the field, we recommend a less biomedical disease- and treatment-focused approach to interventions, and instead a more biopsychosocial theoretical approach targeting broader modifiable psychosocial influences upon body image. Replication and randomised controlled trials of greater rigour are also required to improve the methodological quality of studies.

Keywords: breast cancer; oncology; body image; intervention; systematic review.

Background

Treatment for breast cancer can have a significant impact on bodily appearance, sensations, and function, all of which can impose adverse and enduring effects on body image (1). The consequences of poor body image on physical and psychological health, identity, quality of life, and interpersonal relationships among this group can be grave and long lasting (2). The development and delivery of effective interventions for body image among women who have undergone treatment for breast cancer is therefore indicated. This paper systematically reviews the current status of evidence for psychosocial and behavioural interventions for women who are currently undergoing, or have previously undergone, treatment for breast cancer on body image outcomes to inform healthcare provision and to strategically advance research in this field.

Body image concerns among women treated for breast cancer

Breast cancer is the most commonly diagnosed cancer among women worldwide (3). However, survival rates have improved, with 5-year survival rates at 81.8-91% across the U.S. and Europe (4-6). This promising prognosis indicates that growing numbers of women are living with the consequences of the disease and its treatment. One major consequence is temporary or permanent changes to appearance, sensations and function. Surgery may lead to breast asymmetry, scarring, sensation loss, and lymphedema, whilst the side effects of adjuvant therapies can include hair loss and thinning, fatigue, weight fluctuation, dermatitis, skin and nail discolouration, and the exacerbation of menopausal symptoms.

These extensive treatment-induced changes can cause substantial distress for many women, imposing adverse effects on body image both during and following treatment (1, 7, 8). Up to 77% of this group experience some degree of body image concern (9), with longitudinal research indicating little improvement up to five years following treatment (1,

10). These findings are concerning, as prospective research indicates that poor body image can lead to elevated levels of anxiety, depression, and sexual and intimacy concerns, and increased risk of mortality (2, 11).

Interventions for women treated for breast cancer

The importance of addressing the psychosocial consequences of cancer diagnosis and treatment has been increasingly recognised at an international level by governments, health policy and services, and community organisations (e.g., 12, 13). Breast Cancer Care, the leading breast cancer charity in the United Kingdom (UK), has called for more support specifically to address body image concerns among women treated for breast cancer (14). Nonetheless, body image support currently available is often camouflage-based and target temporary appearance changes (e.g., hair loss). For example, ‘Look Good, Feel Better’ is a globally-delivered skin care and make-up workshop, which teaches women make-up techniques to help manage eyebrow and eyelash loss. Psychosocial support available following active treatment, such as the UK-based ‘Moving Forward’ group courses, provide support and information on a wide array of issues, within which body image is only briefly explored. While women can benefit from these free services, they have not undergone rigorous evaluation. Consequently, their impact on body image remains unknown. This emphasises the importance of developing and evaluating psychosocial interventions to address body image concerns for women at different stages of breast cancer treatment. Health psychology practitioners and researchers, with their specific expertise in managing the psychosocial outcomes associated with physical illness, are well positioned to inform, develop, and deliver these interventions.

Fingeret, Teo, and Epner (15) provided a promising start with regard to appraising psychosocial interventions that target body image concerns among women with breast cancer.

However, the interventions were not reviewed systematically and their evaluative studies were not appraised in relation to their methodological rigour. Given the prevalence of sustained body image concerns experienced by this group, a rigorous evaluation of current psychosocial and behavioural interventions and the methodological quality of studies is necessary to provide robust evidence-based recommendations for intervention delivery and dissemination for health professionals, and to provide strategic direction for future research. This paper therefore reports a systematic review of studies evaluating psychosocial and behavioural interventions delivered to women who have undergone treatment for breast cancer on body image outcomes.

Methods

This systematic review was conducted in compliance with the Cochrane Handbook for Systematic Reviews of Interventions (16). All methods were established prior to the conduct of the review.

Search strategy

Searches were conducted through the following electronic databases: PsycINFO, MEDLINE, CINAHL, AMED, ASSIA, British Nursing Index, EMBASE, Science Direct, Social Sciences Citation Index, Science Citation Index, PubMed, and the Cochrane Library. Five additional databases were searched to identify any grey literature: Web of Knowledge, Zetoc, EThOS, National Research Register, and UK Clinical Research Network. References of included articles were screened manually for additional studies. Combinations of population, intervention and outcome terms guided the searches, including *women*, *female*, *breast cancer*, and *breast oncology* as population terms. Intervention terms included *psychological intervention/therapy*, *psychosocial intervention*, *program*, *cognitive behavioural therapy*, *counselling*, *education*, and *self-help*. Outcome terms included *body*

image, body dissatisfaction/satisfaction, body esteem/appreciation, appearance, shape concern/dissatisfaction, and weight concern/dissatisfaction. Searches were initially conducted in January 2013 and were updated in November 2017.

Eligibility criteria

To qualify, articles had to be published in English from 1992-2017 to provide a current review. The sample had to be comprised of women with a mean age ≥ 35 to reflect the rarity of breast cancer in younger women (17, 18). Participants had to be currently undergoing, or had previously undergone, any form of treatment for breast cancer at any stage (including ductal carcinoma in situ or metastatic disease). Studies with participants with a clinically diagnosed co-morbid condition (e.g., eating disorders) were excluded. Interventions could adopt any form of psychosocial or behavioural approach. These included psychotherapeutic (i.e., provision of formal psychological therapy or therapeutic technique, e.g., cognitive behavioural therapy), psychoeducational (i.e., provision of knowledge about the condition and coping skills, but no formal interactive psychotherapy), physical-activity-based (i.e., guidance or facilitating of any form of physical activity, e.g., strength training, jogging), and camouflage-based (i.e., concealing or altering appearance e.g., make up workshops) approaches. Couple-based interventions were excluded given that they are not relevant to all women. Whilst interventions did not have to assert a primary aim of improving body image, those with the primary aim of weight-loss were excluded, as the focus of the review was to identify interventions which improved improve body image, without necessarily altering weight. Literature reviews and meta-analyses were also excluded. Studies had to compare the intervention group with a passive (e.g., waitlist) or active (alternative intervention) control group. Body image, defined as “a person’s perceptions, thoughts and feelings about his or her body” (19: p.3), had to be measured as an outcome

variable. This was ascertained by the reviewers (of the systematic review), as opposed to the original authors. Quantitative and mixed methods were included, whilst qualitative-only methods were excluded. Post-test only study designs were excluded (20), however, due to ethical issues, random allocation was not a necessity (21).

Identified abstracts were reviewed against the eligibility criteria by the first author, and potentially relevant abstracts were subsequently screened by the second and fourth authors. Following this, the first, second, and fourth authors independently screened the full-texts of these articles. Any discrepancies in screening decisions were discussed and resolved by consensus. See Figure 1 for the process and outcome of the search.

Data extraction

Using a standardised data extraction form and protocol (see S1) adapted from the Cochrane Collaboration (16), the first author extracted the following information from each final paper: intervention approach and theoretical basis, intervention dose and format, facilitator details (training, profession, number) participant details (number, age, treatment), outcomes, and data analysis. The data extraction forms were checked for accuracy and completeness by the fourth author. Any inconsistencies were resolved by reviewing the papers collaboratively. Extracted data for each study was compiled and is presented in Table 1 and Table 2.

Appraisal of intervention effectiveness

An intervention was considered effective if there was a significant improvement at post-test and/or at follow-up among the intervention group, relative to the control group. Cohen's d effect sizes were calculated by dividing the difference between post-test group means by the pooled standard deviation (22). Cohen's d effect sizes were calculated, whereby $d = 0.2$ was considered a 'small' effect size, $d = 0.5$ was a 'medium' effect size, and

$d = 0.8$ was a ‘large’ effect size (23).

Appraisal of study quality

The methodological quality of the final included studies were evaluated using the Cochrane Collaboration tool for assessing risk of bias (16). In concordance with the tool, each domain of bias was judged to be of high or low risk of bias, or as an unclear risk if there was insufficient information for adequate assessment. Sources of funding and potential conflicts of interest were also reviewed for the individual studies.

Data synthesis

There were substantial clinical and methodological differences between studies (e.g., in relation to study design, overall intervention length and dose, outcome measures), suggesting the likelihood of high statistical heterogeneity if data were pooled (24). This could consequently produce misleading and non-generalisable results in a meta-analysis. A meta-analysis was therefore deemed inappropriate and a narrative synthesis was conducted instead (25).

Results

The original search (January 2013) identified 17 papers that met inclusion criteria, and the updated search (November 2017) identified 5 additional papers. Two of these papers were evaluating the same intervention at different time points, and are subsequently discussed as one study (26, 27). One paper was an unpublished doctoral dissertation (28). Consequently, a total of 21 papers were included in the final review, and evaluated 26 interventions. Details concerning the format, participants, and effect sizes of included interventions are displayed in Table 1. Table 2 contains the outcome measures employed to assess body image. Interventions that identified a significant improvement at post-test only are referred to as “post-test effective interventions” ($n = 7$), while interventions that

demonstrated a delayed significant improvement at follow-up but not at post-test are referred to as “delayed-effective interventions” ($n = 2$).

Participant characteristics

The mean age of participants ranged from 43 to 61 years across the studies, with a mean age of 51. With regard to the participants’ stage of treatment for breast cancer, 29% ($n = 6$) of studies included participants who were still undergoing active treatment, whilst 48% ($n = 10$) included participants who had completed active treatment. The remaining studies (23%; $n = 5$) did not provide information regarding participants’ stage of treatment. The majority ($n = 6$; 67%) of the post-effective or delayed-effective interventions were delivered to women who had finished active treatment. None of the studies screened participants for elevated levels of poor body image.

Intervention effects

There were no interventions with improvements at both post-intervention *and* follow-up. However, seven (27%) of the 26 interventions demonstrated a significant improvement on at least one measure of body image at post-test. Cohen’s d effect sizes for post-test effective interventions ranged from 0.15 to 1.43, with large effect sizes reported in three (43%) of these. The effect size could not be calculated for one intervention as the means and standard deviations were absent (29). When follow-up was assessed in these studies, significant effects at post-test were not sustained. Further, two interventions (8% of all interventions) were not significant at post-test, but demonstrated improvements on body image at follow-up. Indeed, one intervention demonstrated a delayed large improvement ($d = 1.40$) at 2-month follow-up (30), whilst the other attained a small improvement ($d = 0.23$) six and half years later (26, 27).

Intervention characteristics

With regard to intervention approach, 31% ($n = 8$) of the 26 interventions adopted a psychoeducational approach, 29% ($n = 7$) of interventions adopted a physical-activity-based approach, 23% ($n = 6$) of interventions adopted a psychotherapeutic approach, 4% ($n = 1$) of interventions adopted a social-support-based approach, and 15% ($n = 4$) of interventions combined different approaches. Only 2 (8%) of the included interventions were reported to have been developed using theory, and neither were effective. With regard to the nine effective interventions, the majority adopted either a psychoeducational ($n = 3$), or psychotherapeutic approach ($n = 3$). Those with large effects employed psychotherapeutic approaches, including Rational Emotive Behaviour Therapy (REBT; 31) and Mindfulness-Based Stress Reduction (MBSR; including yoga; 32, 33). The only delayed-effective intervention with a large effect size employed a psychoeducational approach (30).

The majority of the interventions (62%; $n = 16$), including those which were effective (78%; $n = 7$), were delivered in person to a group of participants. This also included three of the post-test effective interventions with large effects (31-33). The interventions ranged in overall length between 14 minutes and 168 hours, with a mean length of 24 hours and a mean number of 12 sessions. Whilst effective interventions were 34 hours in overall length and comprised of 18 sessions, those with large effects were less than 20 hours in overall length, and were comprised of up to 8 sessions.

Facilitators differed in their profession across all of the interventions, however, the majority had received formal training (77%; $n = 20$) and half delivered the intervention alone (54%; $n = 14$). The effective interventions also differed in these aspects, however, those with large effects were delivered by a psychiatrist, a clinical psychologist, and the author of the paper, who had a nursing background.

Components and content of the effective interventions

The nine interventions demonstrating significant improvements on body image at either post-intervention or follow-up adopted a variety of different approaches and components (see Table S2 for a more detailed overview of the components and content of the interventions). Two interventions were based on physical activity. Mehnert and colleagues (34) evaluated a bi-weekly group exercise programme running across a 10-week period, and led by a physio- and sports- therapist. The activities included gymnastics, movement games, relaxation, walking, jogging, and physiotherapeutic exercises. Speck and colleagues (35) evaluated a bi-weekly group strength training programme led by a fitness instructor, comprised of ‘core’ exercises to strengthen abdominal and back muscles, followed by upper and lower body weight-lifting exercises (e.g., seated row, bicep curls, leg press, leg curl) with increasing resistance over the weeks.

Three interventions adopted a psychoeducational approach. Hamzehgardeshi and colleagues (29) evaluated a six-session group counselling intervention led by a midwife, comprising of lectures and group discussions. Content included identifying and managing stressors and symptoms, managing changes to the body and sexuality, and improving body image. There was also homework between sessions. The other two interventions were delivered on an individual basis. Salonen and colleagues (36) evaluated a telephone support intervention, within which participants received a one-off call from a physiotherapist one week following surgery. Content was based on Sluijs’ themes from patient education in physical therapy (37), such as providing instructions for home exercises, counselling on stress-related problems, and exploring patients’ demands and expectations. Hsu and colleagues (30) evaluated a two-session intervention, whereby the first session was delivered before surgery, and the second was delivered after surgery. The first session provided information and support on the disease, surgery and aftercare, and expected appearance

changes. The second session addressed sourcing and wearing a breast prosthesis, and reconstructing confidence in appearance.

Three effective interventions adopted a psychotherapeutic approach. The first was a group REBT-based programme; a form of cognitive behavioural therapy (CBT; 31). The six-session programme was delivered by a psychiatrist, and content included logical treatment (reducing irrational and illogical beliefs in favour of rational and logical beliefs), muscle relaxation training, adaptive skills, and problem solving, and participants completed homework between sessions. The other two group interventions were MBSR programmes, and followed a very similar format. The eight-session group programmes incorporated meditation, body scans, yoga exercises, identifying reactions to stress, and awareness of events on feelings, thoughts, and bodily sensations (32, 33). The final intervention was a group one-week multimodal residential programme (26, 27), delivered by a range of professionals. Participants were provided with information and support to help manage the physical, psychological, and economic consequences of the disease. The theoretical-educational lectures were mixed with physical activities, dance therapy, relaxation, and social activities.

Outcome measures

With regard to the outcome measures employed to evaluate changes in body image, the majority of studies ($n = 15$; 71%) employed cancer-specific scales, as opposed to scales that measured aspects of body image and well being non-specific to cancer and related treatment. The most commonly employed scales were the Body Image subscale of the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire – Breast Cancer Module (EORTC QLQ-BR23; $n = 4$; 38) and the Body Image Scale (BIS; $n = 4$; 39). Nearly all effective interventions employed breast-cancer specific scales ($n = 8$;

89%), with larger effect sizes generally attained in studies employing the BIS ($ds = 0.69$ - 1.43). Aspects of body image that were improved included dissatisfaction with appearance and scarring, the avoidance of circumstances which provoke concern about appearance, and feelings of defeminisation and of the body feeling less “whole” after treatment.

Methodological quality

Table 3 summarises the results of the risk of bias evaluation of all 21 studies. Whilst the majority of studies (71%; $n = 15$) conducted random sequence generation, only half of these explicitly described their methods, with even less ensuring allocation concealment. Nearly all studies (90%; $n = 19$) indicated a high risk of performance and detection bias. However, these biases are often very difficult to eliminate in psychosocial and behavioural interventions. Half of the studies (57%; $n = 12$) adequately described the rates of attrition and reasons for exclusion, consequently suggesting a low risk of attrition bias. Most studies (86%; $n = 18$) reported pre-specified outcomes consistently throughout, thus indicating a low risk of reporting bias. Further, it was deemed that there was a low risk of other sources of bias (90%; $n = 19$). Only 33% ($n = 7$; 26, 27, 29, 30, 33, 40-42) of the evaluative studies indicated having conducted a power analysis. Of these, 57% ($n = 4$; 29, 30, 41, 42) were powered to detect effects of at least medium effect size. Finally, the majority of the studies reported their sources of funding (71%; $n = 15$), with none suggesting a potential conflict of interest (see S3 for further details). Among the studies which explicitly referred to any conflicts of interest (43%; $n = 9$), only one study indicated a financial interest (42).

Discussion

We conducted a systematic review of interventions delivered to women who have undergone treatment for breast cancer, with the purpose of identifying interventions effective in improving body image. The number of interventions identified ($n = 26$) was encouraging,

however, those that reported significant improvements on body image at post-intervention or follow-up was limited (35%; $n = 9$). These findings indicate the necessity for further research in this field, which could be informed by the small number of existing interventions that have demonstrated improvements in body image among this group.

While a wide variety of approaches were adopted across effective interventions, this review highlights the absence of theoretically driven interventions in this area. None of the intervention evaluation papers explicitly stated whether their interventions were theoretically informed, and of the minority that did discuss theory, it was not clearly articulated as to how the theory contributed to intervention development or the research evaluation design.

Further, only one evaluative paper hypothesised and tested mechanisms of change for their intervention. Indeed, Speck and colleagues (35) proposed that their weight training programme would improve body image due to increased muscle strength, and that this in turn would increase functional ability, which is important to one's body image. However, tests of mediation were non-significant, and the mechanisms of action consequently remain unclear.

A further concern relates to the lack of clarity with regard to whether interventions were primarily targeting body image. As highlighted in Table S2, interventions tended to employ multiple aims, and only a minority reported their primary and secondary targeted outcomes. In future, it would be helpful for studies to clearly specify the intervention targets and outcome measures as primary and secondary so that the intervention effects on body image can be better interpreted in the context of the interventions' aims and nature.

Nonetheless, there was greater consistency regarding format and delivery. Effective interventions were generally delivered face-to-face to groups of women; a format which has been argued to foster group cohesion. It enables members to feel accepted and supported, which has been considered a "necessary precondition for other therapeutic factors to function

optimally” (39: p.49). A further benefit is the lower cost of delivery compared with those provided on an individual basis. The majority of effective interventions only had one trained facilitator, which not only lowers costs, but also eliminates potential for competition between coleaders (40).

There was disparity between effective interventions concerning the stage of treatment of participants. Interventions adopting a physical-activity-based approach tended to be delivered to women who had finished active treatment, as opposed to those who were still undergoing surgery, chemotherapy, and radiotherapy. This may be due to the latter lacking the physical capability to engage in physical activity. Nonetheless, these findings indicate that support for body image can be beneficial at any stage of treatment, and different approaches can accommodate different stages of treatment and associated capabilities.

However, the degree of confidence in these effective interventions and their associated characteristics is determined by the methodological rigour of their evaluative studies. It was therefore disappointing that the three interventions reporting the largest effect sizes indicated a high risk of bias overall. Confidence can, however, be placed in the four interventions that were evaluated in studies considered to be of sound methodological quality overall (26, 27, 33-35). These interventions include a multimodal residential programme, a multi-activity exercise programme, a strength training programme, and a MBSR programme. This review therefore suggests that they should be prioritised and recommended to health professionals aiming to improve body image among women who have undergone treatment for breast cancer.

Recommendations for practice and future research

Impaired body image is an issue of growing importance among women undergoing or following treatment for breast cancer, emphasising the need for interventions. Findings from

this review indicate that progress is being made in this area. Nonetheless, to advance developments in this area strategically, we propose several recommendations for practitioners and researchers based on the findings of this review

First, we recommend the use of empirically supported theory in the development and evaluation of interventions. Theory can help inform targets for intervention (i.e., mechanisms of action), which theoretically, if changed, will lead to changes in the outcome of interest (i.e., body image; 45). Consequently, interventions that draw on theory may have stronger effects than those that do not (46-48). The lack of theoretical basis reported for interventions in the present review limits understanding of mechanisms by which the effective interventions improved body image, and may also have contributed towards the absence of maintained improvements.

Second, we recommend the adoption of an approach which explicitly and exclusively addresses body image, as this focus was associated with improvements in the evaluative studies examined. An explicit focus on body image validates women's concerns, many of whom feel that health professionals fail to recognise the adverse impacts of treatment-related appearance changes (49). Relatedly, future research could usefully investigate the impact of interventions on body image related to temporary and permanent appearance changes. Further, whilst physical-activity-based interventions in this review indicate promise, previous meta-analyses and systematic reviews evaluating psychosocial interventions on a range of psychosocial outcomes amongst both women treated for breast cancer and the wider population suggest that a psychotherapeutic intervention may attain longer-lasting improvements in body image (50-52). Such an approach may also better accommodate women at different stages of active treatment, who will vary with regard to their physical ability. Physical activity may even be harmful, as demonstrated by previous evaluative

studies with women both during, and following, active treatment (53, 54).

Third, we recommend that psychotherapeutic interventions move beyond a narrow disease-focused approach. Psychotherapeutic interventions in the present review tend to reduce a patient to their illness and fail to recognise the broader aspects of their lives that may influence their health and wellbeing. Indeed, they focus on concerns relating to disease and treatment (e.g., aftercare of surgery, managing appearance changes), in place of a more holistic theoretical approach targeting broader and modifiable sociocultural and psychological influences on body image. The absence of maintained improvements on body image may be related to the narrow approach adopted by the interventions. In contrast, considering the interaction between the individual, the disease, and the wider sociocultural context, may help to inform the development of effective interventions and their underlying mechanisms of change. For example, a systematic review of interventions conducted among women in midlife more broadly (55) found that that a CBT-based intervention targeting broad modifiable influences (e.g., appearance importance, perceived media pressure to alter appearance) had both the largest and longest-lasting improvements on body image (56). These sociocultural and psychological factors have also been found to influence the body image of women treated for breast cancer (57, 58), thus indicating the potential utility of this holistic CBT-based intervention to improve body image among this subgroup of women in midlife.

Fourth, future studies would benefit from employing follow-up evaluations. Only nine (43%) of all studies in the present review conducted a follow-up evaluation of the intervention, and only half of these included a follow-up point of at least six months, which is consistent with the Society of Prevention Research criteria for efficacy (59). The majority of the effective interventions assessed post-test improvements only, precluding conclusions

concerning sustained effects. We therefore recommend that follow-up assessments are conducted in future studies, especially given that benefits can be delayed, as demonstrated by two of the effective interventions. This is particularly important, as alterations to appearance, and consequently associated body image, are likely to vary depending on the stage of treatment, thus influencing the timing of the intervention's effects. Further, consistency in the time points across studies would facilitate comparisons of maintained intervention effects and consideration of the costs to deliver these interventions in relation to the results attained.

Fifth, we recommend that evaluative studies employ stricter methodology, in order to increase levels of confidence in their findings. Future studies would benefit from ensuring randomisation of participants and allocation concealment, as trials employing inadequate or unclear concealment tend to exaggerate treatment effects (60, 61). We also urge researchers to explicitly report, and address reasons for, attrition. This would help health professionals determine whether these interventions are likely to be appropriate and acceptable to their clients. Finally, the likelihood of performance and detection bias would be reduced if independent and external facilitators and outcome assessors were sought, and centralized randomization procedures were pursued.

Study limitations

A potential drawback of the review is the exclusion of papers that include samples of women with a mean age below 35 years. Whilst we acknowledge that this group of women are also likely to experience body image concerns, we sought to identify papers comprised of women who represent the age of the majority of breast cancer cases. Further, the majority of studies tend to define 'younger women' with breast cancer as below 50 years of age (62). Further, the exclusion of studies without a control group may have increased the risk of publication bias. However, the comprehensive search procedure, which included the

consideration of grey literature, may have limited the potential impact of this bias (63), as studies which do not show effective results take longer to be published or are not published at all (64). Finally, the importance of conducting power analyses has been previously emphasised (65), yet the majority of included studies threatened internal validity by failing to describe how their sample size was ascertained. Most evaluative studies were comprised of small sample sizes, and were therefore likely to have lacked the power to detect intervention effects. This suggests that some of the non-significant interventions identified in the present review may have been due to lack of statistical power. This highlights the importance of future research to report power analyses.

Clinical implications and conclusions

This review has identified nine interventions that have improved body image among women at different stages of treatment for breast cancer, at either post-intervention or follow-up assessment. Effective interventions were comprised of an array of physical-activity-based, psychoeducational, and psychotherapeutic approaches, and the four interventions that were evaluated within methodologically sound studies were delivered to groups across multiple sessions. These interventions are therefore recommended for use by health professionals (26, 27, 33-36). However, the absence of maintained improvements on body image within the included studies highlights the potential benefits of drawing upon theory to inform intervention development and evaluation, and targeting broader non-disease-specific modifiable influences. These findings also indicate the need for future research to employ evaluative methodology of greater rigour, in order to instil increased levels of confidence in reports of effective interventions.

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Conflict of interest

The authors declare no conflicts of interest.

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RUNNING HEAD: Systematic review of interventions to improve body image

Table 1.

Characteristics of Included Studies

| Authors | Intervention | | Follow-up | Dose (sessions) | | Format | | Facilitator | | | Participants/Sample | | | Outcome results | |
|--|--|-------------------|---|-----------------|-------|----------------------|------------|-------------|----------------------------|---|----------------------------------|--|---|--|--|
| | Approach | Theoretical basis | | # | Mins | Face-to-face/ Remote | Group/ Ind | Trained | Profession | n | M age (SD) | Stage of treatment | n/ condition | Post-test | Follow-up |
| Interventions with significant improvements on body image at follow-up only and not at post-intervention | | | | | | | | | | | | | | | |
| Björneklett et al (2013, 2012) ^{26,27,a} | Multimodal support programme | None | 1. 2 months 2. 6 months 3. 1 year 4. 6.5 years | 7 (+4) | 1 Day | Face-to-face | Group | Y | Multiple | U | 57.8 | Post-radio, 13 % mast, 77% cons, 42% chemo | IG: 191 CG: 191 | N ^{a1} | 1. N ^{a1} 2. N ^{a1} 3. N ^{a1} 4. Y(0.23) ^{a1} |
| Hsu et al (2010) ³⁰ | Informational & emotional consultation | None | 2 months | 2 | 120 | Face-to-face | Ind | U | Author | 1 | 49.2 | Cur. mast (no recon), no chemo | IG: 32 CG: 31 | N ^b | Y(1.40) ^b |
| Interventions with significant improvements on body image at post-intervention only | | | | | | | | | | | | | | | |
| Fadaei et al (2011) ³¹ | REBT | None | No follow-up | 6 | 90 | Face-to-face | Group | Y | Psychiatrist | 1 | IG: 43.5 (7.6) CG: 44.2 (7.1) | Post-mast, received chemo or radio | IG: 32 CG: 40 | Y(1.43) ^b | - |
| Hamzehgardeshi et al (2017) ^{29,b} | Counselling | None | No follow-up | 6 | 90 | Face-to-face | Group | Y | Midwife | 1 | IG: 46.8 (6.9) CG: 48.9 (5.9) | Post-treatment 100% mast, 100% horm | IG: 40 CG: 40 | Y ^b | - |
| Mehnert et al (2011) ³⁴ | Multi-component exercise programme | None | No follow-up | 20 | 90 | Face-to-face | Group | Y | Physio- & Sports-therapist | 1 | 51.9 (8.5) | Post-chemo &/or radio, 39% mast, 59% cons | IG: 30 WL: 28 | Y(0.69) ^b | - |
| Pintado & Andrade (2017) ³² | Mindfulness & yoga programme | None | No follow-up | 8 | 120 | Face-to-face | Group | U | Unknown | U | 49.3 | Post-treatment, 55% mast, 45% cons, 97% chemo + radio + horm | IG: 15 Active CG (beauty sessions): 14 | Y(1.37) ^b | - |
| Rahmani & Talepasand (2015) ³³ | Mindfulness & yoga programme | None | 2 months | 8 | 120 | Face-to-face | Group | Y | Clinical Psychologist | 2 | IG: 43.3 (3.1) CG: 44.8 (3.3) | Targeted women with fatigue ^c | IG: 12 CG: 12 | Y(1.16) ^{a1} N ^{a2} | N ^{a1} N ^{a2} |

RUNNING HEAD: Systematic review of interventions to improve body image

| | | | | | | | | | | | | | | | |
|---|--|----------------------|--------------|------------------------|--|--|-----------------------------------|---|--|--------------------|------------------|---|---------------------------------------|---|---|
| Salonen et al (2009) ³⁶ | Telephone social support | None | No follow-up | 1 | M =14 | Remote | Ind | Y | Physio-therapist | 1 | IG: 57 CG: 56 | 1 week post-surgery: 49% mast, 51% cons, no adjuvant therapy | IG: 120 CG: 108 | Y(0.21) ^{a1} | - |
| Speck et al (2010) ³⁵ | Strength training | None | No follow-up | 96 | 90 | Face-to-face & remote | Group | Y | Fitness Instructor | 1 | 56.5 | Post-treatment, with lymphedema (48%), or at risk (52%), 75% chemo, 77% radio | IG: 113 CG: 121 | Y(0.25) ^f (0.30 - (0.02) ² (0.15) | - |
| Interventions with no significant improvements on body image at post-intervention | | | | | | | | | | | | | | | |
| Beatty et al (2010) ⁶⁶ | Self-help workbook | None | 3 months | | | Remote | Ind | | | | 55.2 (12.7) | Post-surgery: 43% mast, 53% cons, 63% chemo, 67% radio | IG: 25 Active CG (info only): 24 | N ^{a1} | N ^{a1} |
| Dibbell-Hope (2000) ⁶⁷ | Dance therapy | None | 3 weeks | 6 | 180 | Face-to-face | Group | U | Dance Therapist | 1 | 54.7 | Post-treatment, 81% mast, 10% recon, 21% chemo, 19% radio | IG: 15 WL: 16 | N ^d | N ^d |
| Duijts et al (2012) ⁴⁰ | 1. CBT 2. Exercise 3. CBT + exercise | None | 6 months | 1. 6 2. 12 3. 18 | 1.90 2.150- 180 3.90+ (150-180) | 1. Face-to-face 2. Remote 3. Face-to-face + remote | 1.Group 2.Ind 3.Group + Ind | Y | 1. Clinical Psychologist & Clinical Social Workers 2. Physio-therapists | 1. 1 +3 2. 1 | 48.2 (5.6) | Targeted women with menopause, 50% mast, 91% chemo, 86% horm | 1. 109 2. 104 3. 106 WL: 103 | 1.N ^{a1} 2. N ^{a1} 3. N ^{a1} | 1.N ^{a1} 2. N ^{a1} 3. N ^{a1} |
| Helgeson et al (1999) ^{68,d} | 1. Education 2. Peer discussion 3. Education + peer discussion | None | 6 months | 8 | 1. 45 2. 60 3.45 +60 | Face-to-face | Group | Y | 1. Multiple 2. Oncology Nurse & Social Worker | 2 | 48.25 (9.64) | Post-surgery & cur. chemo, 32% mast, 68% cons | 1. 79 2. 74 3. 82 CG: 77 | 1. N ^j 2. N ^j 3. N ^j | 1. N ^j 2. N ^j 3. N ^j |
| Jun et al (2011) ⁴¹ | Sexual life reframing programme | None | No follow-up | 6 | 120 | Face-to-face | Group | U | Authors | 1 | 45.7 | Post-treatment, 60% mast, 40% cons, 100% chemo, 56% radio, 78% horm | IG: 22 WL: 23 | N ^{e1} | - |
| Mock et al (1994) ^{69,c} | Exercise (a) & support group (b) | Roy Adaptation Model | No follow-up | U | U | a: Remote b: Face-to-face | a: Ind b: Group | Y | a: Authors b: CNS | a: U b: 1 | 44 | Cur. chemo (post-surgery) 7% mast + no recon, 14% mast + recon, 79% cons | IG: 9 CG: 5 | N ^{h1} N ⁱ | - |

RUNNING HEAD: Systematic review of interventions to improve body image

| | | | | | | | | | | | | | | | |
|--|------------------------------|---|--------------|----|-----|--------------|-------|---|--------------------------------|--------------|-------------------------------|--|--------------------------|--|--|
| Pinto et al (2005) ⁷⁰ | Physical activity | Trans-theoretical Model of Behaviour Change | No follow-up | 12 | U | Remote | Ind | U | Authors | 1 | 53.1 (9.7) | Post-treatment, 22% mast + no recon, 7% mast + recon, 76% cons, 59% chemo, 72% radio, 65% horm | IG: 39 CG: 43 | N ^c | - |
| Quintard and Lakdja (2008) ⁷¹ | Beauty treatment | None | 3 months | 1 | U | Face-to-face | Ind | Y | Beauty Therapist | 2 | 50% 40-50 | 1 week post-surgery: 9% mast, 91% cons | IG: 50 CG: 50 | N ^g | N ^g |
| Sandel et al (2005) ⁷² | Dance & movement programme | None | No follow-up | 18 | 60 | Face-to-face | Group | Y | Author | 1 | 61 | Post-treatment, 71% mast + no recon, 21% mast + recon, 8% cons, 8% cur. chemo, 8% cur. radio | IG: 19 WL: 19 | N ^b | - |
| Scheier et al (2005) ^{42,f} | 1. Education 2. Nutrition | None | 9 months | 4 | 120 | Face-to-face | Group | Y | 1. Multiple 2. Nutritionist | 1. 2 2. 1 | 44.2 | Post-treatment- 18% mast, 76% cons, 16% chemo, 22% radio, 61% chemo + radio, 57% horm | 1. 70 2. 78 CG: 76 | 1. N ^k 2. N ^k | 1. N ^k 2. N ^k |
| Svensk et al (2009) ^{73,g} | Art therapy | None | 6 months | 5 | U | Face-to-face | Ind | Y | Art Therapist | 1 | Median: IG: 59.5 CG: 55 | Cur. radio, 24% mast, 76% cons, 46% chemo, 41% horm | IG: 20 CG: 21 | N ^{a1} | - |
| Vito (2007) ²⁸ | Yoga | None | No follow-up | 16 | 90 | Face-to-face | Group | Y | Yoga Instruct | 2 | 50.96 (10.02) | Post-treatment, 52% mast, 40% cons, 68% chemo, 60% radio | IG: 13 WL: 12 | N ^c | - |

Note. N/A = Not Applicable; REBT = Rational Emotive Behaviour Therapy; CBT = Cognitive Behaviour Therapy; # = number of session; Y = Yes; N = No; U = Unclear; CNS = Cancer Nurse Specialist; IG = intervention group; CG = control group; WL = waitlist control condition; mast = mastectomy; recon = breast reconstruction; cons = breast conserving surgery; chemo = chemotherapy; radio = radiotherapy; horm = hormonal therapy; cur. = currently undergoing; significant improvements in Body Image where $p < 0.05$ indicated by Y/N; Cohen's d in brackets if Y; measures in superscript (e.g., ^{a,b}) and Table 2.

^aA multi-modal residential-based programme, including education, psychological support, relaxation, dance, and social activities. Facilitators included oncologists, social workers, a psychologist, an art therapist, massage therapists, a dietician, and a person trained in mental visualisation. A follow-up session of 4 residential days took place 2 months later. ^bUnable to calculate effect size from paper. ^cNo information regarding stage of treatment was provided by the authors. ^d1. Education: Facilitators varied by session, and included a nurse, a social worker, dietician, physical therapist, image consultant, and physician. ^e The programme began as participants started chemotherapy and lasted throughout the treatment protocol (4-6 months). A significant difference was identified between the conditions mid-treatment, but disappeared by post-treatment. ^f1. Education: Facilitators varied by session, and included an endocrinologist, a minister, a psychologist, a nurse, and oncology social worker. ^gThe 5 week programme began as participants started radiotherapy. Outcome assessments were 2 and 6 months later.

Table 2.

Measures Used to Determine Significant Alterations of Body Image

| Questionnaire/Scale used to measure Body Image | |
|---|--|
| Measure | Subscale |
| ^a European Organisation for Research and Treatment of Cancer - Quality of Life Questionnaire Breast Cancer Module (EORTC QLQ-BR23; Sprangers et al., 1996) | ^{a1} Body Image ^{a2} Sadness due to Hair Loss |
| ^b Body Image Scale (Hopwood, Fletcher, Lee, & Al Ghazal, 2001) | ^{b1} Individual Body Image ^{b2} Social Body Image |
| ^c Body Esteem Scale (Franzoi & Shields, 1984) | |
| ^d Body-Image Scale (Berscheid, Walster, & Bohrnstedt, 1972) | |
| ^e Cancer Rehabilitation Evaluation System Questionnaire (CARES; Schag & Heinrich, 1990) | ^{e1} Body Image |
| ^f Body Image and Relationships Scale (Hormes et al., 2008) | ^{f1} Strength and Health ^{f2} Social barriers ^{f3} Appearance and Sexuality |
| ^g Body-Image Questionnaire (Bruchon-Schweitzer, 1987) | |
| ^h Tennessee Self-Concept Scale (Fitts, 1965) | ^{h1} Physical Self |
| ⁱ Visual Analogue Scale | |
| ^j Cancer Rehabilitation Evaluation System Questionnaire – adapted by Authors (Helgeson et al., 1999) | |
| ^k Self-Concept Scale developed by Authors (based on previous research exploring psychosocial outcomes associated with breast cancer treatment; Scheier et al., 2005) | |

Note. To be used in conjunction with Table 1.

Table 3

Judgement Regarding Risk of Bias of According to the Cochrane Collaboration Risk of Bias Tool

| | Random sequence generation | Allocation concealment | Blinding: participants | Blinding: facilitators | Blinding: outcome assessors | Incomplete outcome data | Selective reporting | Other bias |
|--|----------------------------------|---------------------------|---------------------------|---------------------------|-----------------------------------|-------------------------------|------------------------|---------------|
| Interventions with significant improvements on body image at follow-up only and not at post-intervention | | | | | | | | |
| Björneklett et al (2013, 2012) ^{26,27} | + | + | - | - | ? | - | + | + |
| Hsu et al (2010) ³⁰ | - | - | - | - | ? | + | + | + |
| Interventions with significant improvements on body image at post-intervention only | | | | | | | | |
| Fadaei et al (2011) ³¹ | - | - | - | - | ? | ? | + | + |
| Hamzehgardeshi et al (2017) ²⁹ | + | ? | - | - | ? | + | - | - |
| Mehnert et al (2011) ³⁴ | + | + | - | - | ? | + | + | + |
| Pintado & Andrade (2017) ³² | - | - | + | - | ? | + | + | + |
| Rahmani & Talepasand (2015) ³³ | + | ? | - | - | ? | + | + | + |
| Salonen et al (2009) ³⁶ | - | - | - | - | ? | - | + | + |
| Speck et al (2010) ³⁵ | + | + | - | - | + | - | + | + |

| Interventions with no significant improvements on body image | | | | | | | | |
|--|---|---|---|-----|---|---|---|---|
| Beatty et al (2010) ⁶⁶ | + | + | + | N/A | ? | + | + | + |
| Dibbell-Hope (2000) ⁶⁷ | + | ? | - | - | ? | ? | + | + |
| Duijts et al (2012) ⁴⁰ | + | ? | - | - | ? | + | - | + |
| Helgeson et al (1999) ⁶⁸ | + | ? | - | - | ? | ? | - | + |
| Jun et al (2011) ⁴¹ | + | - | - | - | ? | + | + | + |
| Mock et al (1994) ⁶⁹ | - | - | - | - | ? | - | + | + |
| Pinto et al (2005) ⁷⁰ | + | ? | - | - | ? | + | + | + |
| Quintard & Lakdja (2008) ⁷¹ | + | ? | - | - | ? | + | + | + |
| Sandel et al (2005) ⁷² | + | + | - | - | ? | + | + | + |
| Scheier et al (2005) ⁴² | + | ? | - | - | ? | - | + | + |
| Svensk et al (2009) ⁷³ | + | ? | - | - | ? | + | + | + |
| Vito (2007) ²⁸ | - | - | - | - | ? | - | + | - |

Note. + represents quality criteria satisfied and low risk of bias; - represents quality criteria not satisfied and high risk of bias; ? represents insufficient information in the paper to judge risk of bias; N/A = Not Applicable.