

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

Introduction

For many women breast cancer has a detrimental effect on a number of psychosocial domains. Breast cancer diagnosis and treatment is associated with increased rates of anxiety, depression, distress and reduced quality of life (Kydd, Reid and Adams 2006). The period following breast cancer surgery is also associated with considerable psychosocial morbidity (Ganz et al. 2003) with as many as 30% of women experiencing anxiety and depression (Kydd, Reid and Adams 2006). Body image issues and sexual difficulties are also significantly higher following surgical treatment for breast cancer (Maguire 2000). 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 their “*safety nets*” provided by contact with the oncology teams (Ganz et al. 2003). Additionally, a recent meta-analysis suggested anxiety after a diagnosis of cancer may persist for up to 10 years or more (Mitchell et al. 2013). Collectively, these findings underscore the need to address the psychosocial wellbeing 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 two or more individuals whose purpose is to promote awareness and education, provide emotional support, encouragement, and assist with problem solving (Sandgren et al. 2000). Psychosocial interventions that have been utilised with breast cancer patients following surgery include group therapy, individual counselling, psychotherapy, and psychoeducational interventions (Burke and Kissane 1998, Newell, Sanson-Fisher and Savolainen 2002). 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 (Meyer and Mark 1995), and specifically breast cancer patients (Burke and Kissane 1998). However, little is known about which intervention is most effective following breast cancer surgery and literature surrounding interventions to improve post-mastectomy reconstruction outcomes is in its infancy. The aim of this systematic review and meta-analysis was to evaluate the efficacy of interventions on psychosocial outcomes following surgical treatment for breast cancer, specifically breast conservation surgery and mastectomy, with the view that the efficacy of such interventions may also be applicable to post-reconstruction outcomes. In order to evaluate the efficacy of interventions we must define and describe the most common psychosocial outcomes and their complex interactions within the context of surgical treatment.

Methods: Search, Selection and Review Strategies

Following ethical approval (P33731), 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 seven 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 three blocks: Block 1 - breast neoplasms, breast oncol*, breast cancer, breast tumor, breast tumour; Block 2; mastectom* lumpectom*, prophylactic; 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, 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, psycho-educational and/or psychosocial intervention; (iv) written in English; (v) quantitative methodology; (vi) presenting empirical findings. Studies were excluded if interventions focused on physical rehabilitation, physiological outcomes, palliative and/or metastatic breast cancer, 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 in order to identify any additional articles.

Two blinded raters (Hannah Matthews & Elizabeth Grunfeld) independently applied a 14 item quality assessment checklist from a standardised quality assessment tool to each study (Kmet, Lee and Cook 2004). Discrepancies were systematically resolved by consensus. Each study was assessed against the 14 items using a three point scale (2-fully met criterion, 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 0-100 and divided into three categories representing low, moderate, or high quality studies. Studies with a score of 75 or more were considered high quality, moderate quality 50-74, and low quality 49 or less.

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 (SD) multiplied by factor (J) that corrects the underestimation of the population SD (Borenstein and Hedges 2009). Through pooling variances, hedges g standardises outcomes across studies and

allows for comparison among disparate outcome measures. Effect size calculations used a random effects model. This assumes that analysed studies represent a random sample of effect sizes, subsequently facilitating the generalisability of results (Borenstein et al. 2009). 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, an I^2 value of 25%, 50%, and 75% tentatively signify low, moderate, and high heterogeneity between studies (Higgins et al. 2003). To minimise 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 (Cohen 1962) 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 (Borenstein et al. 2005).

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 exist is a disproportionate number of studies will fall to the bottom right of the plot (Duval and Tweedie 2000). 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 (Duval and Tweedie 2000). Orwin's fail-safe N was also calculated to assess the robustness of the overall effect (Orwin 1983). This will determine the number of studies with a null effect size required to reduce the overall effect to non-significance. In this meta-analysis the number of studies is represented by k .

Systematic Review Results

The search strategy identified 3,817 records, reduced to 1,455 unique articles following the exclusion of duplicates and to 19 articles following the application of the inclusion and exclusion criteria. The search strategy is depicted in Figure 1. A backwards search identified 8 additional articles and a forward search identified 7 further articles, totalling 34 articles. Twenty-one articles were classified as high quality, eleven as moderate quality and two as low quality. Details of each study included in the systematic review are displayed in Table 1. The two low quality articles were removed from the review. In total, 32 articles were included in the review. Twenty-two studies utilised a randomised controlled trial design, 5 pre and post group evaluations, 2 non-randomised controlled studies, 2 single cohort pre & post evaluations, and 1 randomised & comparative study design. Follow-up periods ranged from 1 to 36 months with between two and six data collection points. Participant and design characteristics of the 32 studies included in this review are summarised in Table 1.

Figure1. A Flow Diagram Depicting the Systematic Review Process

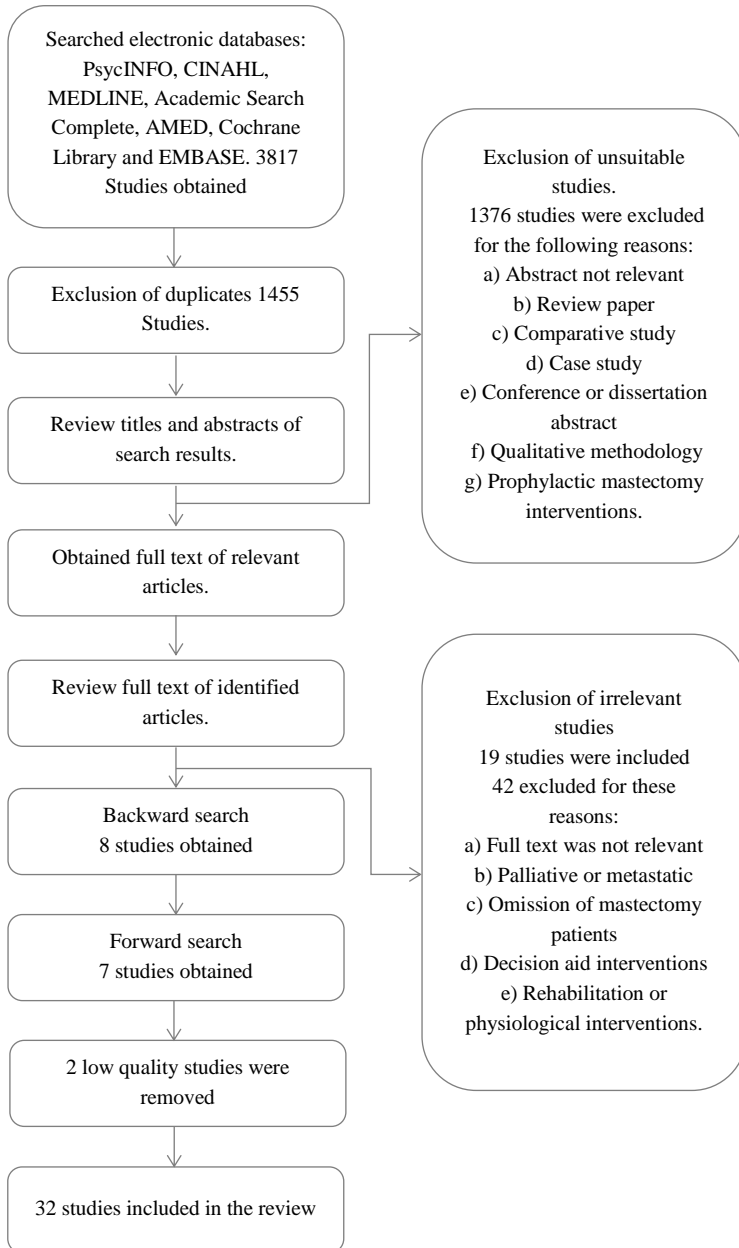


Table1. Systematic Review of Psychosocial Interventions for Women after Breast Cancer Surgery (k=32)

Authors	Study design	Sample size	Intervention	Measures	Outcomes	Quality rating	
Antoni et al. 2001 USA	RCT	Int: 46 Comp: 53	Cognitive behavioural therapy	The Profile of Mood States Centre for Epidemiologic Studies Depression Scale Life Orientation Test—Revised	Distress Depression Optimism	1.77 F=2.33 Int: Q=13.60** Comp: Q=2.67 Int:2.81 Comp=20.15 F=6.96***	High
Antoni et al. 2009 USA	RCT	Int: 63 Comp: 65	Cognitive behavioural therapy	Impact of Event Scale Hamilton rating Scale for Anxiety Affects Balance Scale	Anxiety Intrusive thoughts	F = 3.86* F= 3.24*	High
Ashing & Rosales USA	RCT	Int: 100 Comp: 99	Psychoeducational intervention	20 item CES-D	Depression	Int: 25.4 ± 17.2*** Comp:14.8 ± 14.1* (CI: -5.75 to -0.282)*	High
Charlson et al. USA	Pre & post group evaluation	Int: 46	Contemplative self-healing intervention	The Impact of Events Scale General Functional Assessment of Cancer Therapy Scale + Breast Cancer Subscale FACIT Spirituality Scale	Quality of life Spirituality Breast Cancer Specific QoL	4.6 ± 10.9* +1.4±1.0 +4.8± 12.8	High
Cho et al. Asia	Non randomised & comparative	Int: 28 Comp: 27	Psychoeducational intervention & peer support	18-item Psychosocial Adjustment Scale 27-item Quality of Life Scale	Psychosocial adjustment Quality of life	Int: 49.1 ± 52.1*** Comp: 50.3 ± 4.73 Int: 6.2 ± 7.0 ** Comp: 6.4 ± 6.3	Moderate
Christensen USA	RCT	Int: 10 Comp: 10	Couples counselling	Locke- Wallace Martial Adjustment Test Sexual Satisfaction Scale Beck Depression Inventory Rosenberg Self-Esteem Scale Spielberger State/Trait Anxiety Inventory (STAI)	Martial happiness Sexual functioning Depression Self-esteem Anxiety	Int: 106.15 Comp:99.6 Int: 80.41 Comp: 69.04 F=33.92* Int: 98.18 Comp: 12.02 F=7.53* Int: 17.5 Comp:17.8 Int: 39.9 Comp:40.5	Moderate
Classen et al. USA	RCT	Int: 178 Comp:179	Supportive–expressive group therapy	The Profile of Mood States Questionnaire The Hospital Anxiety and Depression Scale Yale Social Support Index	Mood Anxiety Depression Social support	Int: 13.69 F=4.7* Comp: 9.05 F=6.5*** Int: F=5.4* Comp: F=6.3** Int:F=5.2* Comp: F=5.3* Int:F=6.0* Comp: 5.4*	High
Coleman et al. USA	RCT	Int: 54 Comp: 52	Psychoeducational intervention & social support	Profile of Mood States The visual Analogue Scale–Worry The Relationship Change Scale The 20-item University of California, Los Angeles, Loneliness Scale–Version 3	Mood Cancer-Related worry Relationships Loneliness	NS NS NS NS	High

Collie et al. USA	Pre & post group evaluation	Int: 27	Support groups	The Centre for Epidemiologic Studies Depression Scale The Cancer Behaviour Inventory Courtauld Emotional Control Scale	Depression Emotional expression Self-efficacy	t=2.44* d=0.51 t=0.44 t=0.71	Moderate
Dow Meneses et al. USA	RCT	Int: 125 Comp: 131	Psychoeducational intervention	Quality of Life-Breast Cancer Survivors	Quality of life	Int: -1.687 Comp:-2.909***	High
Esplen et al. USA	RCT	Int: 128 Comp: 65	Support groups	Body Image Scale Objectified Body Consciousness Scale Mental Adjustment to Cancer Scale Female Sexual Function Index Social Support Survey Functional Assessment of Cancer Therapy – Breast	Body image Body stigma Sexual functioning Quality of life	Int:18.3 ± 15.3 Comp:18.5 ± 17.3* Int: 37.5 ± 34.3 Comp: 37.5 ± 37.4*** Int:13.5 ± 15.2 Comp: 12.1 ± 12.7 Int: 91.2 ± 94.8 Comp: 89.8 ± 92.4	High
Fadaei et al. Iran	RCT	Int: 32 Comp: 40	Cognitive behavioural therapy	The body Image Scale (BIS)	Body image	Int:16.97 ±9.03 Comp:15.95 ± 17.18 t=-6.07***	Moderate
Fobair et al. USA	Single cohort pre & post evaluation	Int: 20	Supportive–expressive group therapy	The Impact of Event Scale The Profile of Mood States The Hospital Anxiety and Depression Scale The Mini-Mental Adjustment to Cancer The Body Image and Sexuality Scale for Women With Breast Cancer The Family Relations Index The Social Network and Support Assessment The Medical Interaction Scale of the Cancer Rehabilitation Evaluation System The Impact of Illness on Your Life questionnaire Structured Insomnia Interview	Mood Anxiety Depression Coping Body image Relationships Social support Impact of illness on life Sleep	t=-2.43* t=-2.52* t=-3.11** t=-3.57** t=0.71 t=-2.78** t=-2.42* t=-1.62 t=2.27*	High
Gunn et al. Australia	Pre & post group evaluation	Int: 44	Support groups	Profile of Mood States The Coopersmith Self-esteem Inventory The Duke UNC Functional Social Support Questionnaire	Distress Self-esteem Social support	t=3.44*** t=-0.55 t=0.77	Moderate
Hoffman et al. UK	RCT	Int: 103 Comp: 111	Mindfulness based stress reduction	Profile of Mood States Functional Assessment of Cancer Therapy–Breast WHO Five-Item Wellbeing Questionnaire	Mood Quality of life Well-being	(CI:-21.02 to -4.81)*** (CI:4.16 to 10.68)*** (CI:1.16 to 3.15)***	High

Jones et al. Canada	RCT	Int: 216 Comp: 226	Psychoeducational intervention	Knowledge Questionnaire Perceived Preparedness for Re-entry Scale Self Efficacy for Managing Chronic Disease Profile of Mood States Health Distress Scale	Knowledge Perceived preparedness Self-efficacy Mood Distress	0.718 (CI:0.418 to 1.017)*** 0.409 (CI: 0.273 to 0.545)*** -0.221 (CI:-0.510 to 0.068) 0.859 (CI-2.398 to 4.116) 0.114 CI-0.035 to 0.262)	High
Kalaitzi et al. Greece	RCT	Int: 20 Comp: 20	Psychosexual intervention	Speilberger's State Trait Anxiety Inventory (STAI) Centre for Epidemiological Studies- Depression Scale (CES-D) Questionnaire Assessing Sexuality and Body Image	Depression Anxiety	int: p<0.001*** Comp: p<0.236 int: p<0.006** Comp: p<0.645	Moderate
Kimman et al. Netherlands	RCT	Int: 149 Comp: 150	Psychoeducational intervention	The European Organisation for Research and Treatment of Cancer (EORTC QLQ- 30) measure State-Trait Anxiety Inventory	Quality of life Anxiety	NS NS	High
Kionberg et al. Sweden	Non randomised controlled study	Int: 50 Comp: 46	Psychoeducational intervention	The Functional Assessment of Cancer Therapy General Scale (FACT-G) Sense of Coherence Scale	Wellbeing Sense of coherence	NS NS	High
Lengacher et al. USA	RCT	Int: 41 Comp: 43	Mindfulness based stress reduction	30-item Concerns about Recurrence Scale The State-Trait Anxiety Inventory Epidemiological Studies depression Scale 6-item Life Orientation Test 10-item Perceived Stress Scale 19-items Medical Outcomes Social Support Survey	Fear of recurrence Anxiety Depression Optimism Perceived stress Social support	Int:9.3 Comp:11.6** Int:28.3 Comp:33.0* Int:6.3 Comp:9.6* Int: 46.7 Comp: 44.9 Int: 12.6 Comp:14.4 Int: 12.4 Comp: 12.8	High
Manos et al. Spain	Non randomised controlled study	Int:94 Comp:94	Psychoeducational intervention & cognitive behavioural therapy & social support	The European Organisation for Research and Treatment of Cancer (EORTC QLQ- 30) measure Mental Adjustment to Cancer scale.	Quality of life Anxious preoccupation Fighting spirit Optimism	F=25.173** F=16.036** F=55.345** F=18.413**	Moderate
Marchioro et al. Italy	RCT	Int: 18 Comp: 18	Cognitive behavioural therapy	Functional Living Index Cancer The Beck Depression Inventory	Quality of life Depression	Int: 41.17 Comp: 60.28*** Int: 4.83 Comp:8.17***	Moderate
Marcus et al. USA	RCT	Int: 152 Comp: 152	Counselling	Impact of Event Scale Centre for Epidemiologic Studies Depression Scale The Sexual Dysfunction scale	Distress Depression Sexual functioning	p=0.29 r=0.24 p=0.48 r=0.23 p=0.04 r=0.23*	High

Montazeri et al. Iran	Single cohort pre & post evaluation	Int: 56	Support groups	The Hospital Anxiety and Depression Scale	Anxiety Depression	t=2.21* t=2.75**	Moderate
Qui et al. China	RCT	Int: 31 Comp: 31	Cognitive behavioural therapy	17 item Hamilton Depression Rating Scale Self- Rating Anxiety Scale Functional Assessment of Cancer Therapy- Breast Self-Esteem Scale (SES)	Depression Anxiety Self-esteem Quality of life	Int: 7.51 Comp: 14.35 (ES=1.51)*** Int: 37.74 Comp: 43.10 (ES=0.66) Int:28.42 Comp: 27.00 (ES=0.63)* Int: 97.17 Comp: 89.85 (ES=0.53) **	High
Sandgren et al. USA	RCT	Int: 24 Comp: 29	Cognitive behavioural therapy	Coping Response Indices-Revised Profile of Mood States	Distress Coping cognitive Coping behavioural Coping avoidant Anxiety Mood	Int: 8.2 Comp: 7.4 F=4.48* Int:28.9 Comp: 26.7 Int: 31.5 Comp:20.8 Int:11.2 Comp:12.0 Int: 2.9 Comp: 3.6 F=6.29* Int: 2.0 Comp: 3.0 F=3.15*	High
Savard et al. Canada	RCT	Int: 27 Comp: 30	Cognitive behavioural therapy	Insomnia Severity Index Hospital Anxiety and Depression Scale The European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire	Sleep Anxiety Depression Quality of life	F=11.70*** F=5.19* F=4.14* F=5.69*	High
Sharif et al. Iran	RCT	Int: 49 Comp: 50	Psychoeducational intervention	The European Organisation for Research and Treatment of Cancer (EORTC QLQ-30) measure	Quality of life	Int: 80.0 Comp: 61.66***	High
Stanton et al. USA	RCT	Int:143 Comp: 136	Psychoeducational intervention	Four Item Short Form Vitality Subscale Revised Impact of Events Scale The Centre for Epidemiologic Studies Depression Scale Post-traumatic Growth Inventory Perceived preparedness for re-entry	Vitality Distress Depression Post-traumatic growth Perceived preparedness	Educ: 7.36 Comp: 6.60 Educ: -0.07 Comp:-0.08 Educ: -0.68 Comp: -1.79 Educ: 5.44 Comp:2.43 B=3.73 (CI:0.95 to 6.52) t=2.64**	High
Watson et al. UK	Pre & post group evaluation	Int: NR Comp: NR	Counselling	Profile of Mood States Spielberger State-Trait Anxiety Inventory	Mood Anxiety	Int: t=2.98* Comp:t=2.3* Int: 0.5 Comp:4.5	Moderate
Wojtyna et al. Poland	Pre & post group evaluation	Int: 35 Comp:32	Cognitive behavioural therapy	European Organisation for Research and Treatment of Cancer Questionnaire R. Cibor's Self Esteem Scale	Quality of life Self-esteem	Int: 64.76 Comp:54.86 f=6.33* Int: 27.06 Comp:32.91 f=4.46*	Moderate
Zhou et al. China	RCT	Int: 85 Comp:85	Music therapy & progressive muscle relaxation training	Zung self-rating depression Scale State Anxiety Inventory	Depression Anxiety	38.29 ± 32.65 F=6.91** 53.98 ± 41.06 F=5.46*	High
p<0.05*	p<0.01**	p<0.001***	Bold= primary study outcomes				

4.6 Continued Systematic Review Results

This review comprised of 32 psychosocial interventions with eight studies utilising cognitive behavioural therapy interventions (Antoni et al. 2001, Antoni et al. 2009, Fadaei et al. 2011, Marchioro et al. 1996, Sandgren et al. 2000, Savard et al. 2005, Qiu et al. 2013, Wojtyna, Życińska and Stawiarska 2007), seven psychoeducational interventions (Ashing and Rosales 2014, Dow Meneses et al. 2007, Jones et al. 2013, Kimman et al. 2011, Koinberg et al. 2006, Sharif et al. 2010, Stanton et al. 2005), four support groups (Collie et al. 2007, Esplen et al. 2013, Gunn et al. 2006, Montazeri et al. 2000), three counselling interventions (Christensen 1983, Marcus et al. 2010, Watson 1989), two mindfulness based stress reduction interventions (Hoffman et al. 2012, Lengacher et al. 2009), two supportive–expressive group therapy interventions (Classen et al. 2008, Fobair et al. 2002), one psychosexual intervention (Kalaitzi et al. 2007), one music therapy and progressive muscle relaxation training (Zhou et al. 2015) and one contemplative self-healing intervention (Charlson et al. 2005). The review also included two studies which combined psychoeducational interventions and peer and social support interventions (Cho, Yoo and Kim 2006, Coleman et al. 2005), and one intervention which combined cognitive behavioural therapy, social support and psychoeducational elements (Manos et al. 2009). Twenty-five interventions were delivered in-person, six were delivered via telephone and one 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. The total number of participants across all studies included in this review was 4,148. Twenty-nine of 32 studies reported significant treatment effects in one or more examined outcomes.

Anxiety: Thirteen studies reported a significant reduction in anxiety following the intervention (Antoni et al. 2009, Classen et al. 2008, Fobair et al. 2002, Kalaitzi et al. 2007, Lengacher et al. 2009, Montazeri et al. 2000, Savard et al. 2009, Zhou et al. 2015). Whilst, two studies demonstrated significant effects with cognitive behavioural therapy on anxiety (Antoni et al. 2009, Savard et al. 2009), two studies reported no significant effects with cognitive behavioural therapy (Qiu et al. 2013, Sandgren et al. 2000). Counselling interventions also failed to demonstrate significant treatment effects on anxiety (Christensen 1983, Marcus et al. 2010, Watson et al. 1989), and Kimman and colleagues (2011) also reported no significant treatment effects of a telephone educational intervention on anxiety.

Depression: Thirteen studies reported a significant reduction in depression across a range of interventions including cognitive behavioural therapy (Antoni et al. 2001, Marchioro et al. 1996, Qiu et al. 2013, Savard et al. 2005), psycho-educational intervention (Ashing and Rosales 2014), counselling (Christensen 1983), supportive–expressive group therapy (Classen et al. 2008, Fobair et al. 2002), videoconferencing support groups (Collie et al. 2007), psychosexual intervention (Esplen et al. 2007), mindfulness based stress reduction (Lengacher et al. 2009), support groups (Montazeri et al. 2000), and music therapy & progressive muscle relaxation training (Zhou et al. 2015). No significant treatment effect was reported for telephone counselling (Marcus et al. 2010) or psycho-education with peer modelling on depression (Stanton et al. 2005).

Quality of life: Thirteen studies reported improved quality of life across a range of interventions including, contemplative self-healing intervention (Charlson et al. 2005), psychoeducational interventions (Dow Meneses et al. 2007), mindfulness based stress reduction (Hoffman et al. 2012), cognitive behavioural therapy (Marchioro et al. 1996, Savard et al. 2005, Qiu et al. 2013), counselling (Watson et al. 1989), a psychoeducational intervention (Sharif et al. 2010), and combined interventions utilising psychoeducational, cognitive behavioural therapy and social support (Manos et al. 2009), and a psychoeducational and peer support intervention (Cho, Yoo and Kim 2006). Support groups (Esplen et al. 2013), and two psychoeducational interventions (Kimman et al. 2011 and Koinberg et al. 2006), reported no significant treatment effects on quality of life.

Mood disturbance: Five studies reported a significant improvement in mood with supportive–expressive group therapy (Classen et al. 2008, Fobair et al. 2002), mindfulness based stress reduction (Hoffman et al. 2012), telephone cognitive behavioural therapy (Sandgren et al. 2000), and counselling (Watson et al. 1989). In contrast, two psychoeducational interventions reported no significant treatment effect on mood disturbance (Coleman et al. 2005, Jones et al. 2013).

Distress: Three studies reported a significant improvement in distress after cognitive behavioural therapy (Antoni et al. 2001), a support group intervention (Gunn et al. 2006), and a relaxation intervention (Fadaei et al. 2011). In contrast, two psycho-educational interventions (Jones et al. 2013, Stanton et al. 2005) and a telephone counselling intervention (Marcus et al. 2010) reported no significant treatment effects. A psychoeducational intervention reported an increase in distress post intervention (Jones et al. 2013).

Body image: Two studies reported significant treatment effects with cognitive behavioural therapy (Fadaei et al. 2011) and support groups (Esplen et al. 2013). In contrast, no significant treatment effect on body image was observed for supportive expressive group therapy (Fobair et al. 2002).

Sleep disturbance: Two studies reported improved sleep utilising supportive expressive group therapy (Fobair et al. 2002), and cognitive behavioural therapy (Savard et al. 2005). One study reported a reduction in sleep disturbance was associated with decreased anxiety, depression and improved quality of life (Dow Meneses et al. 2007).

Self-esteem: Group cognitive behavioural therapy reported a significant improvement in self-esteem (Qiu et al. 2013, Wojtyna, Życińska and Stawiarska 2007). In contrast, studies utilising support groups (Gunn et al. 2006) and couple counselling (Christensen 1983) reported no significant treatment effects for self-esteem.

Sexual functioning: Two studies reported significant improvements in sexual dysfunction through counselling (Christensen 1983, Marcus et al. 2010). Marcus and colleagues

(2010) reported virtually no change from baseline, suggesting that this source of psychosocial morbidity may be especially resistant to improvement in the absence of intervention (Marcus

et al. 2010). However, no significant treatment effects were reported for support groups and sexual functioning (Esplen et al. 2013).

4.7 Meta-Analysis Results

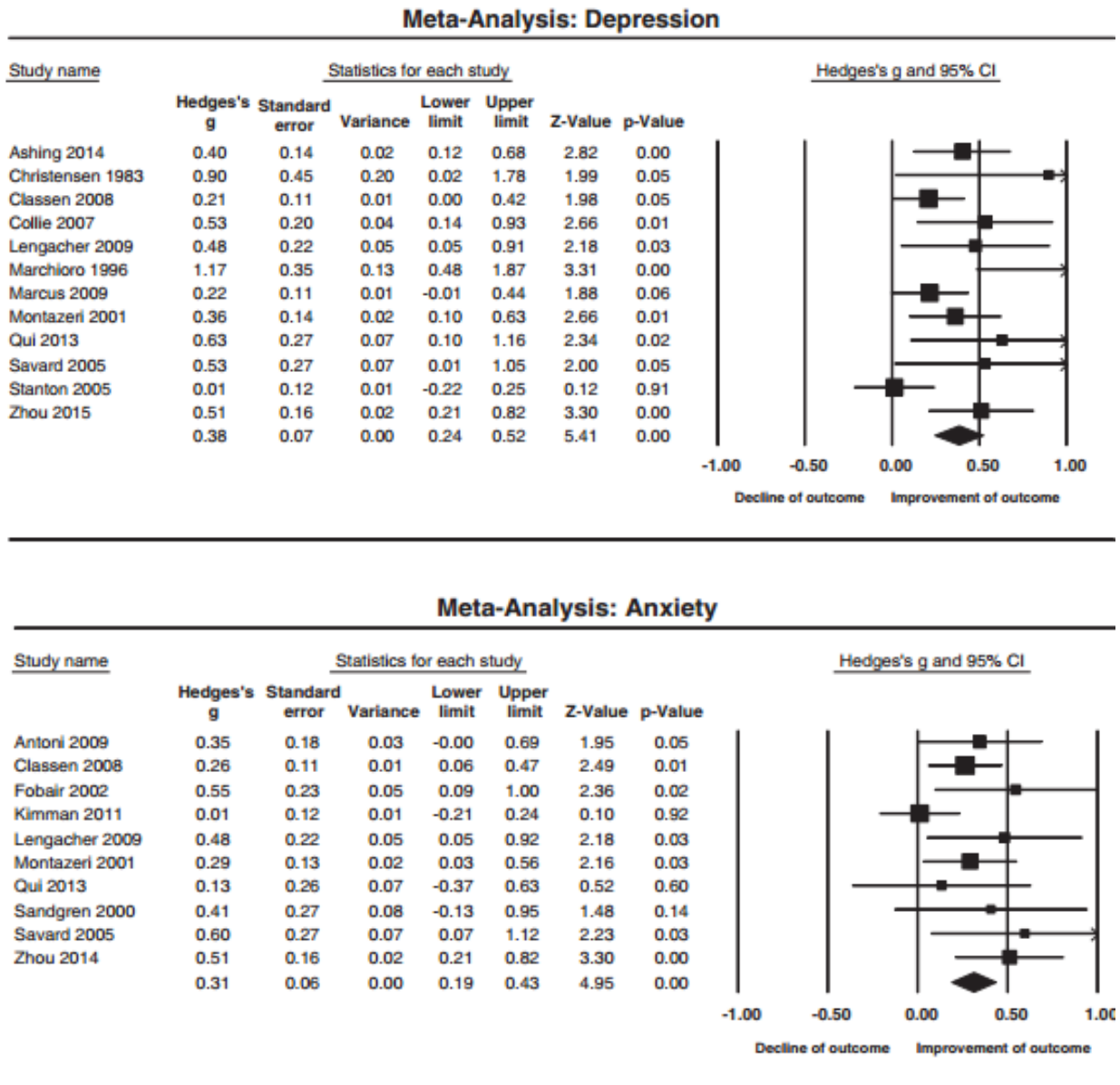
Table 2. Mean Effect Sizes for Psychosocial Outcomes for Review Studies

<i>Psychosocial Outcome</i>	<i>k</i>	<i>Effect size (g)</i>	<i>95% CI</i>	<i>p-value</i>	<i>Heterogeneity</i>	<i>Fail-safe N</i>
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

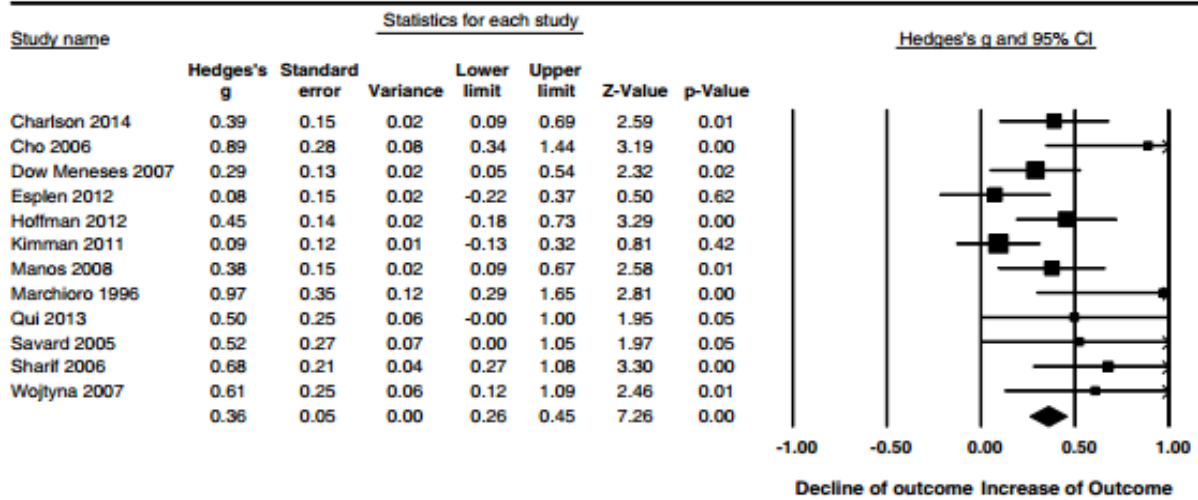
Forest plots displaying the weighted average effect sizes for each psychosocial outcome are displayed in Figure 2. Meta-regression indicated that the number of sessions within an intervention was not a significant moderator of depression ($k=10; B=0.006; P=0.49$), or quality of life ($k=11; B=-0.016; P=0.08$). However, the number of sessions was a significant moderator for anxiety ($k=9; B=0.015; P=0.04$), with the greater number of sessions resulting in a greater reduction in anxiety. In regards 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. 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 in order to assess the robustness of the overall effect for each outcome. Orwin's fail-safe N indicated 198 non-significant studies for depression, 81

for anxiety and 189 for quality of life would be required to render the efficacy of the interventions trivial. Orwin's fail-safe N analyses for all outcomes are displayed in Table 2.

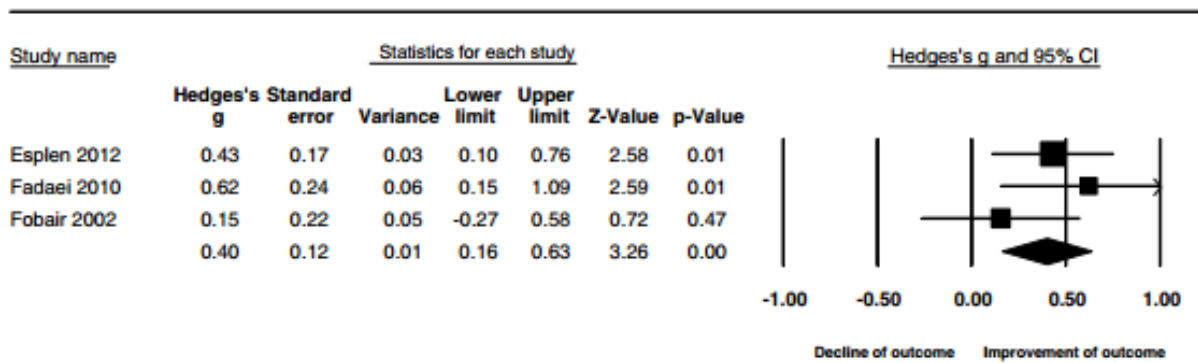
Figure 2. Forest Plots displaying the Weighted Average Effect Sizes for Psychosocial Outcomes



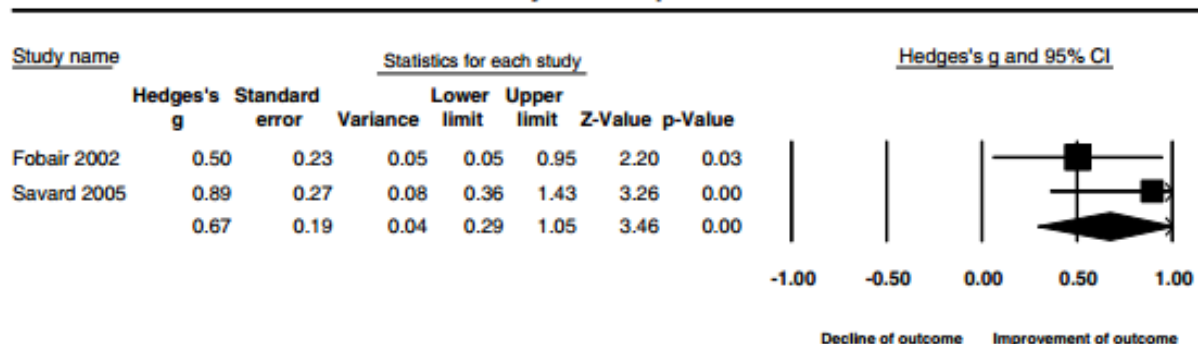
Meta-Analysis: Quality of Life



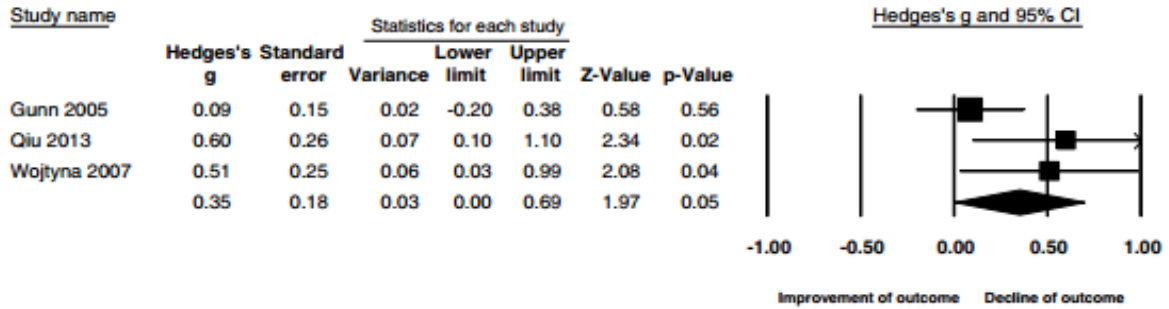
Meta-Analysis: Body Image



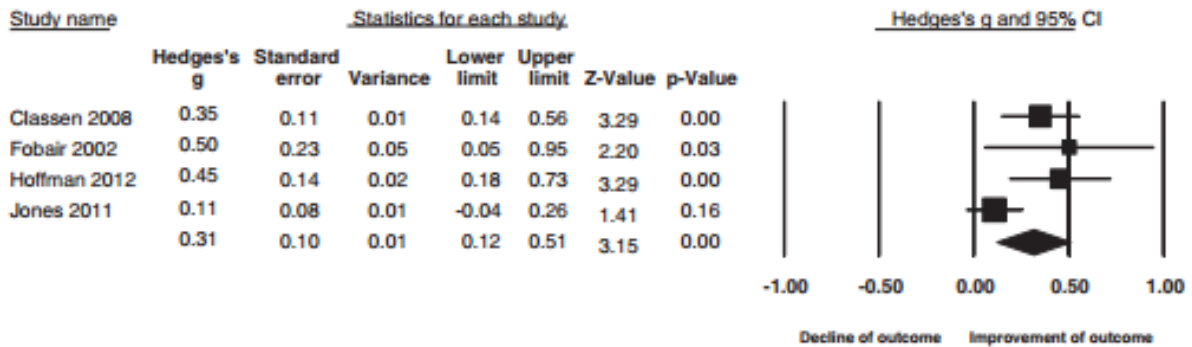
Meta-Analysis: Sleep disturbance



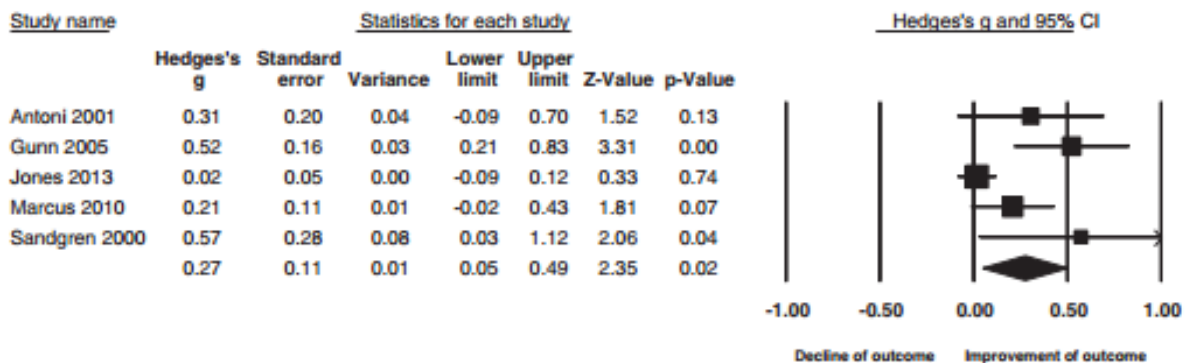
Meta-Analysis: Self-esteem



Meta-Analysis: Mood disturbance



Meta-Analysis: Distress



4.8 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 following surgical treatment. The meta-analysis demonstrated small effect sizes on eight 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 to experience anxiety and depression (Kydd, Reid and Adams 2010), and the widely recognised impact of anxiety and depression on quality of life (Ganz et al. 2003). Moreover, cognitive behavioural therapy was the most common intervention for both anxiety and depression often reporting significant treatment effects (Antoni et al. 2001, Antoni et al. 2009, Marchioro et al. 1996, Qiu et al. 2013, Savard et al. 2005). This meta-analysis provides clear evidence for the efficacy of cognitive behavioural therapy in improving outcomes in relation to anxiety (Antoni et al. 2009, Esplen et al. 2013, Montazeri et al. 2000, Sandgren et al. 2000), depression (Antoni et al. 2001, Esplen et al. 2013, Marchioro et al. 1996, Qiu et al. 2013) and quality of life (Marchioro et al. 1996, Qiu et al. 2013, Savard et al. 2005, Wojtyna, Życińska and Stawiarska 2007). 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, nor the timing of the intervention or who delivered the intervention as a large proportion of the studies did not report significant details of the interventions. This should be addressed in future research in order to develop effective evidence based interventions to enhance breast cancer care following surgical treatment.

Previous literature indicates cognitive behavioural therapy reduces fatigue (Gielissen, Verhagen and Bleijenberg 2007), insomnia (Ritterband et al. 2012), improves physical activity and quality of life (Armes et al. 2007) following breast cancer. The efficacy of cognitive behavioural therapy has also been demonstrated with adult cancer survivors, with the authors reporting large effect sizes ($g=1.99$) on anxiety, depression and quality of life, based on four studies (Osborn, Demoncada and Feuerstein 2006). Moreover, the efficacy of cognitive behavioural therapy has also been reported with breast cancer patients on anxiety, depression, and quality of life (Naaman et al. 2009). Furthermore, research suggests cognitive behavioural therapy may be effective at all stages of the breast cancer trajectory (Eccles et al. 2013). The findings of this meta-analysis are conservative yet consistent with previous literature. To our knowledge, 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 has predominately focused on anxiety, depression and quality of life (Osborn, Demoncada and Feuerstein 2006), and whilst 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 time 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 intervention would be most effective and 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 behavioural therapy improving outcomes in relation to anxiety, depression and quality of life.

Limitations

The quality of both the systematic review and meta-analysis is dependent on the quality of studies analysed. One review suggests the more rigorous the review the less likely it is to conclude there is evidence psychosocial interventions in oncology are effective (Lepore and Coyne 2006). Consequently, the design of the studies included must be considered. Whilst, the majority of studies utilised a randomised controlled trial study design, a number of studies employed a pre and post-test design. Therefore, in relation to the studies which employed a pre and post-test design the findings may be attributed to changes which occurred independently to the intervention, for example increased support from family members may improve psychosocial wellbeing. A number of studies acknowledge an absence in randomisation and/or the process of randomisation did not result in equity between groups. Therefore, further evidence with randomised 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, the 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, there is a possibility of reporting small effect sizes for secondary outcomes. Four studies were excluded because the published data were not suitable for meta-analysis and the required data could not be obtained from the authors (Coleman et al. 2005, Kalaitzi et al. 2007, Koinberg et al. 2006, Watson et al. 1989).

The studies included in this meta-analysis also present a number of limitations. The majority of the studies recruited a sample of highly educated, middle class white women who may be more likely to be motivated to participate in health research. Furthermore, three studies (Ashing & Rosales 2014, Classen et al. 2008, Qiu et al. 2013) utilised samples with clinically depressed and highly distressed participants, and another study included women experiencing chronic insomnia (Savard et al. 2005). 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 (Goodwin et al. 2001). 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 generalisability from small sample sizes ($n < 50$) and were therefore, were underpowered to evaluate changes in the multiple outcomes that were measured (Charlson et al. 2005, Christensen 1983, Collie et al. 2007, Fobair et al.

2002, Gunn et al. 2006, Kalaitzi et al. 2007, Marchioro et al. 1996). Notably, studies with low statistical power have a reduced chance of detecting a true effect (Button et al. 2013).

A number of studies also reported limited generalizability from single centre trials, and due to the use of a single highly trained therapist within the interventions. Furthermore, many of the interventions included multiple components and subsequently on occasions it was not possible to determine which component an improvement is attributable too. As Czaja and colleagues (2003) 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 overtime (Button et al. 2013). For example a reduction in the number of GP visits, may result in overall cost-effectiveness of an intervention (Badr and Krebs 2013). We recommend future investigators to consider the cost-effectiveness of interventions, particularly considering different modes of administration (i.e. in-person or over the phone) in order 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 behaviour therapy in improving outcomes in relation to anxiety, depression and quality of life. Future research priorities should focus on strengthening studies both conceptually and methodologically, in order to meaningfully pool data to determine which intervention components are required to enhance breast cancer survivorship. At present, robust conclusions cannot be determined surrounding 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 behavioural therapy on anxiety, depression and quality of life following breast cancer surgery.

4.9 Conclusion

This chapter evaluated the efficacy of interventions following breast cancer surgery and found clear evidence for the efficacy of cognitive behavioural therapy in promoting improvements in anxiety, depression, and quality of life. This is of significant importance given the potential for widespread integration of evidenced-based psychosocial interventions in clinical cancer care. The following two chapters consider psychosocial outcomes in relation to breast reconstruction using quantitative and qualitative methodology.