

REVIEW

The efficacy of interventions to improve psychosocial outcomes following surgical treatment for breast cancer: a systematic review and meta-analysis

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Abstract

Objective Breast cancer is the most commonly diagnosed cancer in women across the world. The majority of women diagnosed with the disease undergo surgery, which is often associated with significant psychosocial morbidity. The aim of this meta-analysis was to identify the efficacy of psychosocial interventions for women following breast cancer surgery.

Method A comprehensive literature search was undertaken using keyword and subject headings within 7 databases. Included studies employed a quantitative methodology presenting empirical findings focusing on interventions for female breast cancer patients following surgery.

Results Thirty-two studies were included and based on conventional values of effect sizes. Small effects emerged for the efficacy of psychosocial interventions in relation to anxiety (Hedges $g = 0.31$), depression (0.38), quality of life (0.40), mood disturbance (0.31), distress (0.27), body image (0.40), self-esteem (0.35), and sexual functioning (0.22). A moderate to large effect emerged for the efficacy of interventions in promoting improvements in sleep disturbance (0.67). Clear evidence emerged for the efficacy of cognitive behavioral therapy in promoting improvements in anxiety, depression, and quality of life.

Conclusion This is the first meta-analysis to demonstrate the efficacy of interventions on a range of psychosocial outcomes following breast cancer surgery. The meta-analysis highlighted that cognitive behavioral therapy was consistently the most effective psychosocial intervention promoting improvements in anxiety, depression, and quality of life. However, there are shortcomings in existing studies; the length of the follow-up period is typically short and the generalizability of findings was limited by small samples, both of which should be addressed in future studies.

KEYWORDS

cancer, mastectomy, meta-analysis, oncology, psychosocial interventions

1 | INTRODUCTION

Breast cancer is the most commonly diagnosed cancer in women across the world.¹ It is estimated that 1 out of every 8 women will develop breast cancer at some point in their lives.² Mortality rates have fallen over recent decades partly because of advances in early detection and treatment,³ resulting in a growing cohort of breast cancer survivors.⁴ Improved survival rates have placed increased importance on promoting and supporting a high quality of life and optimal psychosocial adjustment among breast cancer patients. The

primary treatment for breast cancer is surgical, consisting of either a mastectomy or breast conservation surgery.¹ Following mastectomy, approximately one-third of women choose to undergo immediate breast reconstruction⁵ in order to reconstruct or reshape the breast mound.

Breast cancer diagnosis and treatment is associated with increased rates of anxiety, depression, distress, and reduced quality of life.⁶ The period following breast cancer surgery is also associated with considerable psychosocial morbidity⁷ with as many as 30% of women experiencing anxiety and depression.⁶ Body image issues and sexual

difficulties are also significantly higher following surgical treatment for breast cancer.⁸ However, it is often assumed that the distress experienced by women with breast cancer abates after the initial treatment, yet stress-related symptoms may actually increase after surgery and treatment completion, as patients leave the "safety net" provided by contact with the oncology team.⁷ A recent meta-analysis suggested anxiety after a diagnosis of cancer may persist for up to 10 years or more.⁹ Collectively, these findings underscore the need to address the psychosocial well-being of breast cancer patients following surgical treatment and reconstruction.

The past decade has seen an increase in the development of interventions to reduce psychosocial morbidity and improve coping and adjustment following breast cancer treatment. Psychosocial interventions are broadly defined as any supportive interaction involving 2 or more individuals whose purpose is to promote awareness and education, provide emotional support and encouragement, and assist with problem solving.¹⁰ Psychosocial interventions that have been utilized with breast cancer patients following surgery include group therapy, individual counseling, psychotherapy, and psychoeducational interventions.^{11,12} Generally, such interventions have only focused on a limited number of patient outcomes, including anxiety, depression, and quality of life. Nevertheless, accumulating evidence indicates psychosocial interventions provide a consistent beneficial effect for cancer patients¹³ and specifically breast cancer patients.¹¹ However, little is known about which intervention is most effective following breast cancer surgery. The aim of this systematic review and meta-analysis was to evaluate the efficacy of interventions on a range of psychosocial outcomes following surgical treatment for breast cancer, both mastectomy and breast conservation surgery.

2 | METHODS

2.1 | Search, selection, and review strategies

Two chartered health psychologists, a medical librarian, and a consultant plastic surgeon formed part of the panel to develop an appropriate search strategy. Four methods were used to identify relevant studies: a keyword search, a subject search, a backward search, and a forward search. Literature searches were performed using 7 electronic databases: PsycINFO (1976-2015), CINAHL (1998-2015), MEDLINE (1975-2015), Academic Search Complete (1980-2015), AMED (1996-2014), Cochrane Library (1975-2015), and EMBASE (1974-2015). The search terms were grouped into 3 blocks: block 1—breast neoplasms, breast oncol*, breast cancer, breast tumor, and breast tumour; block 2—mastectom*, lumpectom*, and prophylactic; and block 3—family therap*, group therap*, psychosocial rehabilitation, anxiety management, relaxation therap*, cognitive therap*, cognitive behaviour*, therap*, social support, support groups, counsel*, counselling, counselling, group counsel, group counselling, and group counseling. The terms relating to the types of surgical procedures (block 2) were combined with OR and NOT prophylactic, referring to prophylactic mastectomy. Terms within each block were combined using OR, and then the results of each block were combined using the AND function. Duplicates were excluded. This study was approved by a

university ethics committee, and a review protocol was developed and followed but is not available to access.

Inclusion criteria were as follows: (i) female adult breast cancer survivors; (ii) any type of primary breast cancer surgery including mastectomy and breast conservation surgery; (iii) psychological, psychoeducational, and/or psychosocial intervention; (iv) written in English; (v) quantitative methodology; and (vi) presenting empirical findings. Studies were excluded if interventions focused on physical rehabilitation, physiological outcomes, and palliative and/or metastatic breast cancer and were published as a conference abstract or a case study. A backward (reference) search was performed, which involved hand searching the reference list of articles included in the analysis. A forward (citation) search was also performed using Scopus. Additionally, as part of the systematic search procedure, review articles were also obtained and examined to identify any additional articles.

Two blinded raters (H.M. and E.G.) independently applied a 14-item quality assessment checklist from a standardized quality assessment tool to each study.¹⁴ Discrepancies were systematically resolved by consensus. Each study was assessed against the 14 items using a 3-point scale (2 fully met, 1 partially met, and 0 did not meet the criterion). A total score was calculated by summing the number of "yes" responses, multiplying this by 2, and adding this to the number of partials. If a criterion was not applicable, it was excluded from the score calculation. The total possible score was calculated as 28 minus 2 times the number of not applicable. Lastly, a summary score (total sum/total possible sum) was calculated, representing the methodological quality of each article. These scores were calculated as a linear score from 0 to 100 and divided into 3 categories representing low, moderate, or high-quality studies. Studies with a score of 75 or more were considered as high quality, 50 to 74 as moderate quality, and 49 or less as low quality.

2.2 | Meta-analysis strategy

We used Hedges g as the effect size statistic. Hedges g calculates the difference between intervention and control group means (d) divided by the pooled standard deviation multiplied by a factor (J) that corrects the underestimation of the population standard deviation.¹⁵ Through pooling variances, Hedges g standardizes outcomes across studies and allows for comparison among disparate outcome measures. Effect size calculations used a random-effects model. This assumes that analyzed studies represent a random sample of effect sizes, subsequently facilitating the generalizability of results.¹⁶ The heterogeneity between studies was calculated using the heterogeneity I^2 statistic. The I^2 statistic calculates what proportion (0-100%) of the observed variance reflects variance in true effect sizes, rather than sampling error. A value of 0% represents no observed heterogeneity, and an I^2 value of 25%, 50%, or 75% tentatively signifies low, moderate, or high heterogeneity between studies, respectively.¹⁷ To minimize heterogeneity, when studies reported outcomes at multiple time points, the furthest time point was used to calculate effect size. We used the conventional values of effect size¹⁸ in this analysis. An effect size of 0.2 demonstrated a small effect, 0.5 a moderate effect, and 0.8 a large effect. We used the Comprehensive Meta-Analysis software for all statistical analyses.¹⁹

2.3 | Sources of bias

Mean effects for each outcome were assessed for the degree of publication bias (the preferential publication of studies with positive effects). Publication bias was assessed using two techniques: the examination of the funnel plot and estimates of correction, trim and fill. If the points on the funnel plot are evenly distributed between positive and negative effects, bias is lacking within the meta-analysis. If publication bias exists, a disproportionate number of studies will fall to the bottom right of the plot.²⁰ The trim and fill method attempts to estimate the number of missing studies that may exist in the meta-analysis and correct for funnel plot asymmetry.²⁰ Orwin's fail-safe

N was also calculated to assess the robustness of the overall effect.²¹ This will determine the number of studies with a null effect size required to reduce the overall effect to non-significant. In this meta-analysis, the number of studies is represented by k .

2.4 | Systematic review results

The search strategy identified 3817 records, reduced to 1455 unique articles following the exclusion of duplicates and to 19 articles following the application of the inclusion and exclusion criteria (Figure 1). A backwards search identified 8 additional articles, and a forward

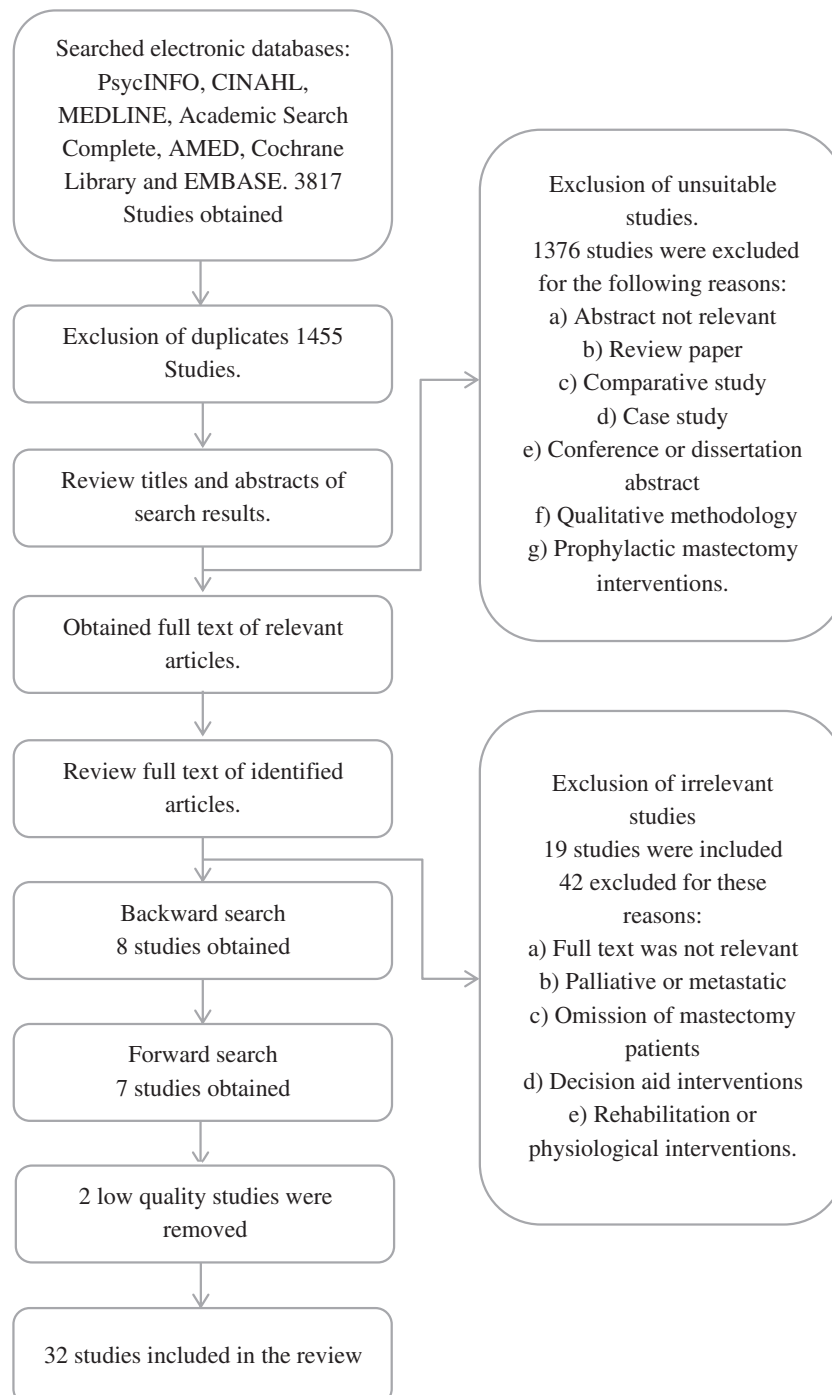


FIGURE 1 Flow diagram depicting the systematic review process

search identified 7 further articles, totaling 34 articles. Twenty-one articles were classified as high quality, 11 as moderate quality, and 2 as low quality (Table 1). The two low-quality articles were removed from the review. In total, 32 articles were included in the review. Twenty-two studies utilized a randomized controlled trial design, 5 pre- and post-group evaluations, 2 nonrandomized controlled studies, 2 single cohorts pre-evaluation and postevaluation, and 1 randomized and comparative study design. Follow-up periods ranged from 1 to 36 months with between 2 and 6 data collection points.

Participant and design characteristics of the 32 studies included in this review are summarized in Table 1, and outcome and assessment measures are described in detail in Table S3, accessible as supporting information. This review comprised of 32 psychosocial interventions with 8 studies utilizing cognitive behavioral therapy interventions,^{10,22-28} 7 psychoeducational interventions,²⁹⁻³⁵ 4 support groups,³⁶⁻³⁹ three counseling interventions,⁴⁰⁻⁴² 2 mindfulness-based stress reduction interventions,^{43,44} 2 supportive-expressive group therapy interventions,^{45,46} 1 psychosexual intervention,⁴⁷ one music therapy and progressive muscle relaxation training,⁴⁸ and 1 contemplative self-healing intervention.⁴⁹ The review also included 2 studies that combined psychoeducational interventions and peer and social support interventions^{50,51} and 1 intervention that combined cognitive behavioral therapy, social support, and psychoeducational elements.⁵² Twenty-five interventions were delivered in person, 6 interventions were delivered via telephone, and 1 intervention via videoconferencing. The number of intervention sessions ranged from a single session to 30 sessions. The studies reported sample sizes ranging from 20 to 442, and the total number of participants across all studies included in this review was 4148. Twenty-nine of 32 studies reported significant treatment effects in 1 or more examined outcomes.

2.5 | Anxiety

Eight of 13 studies reported a significant reduction in anxiety following the intervention.^{23,27,39,44-48} While two studies demonstrated significant effects with cognitive behavioral therapy on anxiety,^{23,27} 2 studies reported no significant effects with cognitive behavioral therapy.^{10,26} Counselling interventions also failed to demonstrate significant treatment effects on anxiety.^{32,40,42} Moreover, Kimman and colleagues³² reported no significant treatment effects of a telephone educational intervention on anxiety.

2.6 | Depression

Thirteen studies reported a significant reduction in depression across a range of interventions including cognitive behavioral therapy,^{22,25-27} psychoeducational intervention,³⁰ counseling,⁴⁰ supportive-expressive group therapy,^{45,46} videoconferencing support groups,³⁶ psychosexual intervention,⁴⁷ mindfulness-based stress reduction,⁴⁴ support groups,³⁹ and music therapy and progressive muscle relaxation training.⁴⁸ No significant treatment effect was reported for telephone counseling,⁴¹ psychoeducation, and peer modeling on depression.³⁵

2.7 | Quality of life

Thirteen studies reported improved quality of life across a range of interventions including contemplative self-healing intervention,⁴⁹ psychoeducational interventions,³¹ mindfulness-based stress reduction,⁴³ cognitive behavioral therapy,^{25-27,34,42} and combined interventions utilizing psychoeducation, cognitive behavioral therapy, and social support³ and a psychoeducational and peer support intervention.⁵⁰ Support groups³⁷ and 2 psychoeducational interventions^{32,33} reported no significant treatment effects on quality of life.

2.8 | Mood disturbance

Five studies reported a significant improvement in mood with supportive-expressive group therapy,^{45,46} mindfulness-based stress reduction,⁴³ telephone cognitive behavioral therapy,¹⁰ and counseling.⁴² In contrast, 2 psychoeducational interventions reported no significant treatment effect on mood disturbance.^{29,51}

2.9 | Distress

In 2 psychoeducational interventions^{29,35} and a telephone counseling intervention,⁴¹ no significant treatment effect was demonstrated in lowering distress. In contrast, there were modest improvements in distress after cognitive behavioral therapy,²² a support group intervention,³⁸ and a relaxation intervention,²⁴ which all reported a significant reduction in distress. However, 1 psychoeducational intervention reported an increase in distress post intervention.²⁹

2.10 | Body image

Two studies reported significant treatment effects with cognitive behavioral therapy²⁴ and support groups.³⁷ In contrast, no significant treatment effect on body image was observed for supportive-expressive group therapy.⁴⁶

2.11 | Sleep disturbance

Two studies utilizing supportive-expressive group therapy⁴⁶ and cognitive behavioral therapy²⁷ reported improved sleep. One study reported that a reduction in sleep disturbance was associated with decreased anxiety and depression and improved global quality of life.³¹

2.12 | Self-esteem

Group cognitive behavioral therapy reported a significant improvement in self-esteem.^{26,28} In contrast, studies utilizing support groups³⁸ and couple counseling⁴⁰ reported no significant treatment effects for self-esteem.

2.13 | Sexual functioning

Two studies reported significant improvements in sexual dysfunction through counseling.^{40,41} The control group showed virtually no change from baseline, suggesting that this source of psychosocial morbidity may be especially resistant to improvement in the absence of

TABLE 1 Systematic review of psychosocial interventions for women after breast cancer surgery ($k = 32$)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|-------------------------|--------------------------------|-------------|---|--|--|----------------|
| Antoni et al, 2001, USA | RCT | Int: 46 | Cognitive behavioral therapy | The Profile of Mood States | Distress: 1.77, $F = 2.33$ | High |
| | | Comp: 53 | | Center for Epidemiologic Studies Depression Scale | Depression: Int, $Q = 13.60^{**}$; Comp, $Q = 2.67$ | |
| | | | | Life Orientation Test—Revised | Optimism: Int 2.81; Comp 20.15, $F = 6.96^{***}$ | |
| Antoni et al, 2009, USA | RCT | Int: 63 | Cognitive behavioral therapy | Impact of Event Scale | Anxiety: $F = 3.86^*$ | High |
| | | Comp: 65 | | Hamilton Rating Scale for Anxiety | Intrusive thoughts: $F = 3.24^*$ | |
| | | | | Affects Balance Scale | | |
| Ashing and Rosales, USA | RCT | Int: 100 | Psychoeducational intervention | 20-item Center for Epidemiologic Studies Depression Scale | Depression: Int $25.4 \pm 17.2^{***}$; Comp $14.8 \pm 14.1^*$ (CI, -5.75 to -0.282)* | High |
| | | Comp: 99 | | | | |
| Charlson et al, USA | Pre- and post-group evaluation | Int: 46 | Contemplative self-healing intervention | The Impact of Events Scale | QoL: $4.6 \pm 10.9^*$ | High |
| | | | | General Functional Assessment of Cancer Therapy Scale + Breast Cancer Subscale | Spirituality: $+1.4 \pm 1.0$ | |
| | | | | Functional Assessment of Chronic Illness Therapy Spirituality Scale | Breast cancer-specific QoL: $+4.8 \pm 12.8$ | |
| Cho et al, Asia | Nonrandomized and comparative | Int: 28 | Psychoeducational intervention and peer support | 18-item Psychosocial Adjustment Scale | Psychosocial adjustment: Int $49.1 \pm 52.1^{***}$; Comp 50.3 ± 4.73 | Moderate |
| | | Comp: 27 | | 27-item Quality of Life Scale | QoL: Int $6.2 \pm 7.0^{**}$; Comp 6.4 ± 6.3 | |
| Christensen, USA | RCT | Int: 10 | Couples counseling | Locke-Wallace Marital Adjustment Test | Marital happiness: Int 106.15; Comp 99.6 | Moderate |
| | | | | Sexual Satisfaction Scale | Sexual functioning: Int 80.41; Comp 69.04, $F = 33.92^*$ | |
| | | | | Beck Depression Inventory | Depression: Int 98.18; Comp 12.02, $F = 7.53^*$ | |
| | | | | Rosenberg Self-esteem Scale | Self-esteem: Int 17.5; Comp 17.8 | |
| | | | | Spielberger State-Trait Anxiety Inventory | Anxiety: Int 39.9; Comp 40.5 | |
| Classen et al, USA | RCT | Int: 178 | Supportive-expressive group therapy | The Profile of Mood States Questionnaire | Mood: Int 13.69, $F = 4.7^*$; Comp 9.05, $F = 6.5^{***}$ | High |

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TABLE 1 (Continued)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|------------------------|---|--------------|---|---|---|----------------|
| | | Comp: 179 | | The Hospital Anxiety and Depression Scale | Anxiety: Int, $F = 5.4^*$; Comp, $F = 6.3^{**}$ | |
| | | | | Yale Social Support Index | Depression: Int, $F = 5.2^*$; Comp, $F = 5.3^*$ | |
| | | | | | Social support: Int, $F = 6.0^*$; Comp 5.4^* | |
| Coleman et al, USA | RCT | Int: 54 | Psychoeducational intervention and social support | Profile of Mood States | Mood: NS | High |
| | | | | The Visual Analogue Scale—Worry | Cancer-related worry: NS | |
| | | Comp: 52 | | The Relationship Change Scale | Relationships: NS | |
| | | | | The 20-item University of California, Los Angeles, Loneliness Scale—Version 3 | Loneliness: NS | |
| Collie et al, USA | Pre- and post-group evaluation | Int: 27 | Support groups | Center for Epidemiologic Studies Depression Scale | Depression: $t = 2.44^*$; $d = 0.51$ | Moderate |
| | | | | The Cancer Behavior Inventory | Emotional expression: $t = 0.44$ | |
| | | | | Courtauld Emotional Control Scale | Self-efficacy: $t = 0.71$ | |
| Dow Meneses et al, USA | RCT | Int: 125 | Psychoeducational intervention | QoL—Breast Cancer Survivors | QoL: Int -1.687 ; Comp -2.909^{***} | High |
| | | Comp: 131 | | | | |
| Esplen et al, USA | RCT | Int: 128 | Support groups | Body Image Scale | Body image: Int 18.3 ± 15.3 ; Comp $18.5 \pm 17.3^*$ | High |
| | | | | Objectified Body Consciousness Scale | Body stigma: Int 37.5 ± 34.3 ; Comp $37.5 \pm 37.4^{***}$ | |
| | | Comp: 65 | | Mental Adjustment to Cancer Scale | Sexual functioning: Int 13.5 ± 15.2 ; Comp 12.1 ± 12.7 | |
| | | | | Female Sexual Function Index Social Support Survey | QoL: Int 91.2 ± 94.8 ; Comp 89.8 ± 92.4 | |
| | | | | Functional Assessment of Cancer Therapy—Breast | | |
| Fadaei et al, Iran | RCT | Int: 32 | Cognitive behavioral therapy | Body Image Scale | Body image: Int 16.97 ± 9.03 , $t = -6.07^{***}$; Comp 15.95 ± 17.18 | Moderate |
| | | Comp: 40 | | | | |
| Fobair et al, USA | Single cohort pre-evaluation and postevaluation | Int: 20 | Supportive-expressive group therapy | The Impact of Event Scale | Mood: $t = -2.43^*$ | High |

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TABLE 1 (Continued)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|------------------------|--------------------------------|-------------|------------------------------------|--|---|----------------|
| | | | | The Profile of Mood States | Anxiety: $t = -2.52^*$ | |
| | | | | The Hospital Anxiety and Depression Scale | Depression: $t = -3.11^{**}$ | |
| | | | | The Mini-Mental Adjustment to Cancer | Coping: $t = -3.57^{**}$ | |
| | | | | The Body Image and Sexuality Scale for Women With Breast Cancer | Body image: $t = 0.71$ | |
| | | | | The Family Relations Index | Relationships: $t = -2.78^{**}$ | |
| | | | | The Social Network and Support Assessment | Social support: $t = -2.42^*$ | |
| | | | | The Medical Interaction Scale of the Cancer Rehabilitation Evaluation System | Impact of illness on life: $t = -1.62$ | |
| | | | | The Impact of Illness on Your Life Questionnaire | Sleep: $t = 2.27^*$ | |
| | | | | Structured Insomnia Interview | | |
| Gunn et al, Australia | Pre- and post-group evaluation | Int: 44 | Support groups | Profile of Mood States | Distress: $t = 3.44^{***}$ | Moderate |
| | | | | The Coopersmith Self-Esteem Inventory | Self-esteem: $t = -0.55$ | |
| | | | | The Duke-UNC Functional Social Support Questionnaire | Social support: $t = 0.77$ | |
| Hoffman et al, UK | RCT | Int: 103 | Mindfulness-based stress reduction | Profile of Mood States | Mood: CI, -21.02 to -4.81 ^{***} | High |
| | | Comp: 111 | | Functional Assessment of Cancer Therapy—Breast | QoL: CI, 4.16 to 10.68 ^{***} | |
| | | | | WHO five-item Well-being Questionnaire | Well-being: CI, 1.16 to 3.15 ^{***} | |
| Jones et al, Canada | RCT | Int: 216 | Psychoeducational intervention | Knowledge Questionnaire | Knowledge: 0.718 (CI, 0.418 to 1.017) ^{***} | High |
| | | Comp: 226 | | Perceived preparedness for reentry scale | Perceived preparedness: 0.409 (CI, 0.273 to 0.545) ^{***} | |
| | | | | Self-Efficacy for Managing Chronic Disease | Self-efficacy: -0.221 (CI, -0.510 to 0.068) | |
| | | | | Profile of Mood States | Mood: 0.859 (CI, -2.398 to 4.116) | |
| | | | | Health Distress Scale | Distress: 0.114 (CI, -0.035 to 0.262) | |
| Kalaitzi et al, Greece | RCT | Int: 20 | Psychosexual intervention | Spielberger's State-Trait Anxiety Inventory | Depression: Int <0.001 ^{***} ; Comp: $P < .236$ | Moderate |

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TABLE 1 (Continued)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|-------------------------------|--------------------------------|-------------|--|---|---|----------------|
| | | Comp: 20 | | Center for Epidemiologic Studies Depression Scale | Anxiety: Int, $P < .006^{**}$; Comp, $P < .645$ | |
| | | | | Questionnaire assessing sexuality and body image | | |
| Kimman et al, the Netherlands | RCT | Int: 149 | Psychoeducational intervention | EORTC QoL Questionnaire | QoL: NS | High |
| | | Comp: 150 | | State-Trait Anxiety Inventory | Anxiety: NS | |
| Kionberg et al, Sweden | Nonrandomized controlled study | Int: 50 | Psychoeducational intervention | The Functional Assessment of Cancer Therapy General Scale | Well-being: NS | High |
| | | Comp: 46 | | Sense of Coherence Scale | Sense of coherence: NS | |
| Lengacher et al, USA | RCT | Int: 41 | Mindfulness-based stress reduction | 30-item Concerns about Recurrence Scale | Fear of recurrence: Int 9.3; Comp 11.6 ^{**} | High |
| | | Comp: 43 | | The State-Trait Anxiety Inventory | State anxiety: Int 28.3; Comp 33.0 [*] | |
| | | | | Epidemiological Studies Depression Scale | Depression: Int 6.3; Comp 9.6 [*] | |
| | | | | 6-item Life Orientation Test | Optimism: Int 46.7; Comp 44.9 | |
| | | | | 10-item Perceived Stress Scale | Perceived stress: Int 12.6; Comp 14.4 | |
| | | | | 19-item Medical Outcomes Social Support Survey | Social support: Int 12.4; Comp 12.8 | |
| Manos et al, Spain | Nonrandomized controlled study | Int: 94 | Psychoeducational intervention and cognitive behavioral therapy and social support | EORTC QoL Questionnaire | QoL: $F = 25.173^{**}$ | Moderate |
| | | Comp: 94 | | Mental Adjustment to Cancer Scale | Anxious preoccupation: $F = 16.036^{**}$ Fighting spirit: $F = 55.345^{**}$ Optimism: $F = 18.413^{**}$ | |
| Marchioro et al, Italy | RCT | Int: 18 | Cognitive behavioral therapy | Functional Living Index Cancer | QoL: Int 41.17; Comp 60.28 ^{***} | Moderate |
| | | Comp: 18 | | The Beck Depression Inventory | Depression: Int 4.83; Comp 8.17 ^{***} | |
| Marcus et al, USA | RCT | Int: 152 | Counseling | Impact of Event Scale | Distress: $P = .29$; $r = 0.24$ | High |
| | | Comp: 152 | | Center for Epidemiologic Studies Depression Scale | Depression: $P = .48$; $r = 0.23$ | |
| | | | | The Sexual Dysfunction Scale | Sexual functioning: $P = .04$; $r = 0.23^{*}$ | |

(Continues)

TABLE 1 (Continued)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|-----------------------|---|-------------|--------------------------------|---|--|----------------|
| Montazeri et al, Iran | Single cohort pre-evaluation and postevaluation | Int: 56 | Support groups | The Hospital Anxiety and Depression Scale | Anxiety: $t = 2.21^*$ | Moderate |
| Qui et al, China | RCT | Int: 31 | Cognitive behavioral therapy | 17-item Hamilton Depression Rating Scale | Depression: $t = 2.75^{**}$ Depression: Int 7.51; Comp 14.35 (ES = 1.51)*** | High |
| | | Comp: 31 | | Self-rating Anxiety Scale | Anxiety: Int 37.74; Comp 43.10 (ES = 0.66) | |
| | | | | Functional Assessment of Cancer Therapy—Breast | Self-esteem: Int 28.42; Comp 27.00 (ES = 0.63)* | |
| | | | | Self-esteem Scale | QoL: Int 97.17; Comp 89.85 (ES = 0.53)** | |
| Sandgren et al, USA | RCT | Int: 24 | Cognitive behavioral therapy | Coping Response Indices—Revised | Distress: Int 8.2; Comp 7.4, $F = 4.48^*$ | High |
| | | Comp: 29 | | Profile of Mood States | Coping cognitive: Int 28.9; Comp 26.7 Coping behavioral: Int 31.5; Comp 20.8 Coping avoidant: Int 11.2; Comp 12.0 Anxiety: Int 2.9; Comp 3.6, $F = 6.29^*$ Mood: Int 2.0; Comp 3.0, $F = 3.15^*$ | |
| Savard et al, Canada | RCT | Int: 27 | Cognitive behavioral therapy | Insomnia Severity Index | Sleep: $F = 11.70^{***}$ | High |
| | | Comp: 30 | | Hospital Anxiety and Depression Scale | Anxiety: $F = 5.19^*$ | |
| | | | | EORTC QoL Questionnaire | Depression: $F = 4.14^*$ QoL: $F = 5.69^*$ | |
| Sharif et al, Iran | RCT | Int: 49 | Psychoeducational intervention | EORTC QoL Questionnaire | QoL: Int 80.0; Comp 61.66*** | High |
| | | Comp: 50 | | | | |
| Stanton et al, USA | RCT | Int: 143 | Psychoeducational intervention | 4-item Short-Form Vitality Subscale | Vitality: Educ 7.36; Comp 6.60 | High |
| | | Comp: 136 | | Revised Impact of Events Scale | Distress: Educ -0.07; Comp -0.08 | |
| | | | | Center for Epidemiologic Studies Depression Scale | Depression: Educ -0.68; Comp -1.79 | |

(Continues)

TABLE 1 (Continued)

| Authors | Study design | Sample size | Intervention | Measures | Outcomes | Quality rating |
|-----------------------|--------------------------------|---------------------|--|---|--|----------------|
| | | | | Posttraumatic Growth Inventory | Posttraumatic growth: Educ 5.44; Comp 2.43 | |
| | | | | Perceived preparedness for reentry | Perceived preparedness: $B = 3.73$ (CI, 0.95 to 6.52); $t = 2.64^{**}$ | |
| Watson et al, UK | Pre- and post-group evaluation | Int: NR Comp: NR | Counseling | Profile of Mood States Spielberger State-Trait Anxiety Inventory | Mood: Int, $t = 2.98^*$; Comp, $t = 2.3^*$ Anxiety: Int 0.5; Comp 4.5 | Moderate |
| Wojtyna et al, Poland | Pre- and post-group evaluation | Int: 35 Comp: 32 | Cognitive behavioral therapy | EORTC QoL Questionnaire R. Cibur's Self-esteem Scale | QoL: Int 64.76; Comp 54.86, $F = 6.33^*$ Self-esteem: Int 27.06; Comp 32.91, $F = 4.46^*$ | Moderate |
| Zhou et al, China | RCT | Int: 85 Comp: 85 | Music therapy and progressive muscle relaxation training | Zung Self-rating Depression Scale State Anxiety Inventory | Depression: 38.29 ± 32.65 , $F = 6.91^{**}$ Anxiety: 53.98 ± 41.06 , $F = 5.46^*$ | High |

Abbreviations: EORTC, European Organisation for Research and Treatment of Cancer; NS, not significant; QoL, quality of life; RCT, randomized controlled trial. Bold emphases indicate primary study outcomes. $*P < .05$. $**P < .01$. $***P < .001$.

intervention.⁴¹ However, Esplen and colleagues³⁷ reported no significant treatment effects with support groups and sexual functioning.

2.14 | Meta-analysis results

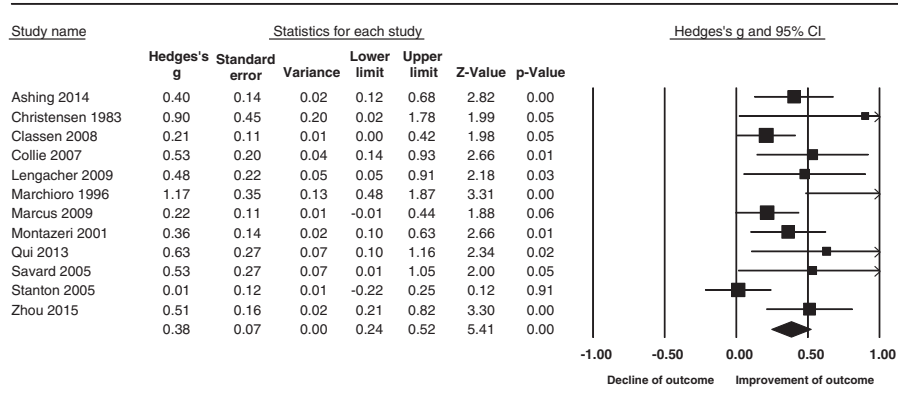
Weighted average effect sizes for each outcome are displayed in Table 2, and forest plots are displayed in Figure 2. Additionally, Table 2 details results of analyses to detect publication bias and heterogeneity statistics for each of the psychosocial outcomes. Meta-regression indicated that the number of sessions within an intervention was not a significant moderator of depression ($k = 10$; $B = 0.006$; $P = .49$), nor was quality of life ($k = 11$; $B = -0.016$; $P = .08$). However, the number of sessions was a significant moderator

for anxiety ($k = 9$; $B = 0.015$; $P = .04$). In regard to publication bias, all funnel plots displayed a greater number of studies to the right of the mean. However, as a disproportionate number of studies did not fall to the bottom right of the plot, this suggests systematic bias does not significantly contribute to our estimate of the efficacy of interventions in relation to psychosocial outcomes. Funnel plots are displayed in Figure S3, accessible online via supporting information. Trim and fill procedures inputted 5 studies for depression, 1 study for anxiety, 4 studies for quality of life, 1 study for sexual functioning, and 2 studies for mood disturbance and distress, and no studies were inputted for self-esteem and body image. Orwin's fail-safe N was calculated to assess the robustness of the overall effect for each outcome. Orwin's fail-safe N indicated 198 nonsignificant studies for depression, 81 for

TABLE 2 Mean effect sizes for psychosocial outcomes for studies with sufficient data for the meta-analysis

| Psychosocial outcome | k | Effect size (g) | 95% CI | p-value | Heterogeneity | Fail-safe N |
|----------------------|----|-----------------|-----------|---------|--|-------------|
| Depression | 12 | 0.38 | 0.24–0.52 | 0.001 | $Q = 21.52$, $p = 0.04$, $I^2 = 44.23$ | 198 |
| Anxiety | 10 | 0.31 | 0.19–0.43 | 0.001 | $Q = 12.71$, $p = 0.24$, $I^2 = 21.33$ | 81 |
| Quality of Life | 10 | 0.40 | 0.27–0.54 | 0.001 | $Q = 20.48$, $p = 0.04$, $I^2 = 46.29$ | 189 |
| Body Image | 3 | 0.40 | 0.16–0.63 | 0.001 | $Q = 21.68$, $p = 0.33$, $I^2 = 7.74$ | 7 |
| Sexual functioning | 3 | 0.22 | 0.07–0.50 | 0.14 | $Q = 3.63$, $p = 0.16$, $I^2 = 44.89$ | 2 |
| Sleep disturbance | 2 | 0.67 | 0.29–1.05 | 0.001 | $Q = 1.19$, $p = 0.27$, $I^2 = 16.52$ | N/A |
| Self-esteem | 3 | 0.35 | 0.00–0.69 | 0.05 | $Q = 4.14$, $p = 0.12$, $I^2 = 51.71$ | 4 |
| Mood disturbance | 4 | 0.31 | 0.12–0.51 | 0.001 | $Q = 8.95$, $p = 0.06$, $I^2 = 55.33$ | 35 |
| Distress | 5 | 0.27 | 0.05–0.49 | 0.02 | $Q = 11.41$, $p = 0.01$, $I^2 = 73.72$ | 9 |

Meta-Analysis: Depression



Meta-Analysis: Anxiety

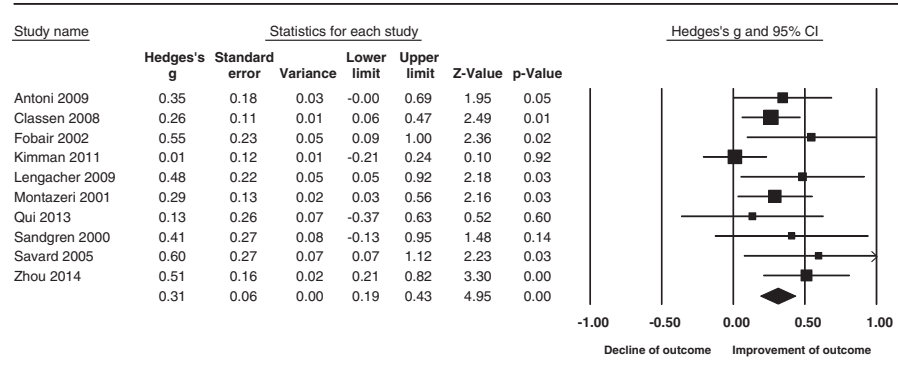


FIGURE 2 Forest plots of effect sizes for studies assessing psychosocial outcomes

anxiety, and 189 for quality of life would be required to render the efficacy of the interventions trivial. The Orwin fail-safe N analysis for all outcomes is displayed in Table 2.

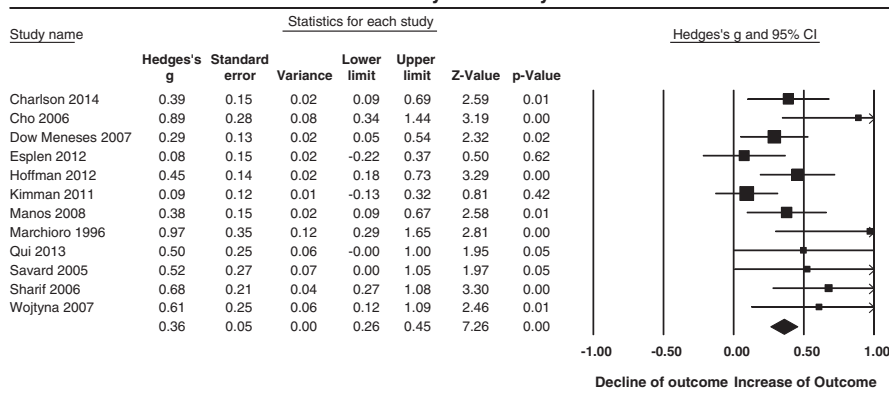
3 | DISCUSSION

To our knowledge, this is the first meta-analysis to evaluate the efficacy of interventions on a range of psychosocial outcomes in breast cancer patients. The meta-analysis demonstrated small effect sizes on 8 psychosocial outcomes: anxiety, depression, quality of life, mood disturbance, distress, body image, self-esteem, and sexual functioning. A moderate to large effect size was detected on sleep disturbance. Within this meta-analysis, anxiety ($k = 14$), depression ($k = 14$), and quality of life ($k = 13$) were the most commonly reported outcomes. This is not surprising given the high incidence of anxiety and depression after surgical treatment for breast cancer, with as many as 30% of women reporting experiencing anxiety and depression,⁶ and the widely recognized impact of anxiety and depression on quality of life.⁷ Moreover, cognitive behavioral therapy was the most common intervention for both anxiety and depression, often reporting significant treatment effects.^{22,23,25–27} This meta-analysis provides clear evidence for the efficacy of cognitive behavioral therapy in improving outcomes in relation to anxiety,^{10,23,37,39} depression,^{22,25,26,37} and quality of life.^{25–28} Meta-regression indicated the number of sessions was not a significant moderator of

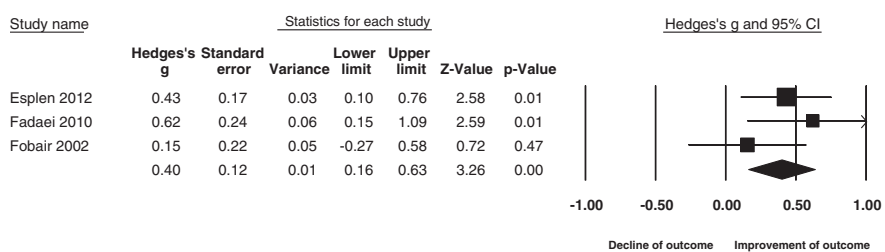
depression or quality of life, although we can conclude the number of sessions is related to effect size for the outcome anxiety. However, we cannot conclude if the length of the sessions moderated the effect size or the timing of the intervention or who delivered the intervention, as a large portion of the studies did not report significant details of the interventions. This should be addressed in future research to develop effective evidence-based interventions to enhance breast cancer care.

A previous meta-analysis demonstrated the efficacy of cognitive behavioral therapy following treatment for adult cancer survivors on anxiety, depression, and quality of life with a large effect size ($g = 1.99$), based on 4 studies.⁵² The findings of this meta-analysis are conservative yet consistent with previous literature. Moreover, a meta-analysis assessing the efficacy of psychological interventions for breast cancer patients reported strong treatment effects for the efficacy of cognitive behavioral therapy in improving anxiety, depression, and quality of life.⁵³ This meta-analysis is the first to demonstrate the efficacy of psychosocial interventions to improve a range of psychosocial outcomes following breast cancer surgery. Previous literature⁵² has predominately focused on anxiety, depression, and quality of life. While these are undoubtedly important outcomes, our meta-analysis goes beyond this and considers less explored yet emerging research outcomes. However, this meta-analysis cannot conclude if the period following breast cancer surgery is optimal to provide support for breast cancer patients; this warrants further investigation. Moreover, it is not clear for the other psychosocial outcomes which

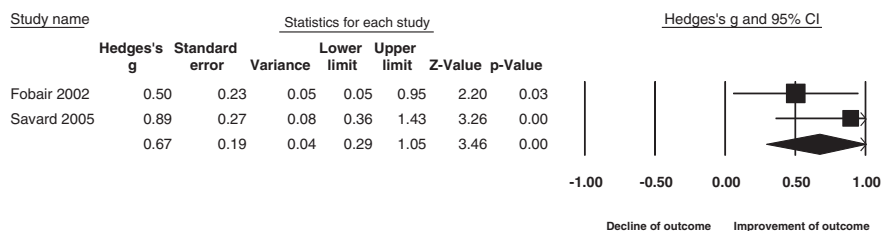
Meta-Analysis: Quality of Life



Meta-Analysis: Body Image



Meta-Analysis: Sleep disturbance



Meta-Analysis: Self-esteem

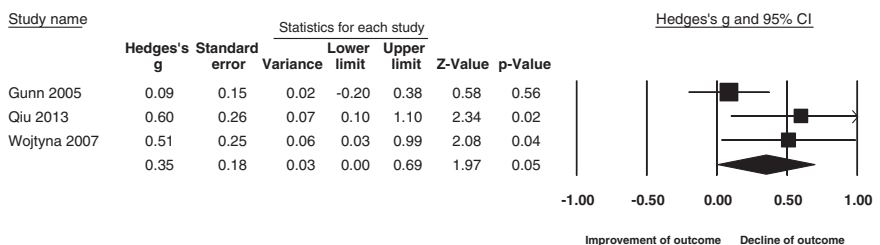


FIGURE 2 (Continued)

intervention would be most effective; this should be addressed in future studies. Consequently, robust conclusions cannot be drawn surrounding which intervention would be most effective for specific psychosocial outcomes, with the exception of cognitive behavioral therapy improving outcomes in relation to anxiety, depression, and quality of life.

The quality of both the systematic review and meta-analysis is dependent on the quality of studies analyzed. One review suggests

the more rigorous the review, the less likely it is to conclude there is evidence that psychosocial interventions in oncology are effective.⁵⁴ Consequently, the design of the studies included must be considered. While the majority of studies utilized a randomized controlled trial study design, a number of studies employed a pretest and posttest design. Therefore, in the studies that employed a pretest and posttest design, the findings may be attributed to changes that occurred independently to the intervention; for example,

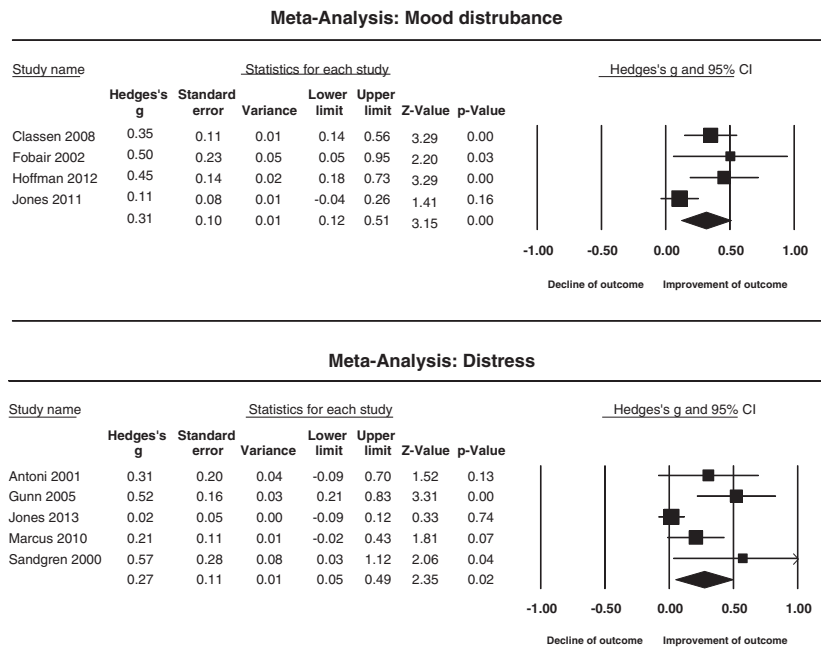


FIGURE 2 (Continued)

increased support from family members may improve psychosocial well-being. A number of studies acknowledge an absence in randomization and/or the process of randomization did not result in equity between groups. Therefore, further evidence with randomized controlled trial study designs may be required to confirm significant treatment effects are not linked to weaker study design. This meta-analysis did not include unpublished studies, as we considered published peer-reviewed studies would provide the strongest evidence regarding the efficacy of psychosocial interventions. However, we recognize effect sizes may be overestimated with the absence of publication of null findings. This review also reported both primary and secondary outcomes of studies within the meta-analysis. Subsequently, we acknowledge the possibility of reporting small effect sizes for secondary outcomes. Seven studies were excluded because the published data were not suitable for meta-analysis, and the required data could not be obtained from the authors.^{11,23,25,37,39,44,48}

The studies included in this meta-analysis present a number of limitations. The majority of the studies recruited a sample of highly educated, middle-class White women who were likely to be motivated to participate in health research. Furthermore, 3 studies^{26,30,45} utilized samples with clinically depressed and highly distressed participants, and another study included women experiencing chronic insomnia.²⁷ Consequently, a significant improvement is more likely, as participants who experience considerable psychological symptoms may be more likely to engage in interventions and hence benefit more from the intervention, enhancing the likelihood of detecting significant treatment effects.⁵⁵ We recommend that researchers should be aware of the sample when assessing the findings. Future studies may want to consider screening for psychological symptoms and including only those participants with elevated scores. This would allow for resources to be targeted at those who would benefit most

from the intervention and reduce the likelihood of bias from the ceiling/floor effects.

Seven studies acknowledged limited generalizability from small sample sizes ($n < 50$) and hence were underpowered to evaluate changes in the multiple outcomes that were measured.^{25,36,38,40,46,47,49}

Notably, studies with low statistical power have a reduced chance of detecting a true effect.⁵⁶ A number of studies also reported limited generalizability from single-center trials, and the use of a single highly trained therapist within the interventions. Furthermore, many of the interventions included multiple components; subsequently, it is often not possible to determine which component an improvement is attributable to. As Czaja and colleagues⁵⁸ acknowledged, the decomposition of psychosocial interventions to identify effective components is an important goal within the field of psycho-oncology and should be addressed in future studies. Moreover, no studies included in this meta-analysis evaluated the cost-effectiveness of interventions. However, there is a pressing need for studies to address cost issues for breast cancer interventions to determine if the initial intervention cost becomes cost-effective over time.⁵⁶ For example, a reduction in the number of general practitioner visits may result in overall cost-effectiveness of an intervention.⁵⁷ We recommend future investigators to consider the cost-effectiveness of interventions, particularly considering different modes of administration (ie, in person or over the phone) to provide efficient and cost-effective support.

This is the first meta-analysis to evaluate the efficacy of interventions to improve a range of psychosocial outcomes following breast cancer surgery. This meta-analysis has demonstrated the efficacy of cognitive behavioral therapy in improving outcomes in relation to anxiety, depression, and quality of life. This meta-analysis is of significant importance given the potential widespread integration of evidenced-based psychosocial interventions in clinical cancer care. Future research priorities should focus on strengthening studies both

conceptually and methodologically, to meaningfully pool data to determine which intervention components are required to enhance breast cancer survivorship. Currently, robust conclusions cannot be determined regarding the efficacy of different types of psychosocial interventions. However, this meta-analysis provides a methodical, novel, and secure evidence base for the efficacy of cognitive behavioral therapy on anxiety, depression, and quality of life following breast cancer surgery.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the author(s).

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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