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

Matthews, H, Grunfeld, EA & Turner, A

Original citation & hyperlink:
Matthews, H, Grunfeld, EA & Turner, A 2016, 'The efficacy of interventions to improve psychosocial outcomes following surgical treatment for breast cancer: A systematic review and meta-analysis' *Psycho-oncology*, vol 26, no. 5, pp. 593-607 https://dx.doi.org/10.1002/pon.4199

DOI 10.1002/pon.4199
ISSN 1057-9249
ESSN 1099-1611

Publisher: Wiley

REVIEW ARTICLE

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

Hannah Matthews* | Elizabeth A. Grunfeld | Andrew Turner

Faculty of Health and Life Sciences, Coventry University, Coventry, UK

Correspondence
Hannah Matthews, Faculty of Health & Life Sciences, Coventry University, Priory Street, Coventry, UK, CV1 5FB.
Email: matthe94@uni.coventry.ac.uk

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 reconstruction[5] 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 morbidity[7] 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 persists 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 patients[13] 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 counselling. 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 size[18] 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 roboustness 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

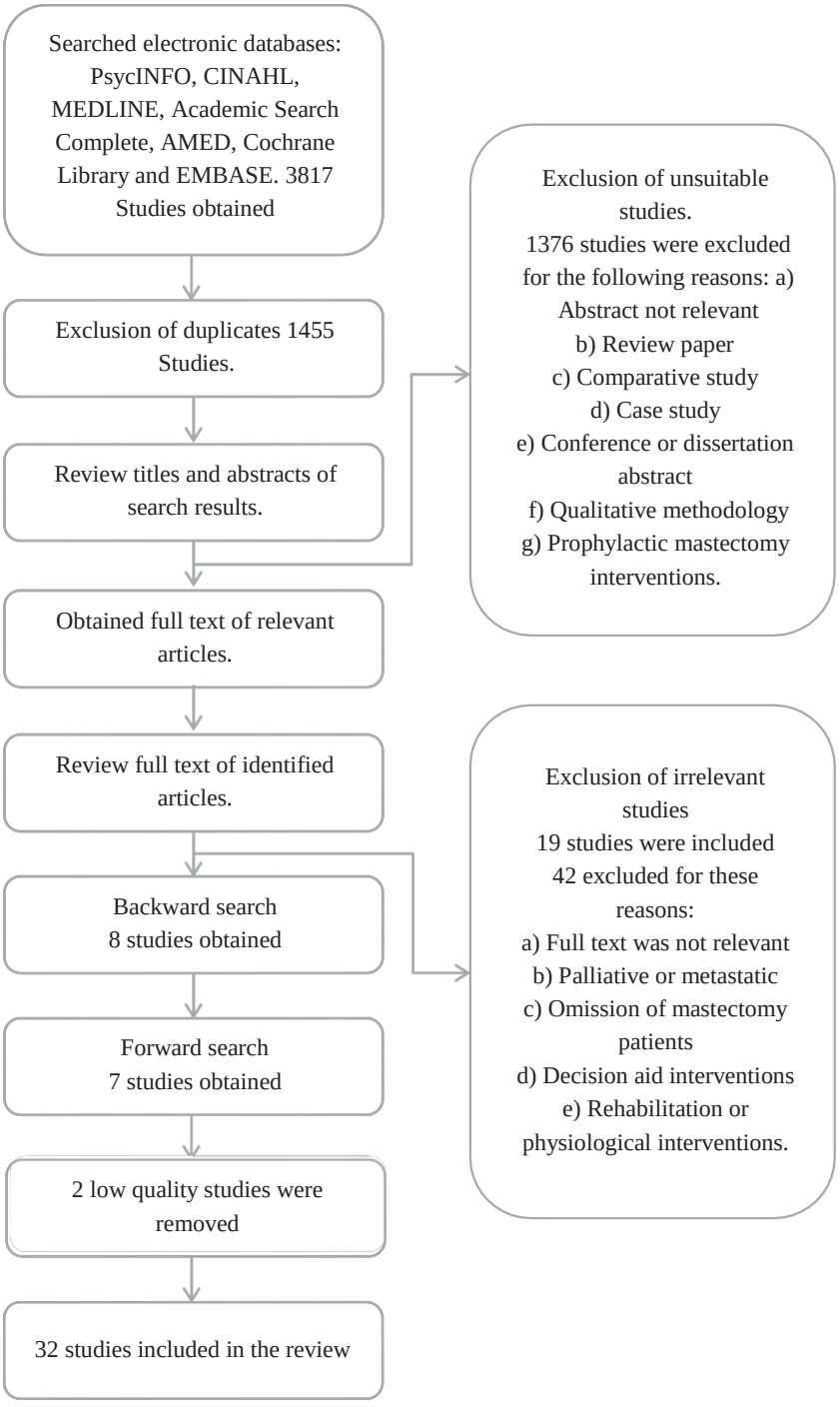

FIGURE 1 Flow diagram depicting the systematic review process

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 colleagues[32] 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 support[3] and a psychoeducational and peer support intervention.[50] Support groups[37] 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 therapy[24] 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 therapy[46] and cognitive behavioral therapy[27] 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 groups[38] and couple counseling[40] 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 ± 17.2***; Comp 14.8 ± 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 ± 10.9*	High
				General Functional Assessment of Cancer Therapy Scale + Breast Cancer Subscale	Spirituality: +1.4 ± 1.0	
				Functional Assessment of Chronic Illness Therapy Spirituality Scale	Breast cancer–specific QoL: +4.8 ± 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 ± 52.1***; Comp 50.3 ± 4.73	Moderate
		Comp: 27		27-item Quality of Life Scale	QoL: Int 6.2 ± 7.0**; Comp 6.4 ± 6.3	
Christensen, USA	RCT	Int: 10	Couples counseling	Locke-Wallace Martial Adjustment Test	Martial happiness: Int 106.15; Comp 99.6	Moderate
		Comp: 10		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

(Continues)

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 ± 17.3*	High
				Objectified Body Consciousness Scale	Body stigma: Int 37.5 ± 34.3; Comp 37.5 ± 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

(Continues)

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

(Continues)

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
					Anxious preoccupation: F = 16.036**	
		Comp: 94		Mental Adjustment to Cancer Scale	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)

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
					Depression: t = 2.75**	
Qui et al, China	RCT	Int: 31	Cognitive behavioral therapy	17-item Hamilton Depression Rating Scale	Depression: Int 7.51; Comp 14.35 (ES = 1.51)***	High
				Self-rating Anxiety Scale	Anxiety: Int 37.74; Comp 43.10 (ES = 0.66)	
		Comp: 31		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
				Hospital Anxiety and Depression Scale	Anxiety: F = 5.19*	
		Comp: 30		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)

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	Counseling	Profile of Mood States	Mood: Int, t = 2.98*; Comp, t = 2.3*	Moderate
		Comp: NR		Spielberger State-Trait Anxiety Inventory	Anxiety: Int 0.5; Comp 4.5	
Wojtyna et al, Poland	Pre– and post–group evaluation	Int: 35	Cognitive behavioral therapy	EORTC QoL Questionnaire	QoL: Int 64.76; Comp 54.86, F = 6.33*	Moderate
		Comp: 32		R. Cibor's Self-esteem Scale	Self-esteem: Int 27.06; Comp 32.91, F = 4.46*	
Zhou et al, China	RCT	Int: 85	Music therapy and progressive muscle relaxation training	Zung Self-rating Depression Scale	Depression: 38.29 ± 32.65, F = 6.91**	High
		Comp: 85				
				State Anxiety Inventory	Anxiety: 53.98 ± 41.06, F = 5.46*	

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 colleagues[37] 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 sufficientdata 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

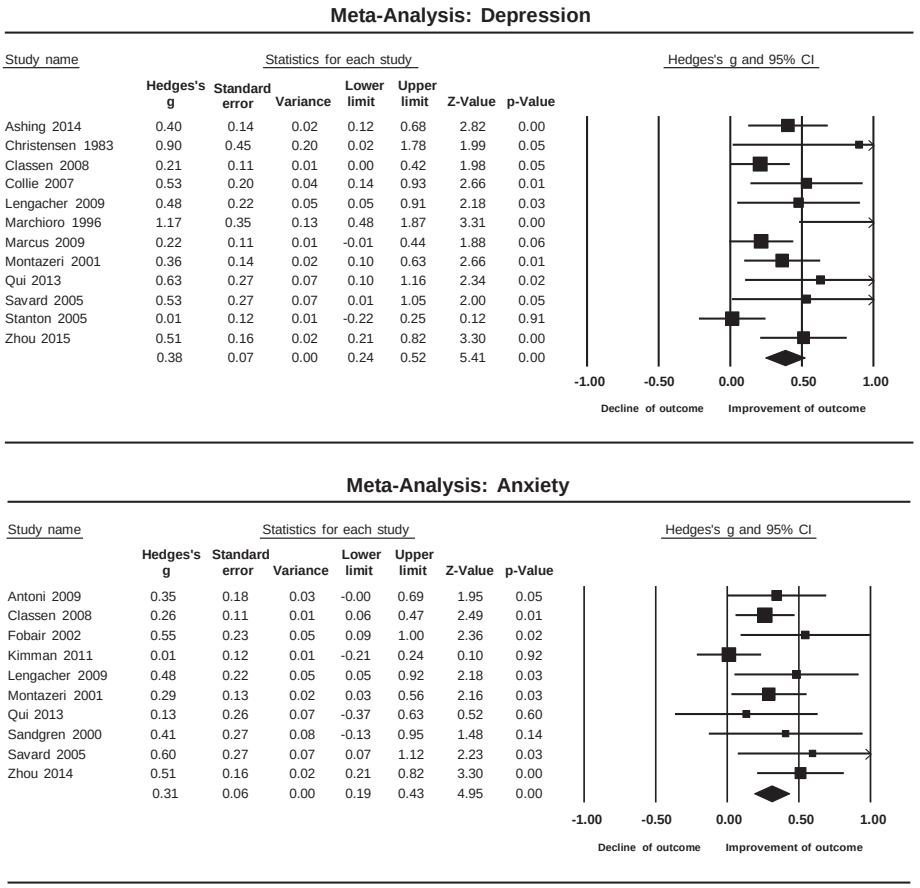

FIGURE 2 Forest plots of effect sizes for studies assessing psychosocial outcomes

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 literature[52] 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

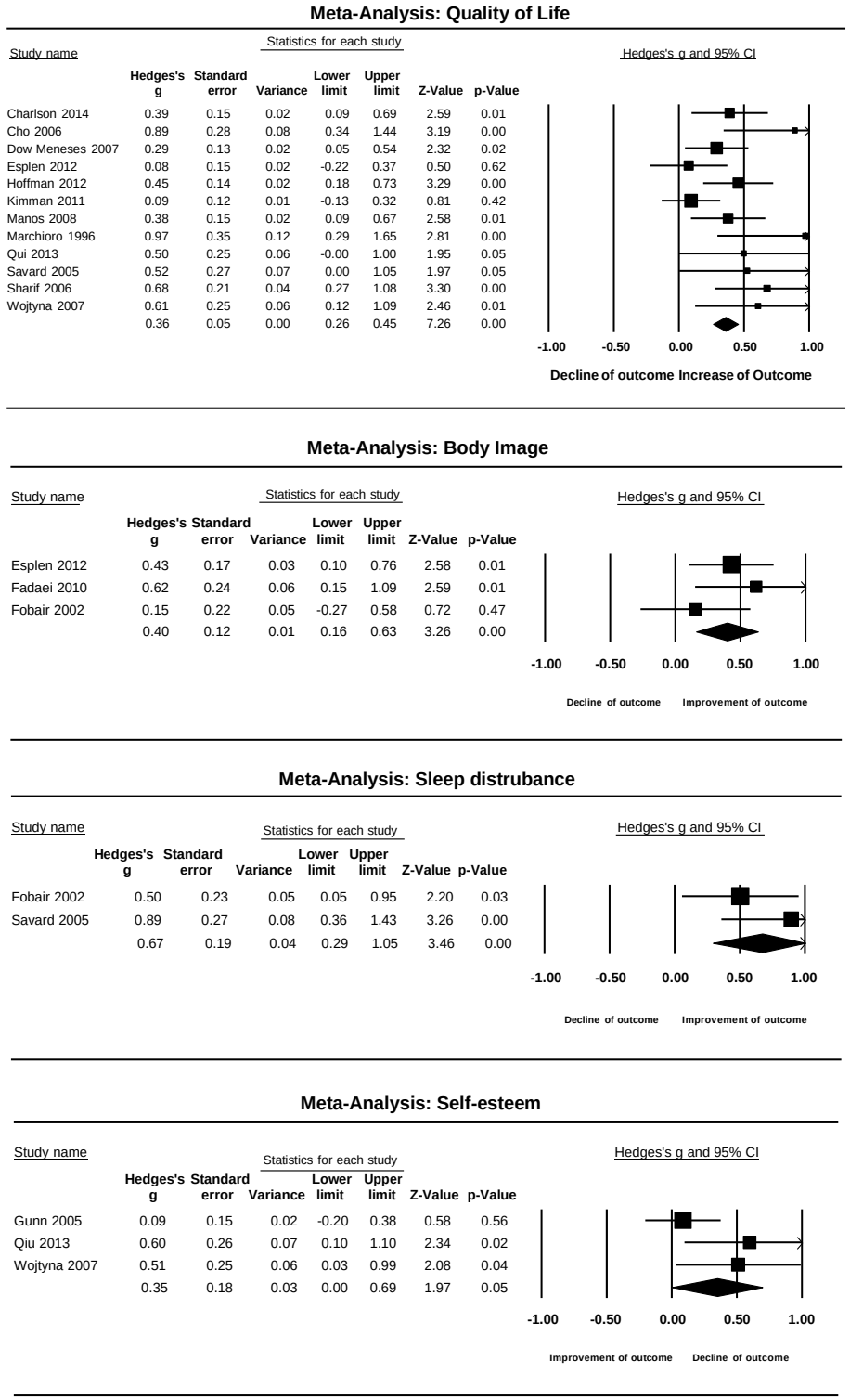

FIGURE 2 (Continued)

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 pre-test and posttest design, the findings may be attributed to changes that occurred independently to the intervention; for example,

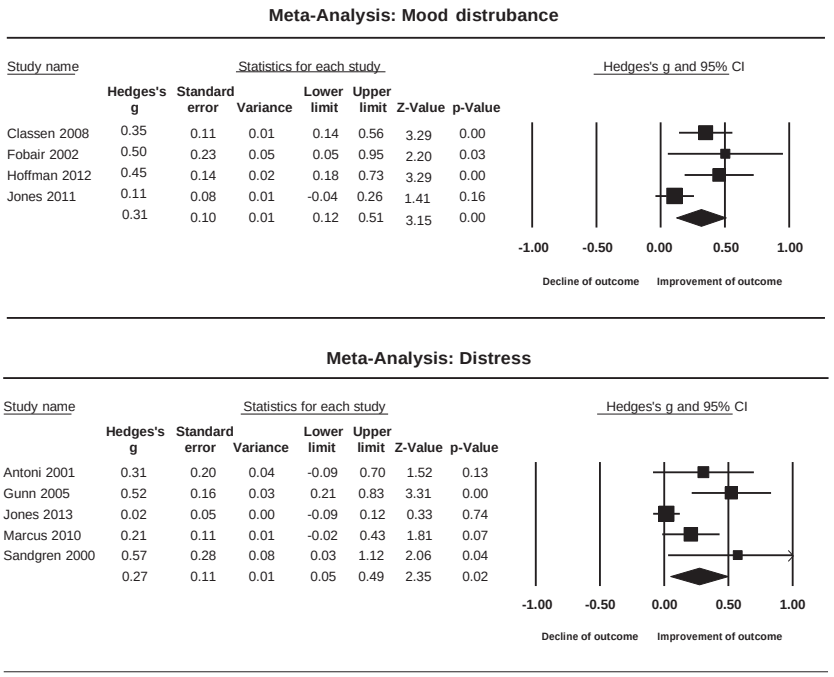

FIGURE 2 (Continued)

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 colleagues[58] 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.

FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. It was completed as part of a doctoral program of study.

CONFLICT OF INTEREST

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

REFERENCES

1. Rowland JH, Aziz N, Tesauro G, Feuer EJ. The changing face of cancer survivorship. Semin Oncol Nurs. 2001;17(4):236–240.
2. Cancer Research UK. 2016. Breast cancer statistics. http://www.cancerresearchuk.org/health-professional/breast-cancer-statistics [accessed 24 February 2016].
3. Manos D, Sebastián J, Mateos N, Bueno M. Results of a multi-componential psychosocial intervention programme for women with early-stage breast cancer in Spain: quality of life and mental adjustment. Eur J Cancer Care. 2009;18(3):295–305.
4. Graham LJ, Shupe MP, Schneble EJ, et al. Current approaches and challenges in monitoring treatment responses in breast cancer. J Cancer. 2014;5(1):58–68.
5. Alderman AK, Hawley ST, Morrow M, et al. Receipt of delayed breast reconstruction after mastectomy: do women revisit the decision? Ann Surg Oncol. 2011;18(6):1748–1756. doi: 10.1245/s10434-010-1509-y
6. Kydd LA, Reid SA, Adams J. The Breast Surgery Gallery: an educational and counseling tool for people with breast cancer or having prophylactic breast surgery. Clin J Oncol Nurs. 2010;14(5):643–648. doi: 10.1188/10.CJON.643-648
7. Ganz PA, Guadagnoli E, Landrum MB, et al. Breast cancer in older women: quality of life and psychosocial adjustment in the 15 months after diagnosis. J Clin Oncol. 2003;21(21):4027–4033.
8. Maguire P. Body Image and Sexual Problems: ABC of Breast Diseases. 2nd ed. London, UK: BMJ Books;2000.
9. Mitchell AJ, Ferguson DW, Gill J, Paul J, Symonds P. Depression and anxiety in long-term cancer survivors compared with spouses and healthy controls: a systematic review and meta-analysis. Lancet Oncol. 2013;14(8):721–732. doi: 10.1016/S1470-2045(13)70244-4
10. Sandgren A, McCaul K, King B, O'Donnell S, Foreman G. Telephone therapy for patients with breast cancer. Oncol Nurs Forum. 2000;27(4):683–688.
11. Burke S, Kissane DW. Psychosocial Impact of Breast Cancer: A Review of Interventions by Specialist Providers: A Summary of the Literature 1976-1996. NSW, Australia: NHMRC National Breast Cancer Center;1998.
12. Newell SA, Sanson-Fisher RW, Savolainen NJ. Systematic review of psychological therapies for cancer patients: overview and recommendations for future research. J Natl Cancer Inst. 2002;94(8):558–584.
13. Meyer TJ, Mark MM. Effects of psychosocial interventions with adult cancer patients: a meta-analysis of randomized experiments. Health Psychol. 1995;14(2):101–108.
14. Kmet LM, Lee RC, Cook LS. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. AHFMR, HTA Initiative. 2004;13:1–21.
15. Borestein M, Hedges LV. Introduction to Meta-analysis. Chichester, UK: Wiley;2009.
16. Borenstein M, Hedges LV, Higgins JPT, et al. Introduction to Meta-analysis. Chichester, UK: Wiley;2009.
17. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ. 2003;327(7414):557–560.
18. Cohen J. The statistical power of abnormal-social psychological research: a review. J Abnorm Soc Psychol. 1962;65:145–153.
19. Comprehensive Meta-Analysis. Book Comprehensive Meta-analysis. City: Biostat;2006.
20. Duval S, Tweedie R. Trim and fill: a simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. Biometrics. 2000;56(2):455–463.
21. Orwin RG. A failsafe N for effect size in meta-analysis. J Stat Educ. 1983;8:157–159.
22. Antoni MH, Lehman JM, Kilbourn KM, et al. Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. Health Psychol. 2001;20(1):20–32.
23. Antoni M, Lechner S, Diaz A, et al. Cognitive behavioral stress management effects on psychosocial and physiological adaptation in women undergoing treatment for breast cancer. Brain Behav Immun. 2009;23(5):580–591.
24. Fadaei S, Janighorban M, Mehrabi T, Ahmad Ahmadi S, Mokaryan F, Gukizade A. Effects of cognitive behavioral counseling on body image following mastectomy. J Res Med Sci. 2011;16(8):1047–1054.
25. Marchioro G, Azzarello G, Checchin F, et al. The impact of a psychological intervention on quality of life in non-metastatic breast cancer. Eur J Cancer. 1996;32(9):1612–1615.
26. Qiu J, Chen W, Gao X, et al. A randomized controlled trial of group cognitive behavioral therapy for Chinese breast cancer patients with major depression. J Psychosom Obstet Gynaecol. 2013;34(2):60–67.
27. Savard J, Simard S, Ivers H, Morin CM. Randomized study on the efficacy of cognitive-behavioral therapy for insomnia secondary to breast cancer, part I: sleep and psychological effects. J Clin Oncol. 2005;23(25):6083–6096.
28. Wojtyna E, Życińska J, Stawiarska P. The influence of cognitive-behaviour therapy on quality of life and self-esteem in women suffering from breast cancer. Rep Pract Oncol Radiother. 2007;12(2):109–117.
29. Jones JM, Cheng T, Jackman M, et al. Getting back on track: evaluation of a brief group psychoeducation intervention for women completing primary treatment for breast cancer. Psychooncology. 2013;22(1):117–124.
30. Ashing K, Rosales M. A telephonic-based trial to reduce depressive symptoms among Latina breast cancer survivors. Psychooncology. 2014;23(5):507–515.
31. Dow Meneses K, McNees P, Loerzel V, Su X, Zhang Y, Hassey L. Transition from treatment to survivorship: effects of a psychoeducational intervention on quality of life in breast cancer survivors. Oncol Nurs Forum. 2007;34(5):1007–1016.
32. Kimman M, Dirksen C, Voogd A, et al. Nurse-led telephone follow-up and an educational group programme after breast cancer treatment: results of a 2 × 2 randomised controlled trial. Eur J Cancer. 2011;47(7):1027–1036.
33. Koinberg I, Langius-Eklöf A, Holmberg L, Fridlund B. The usefulness of a multidisciplinary educational programme after breast cancer surgery: a prospective and comparative study. Eur J Oncol Nurs. 2006;10(4):273–282.
34. Sharif F, Abshorshori N, Tahmasebi S, Hazrati M, Zare N, Masoumi S. The effect of peer-led education on the life quality of mastectomy patients referred to breast cancer-clinics in Shiraz, Iran 2009. Health Qual Life Outcomes. 2010;8:74–80.
35. Stanton A, Ganz P, Kwan L, et al. Outcomes from the Moving Beyond Cancer psychoeducational, randomized, controlled trial with breast cancer patients. J Clin Oncol. 2005;23(25):6009–6018.

36. Collie K, Kreshka M, Ferrier S, et al. Videoconferencing for delivery of breast cancer support groups to women living in rural communities: a pilot study. Psychooncology. 2007;16(8):778–782.
37. Esplen, M.J., Wong, J., Warner, E., Toner, B.. Can we fix what we've broken? Randomized controlled trial of a group therapy to address body image disturbance and sexuality following treatment for breast cancer. 2013.
38. Gunn H, Cairns D, Meiser B, Thewes B. An evaluation of support groups for young women with early breast cancer. Cancer Forum. 2006;29(1): 20–26.
39. Montazeri A, Harirchi I, Vahdani M, et al. Anxiety and depression in Iranian breast cancer patients before and after diagnosis. Eur J Cancer Care. 2000;9(3):151–157.
40. Christensen DN. Postmastectomy couple counseling: an outcome study of a structured treatment protocol. J Sex Marital Ther. 1983;9(4):266–275.
41. Marcus AC, Garrett KM, Cella D, et al. Can telephone counseling post-treatment improve psychosocial outcomes among early stage breast cancer survivors? Psychooncology. 2010;19(9):923–932.
42. Watson M, Denton S, Baum M, Greer S. Counselling breast cancer patients: a specialist nurse service. Couns Psychol Q. 1989;1(1):25–34.
43. Hoffman C, Ersser S, Hopkinson J, Nicholls P, Harrington J, Thomas P. Effectiveness of mindfulness-based stress reduction in mood, breast- and endocrine-related quality of life, and well-being in stage 0 to III breast cancer: a randomized, controlled trial. J Clin Oncol. 2012;30(12): 1335–1342.
44. Lengacher C, Johnson-Mallard V, Post-White J, et al. Randomized controlled trial of mindfulness-based stress reduction (MBSR) for survivors of breast cancer. Psychooncology. 2009;18(12):1261–1272.
45. Classen C, Kraemer H, Blasey C, et al. Supportive-expressive group therapy for primary breast cancer patients: a randomized prospective multicenter trial. Psychooncology. 2008;17(5):438–447.
46. Fobair P, Koopman C, Dimiceli S, et al. Psychosocial intervention for lesbians with primary breast cancer. Psychooncology. 2002;11(5):427–438.
47. Kalaitzi C, Papadopoulos V, Michas K, Vlasis K, Skandalakis P, Filippou D. Combined brief psychosexual intervention after mastectomy: effects on sexuality, body image, and psychological well-being. J Surg Oncol. 2007;96(3):235–240.
48. Zhou K, Li X, Li J, et al. A clinical randomized controlled trial of music therapy and progressive muscle relaxation training in female breast cancer patients after radical mastectomy: results on depression, anxiety and length of hospital stay. Eur J Oncol Nurs. 2015;19(1):54–59.
49. Charlson M, Loizzo J, Moadel A, et al. Contemplative self-healing in women breast cancer survivors: a pilot study in underserved minority women shows improvement in quality of life and reduced stress. BMC Complement Altern Med. 2005;14:349
50. Cho OH, Yoo YS, Kim NC. Efficacy of comprehensive group rehabilitation for women with early breast cancer in South Korea. Nurs Health Sci. 2006;8(3):140–146.
51. Coleman E, Tulman L, Samarel N, et al. The effect of telephone social support and education on adaptation to breast cancer during the year following diagnosis. Oncol Nurs Forum. 2005;32(4):822–829.
52. Osborn RL, Demoncada AC, Feuerstein M. Psychosocial interventions for depression, anxiety, and quality of life in cancer survivors: meta-analyses. Int J Psychiatry Med. 2006;36:13–34.
53. Naaman SC, Radwan K, Fergusson D, Johnson S. Status of psychological trials in breast cancer patients: a report of three meta-analyses. Psychiatry. 2009;72(1):50–69. doi: 10.1521/psyc.2009.72.1.50
54. Lepore SJ, Coyne JC. Psychological interventions for distress in cancer patients: a review of reviews. Ann Behav Med. 2006;32:85–92.
55. Goodwin PJ, Leszcz MDM, Ennis M, et al. The effect of group psychosocial support on survival in metastatic breast cancer. N Engl J Med. 2001;345:1719–1726.
56. Button KS, Ioannidis JP, Mokrysz C, et al. Power failure: why small sample size undermines the reliability of neuroscience. Nat Rev Neurosci. 2013;4(5):365–376.
57. Badr H, Krebs P. A systematic review and meta-analysis of psychosocial interventions for couples coping with cancer. Psychooncology. 2013;8:1688–1704.
58. Czaja SJ, Schulz R, Lee CC, Belle SH. A methodology for describing and decomposing complex psychosocial and behavioral interventions. Psychol Aging. 2003;18(3):385–395.

SUPPORTING INFORMATION

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

How to cite this article: Matthews, H., Grunfeld, E. A., and Turner, A. (2016), The efficacy of interventions to improve psychosocial outcomes following surgical treatment for breast cancer: a systematic review and meta-analysis, Psycho-Oncology, doi: 10.1002/pon.4199