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Cognitive-behavioural stress management enhances adjustment in women with breast cancer

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Objective. This randomized controlled trial examines whether a briefer cognitive-behavioural (CBT) stress management intervention than the norm can reduce stress and distress and enhance benefit finding in women with breast cancer. It further aims to identify characteristics of those women most likely to benefit from the intervention.

Design and method. A randomized controlled trial was conducted to assess the efficacy of a psychological intervention. Women ($N = 355$) who had undergone surgery for breast cancer 4 months earlier, the majority of whom were currently undergoing adjuvant therapy, completed questionnaires assessing global and cancer-specific stress, depression, anxiety, optimism and benefit finding. They were randomly assigned to a 5-week group cognitive-behavioural stress management (CBSM) programme plus standard care or standard care only. Reassessment occurred post-intervention and 12 months later.

Results. Analyses of variance revealed that patients who received the intervention showed significant lowering of global stress and anxiety and increased benefit finding compared to controls. These differences, however, were not maintained at 12 months. Effects of the intervention were moderated by stress such that women with high global stress at baseline showed greater reduction in both stress and anxiety.

Conclusions. A CBSM intervention, which was briefer than the norm (5 weeks vs. 9–20 weeks), had beneficial effects on adjustment for women with breast cancer and was particularly effective for those with increased global stress. Screening on this basis may facilitate optimal and cost-effective psychological treatment.

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Statement of Contribution

What is already known on this subject? Diverse psychological interventions have been utilized to enhance adjustment in women with breast cancer. Cognitive-behavioural therapy has been identified as the most promising intervention and has demonstrated short-term reductions in anxiety depression and quality of life. The findings from longitudinal studies are mixed, so more studies are needed which assess the durability of effects. Previous CBT interventions with women with breast cancer during the adjuvant treatment phase have ranged from 9 to 20 weeks which is both time and resource intensive.

What does this study add? This is a longitudinal randomized control trial with introduction of a CBT intervention conducted over a shorter period than previous interventions in the adjuvant treatment phase. The shorter intervention did enhance adjustment post-intervention, but differences were not sustained at 12 months. In this study, positive and negative adjustments are assessed, and only two other CBT intervention studies have included positive outcomes. In this study, consecutive patients from a clinic are recruited versus selection through diverse methods as in other key studies of CBSM interventions. This is the only study to assess initial global stress as a moderator of the effects of a CBT intervention and women with high initial global stress did better in the intervention. A scale measuring this could be a useful screening tool to identify women in need of psychological intervention, thereby contributing to more cost-effective health care.

Diagnosis and treatment of primary breast cancer in women present a series of challenges often resulting in stress, emotional distress, difficulty in adjustment and decreased social interactions (e.g., Classen *et al.*, 2008; Vos, Visser, Garssen, Duivenvoorden & de Haes, 2006). Considerable data suggest that depression and anxiety are the most commonly studied mood disorders, but that the rates of depression vary (10–20%) as reported in a review by Fann *et al.* (2008). Another study suggests, however, that the number of patients with depression or anxiety is closer to 50% in the first year (Burgess *et al.*, 2005), and a recent study reported that 35% still experience increased distress at 5-year follow-up (Hopwood, Sump, Mills, Haviland & Bliss, 2010). Although underlying methodological differences in the studies may contribute to these diverse findings, it is undisputed that a significant minority of women experience serious adjustment problems after the treatment for breast cancer (Sollner, Maislinger, Konig, Devries & Lukas, 2004).

Psychological interventions have been designed to ameliorate this distress. They range from Supportive-Expressive groups (e.g., Spiegel, Bloom, Kraemer & Gottheil, 1989; Classen *et al.*, 2008) through Cognitive-Behavioural programmes (CBT) (e.g., Antoni *et al.*, 2001; Antoni, Lechner *et al.*, 2006; Savard, Simard, Ivers & Morin, 2005) to Education/Information groups (Helgeson, Snyder & Seltman, 2004; Stanton *et al.*, 2005).

A myriad of trials have tested the efficacy of psychological interventions on adjustment and quality of life with various cancer groups, but findings are mixed with both systematic and meta-analytic reviews reporting conflicting conclusions. Some report beneficial effects of psychosocial treatment (Meyer & Mark, 1995; Rehse & Pukrop, 2003), while others report that they are ineffective in reducing distress in patients with cancer (Lepore & Coyne, 2006; Newell, Sanson-Fisher & Savolainen, 2002).

CBT is the most frequently used approach in studying the effects of psychological intervention in adjustment to cancer (Jassim, Whitford & Grey, 2010; Moyer, Sohl, Knapp-Oliver & Schneider, 2009; Redd, Montgomery & DuHammel, 2001), and its value has been demonstrated in reducing distress with diverse cancer populations (Mundy,

DuHamel & Montgomery, 2003). Tatrow and Montgomery (2006) have highlighted that CBT is particularly beneficial for breast cancer patients with respect to their short-term effects on depression, anxiety and quality of life.

A systematic review of women with non-metastatic breast cancer (Fors *et al.*, 2011) reported on seven good-quality randomized control trials (RCTs) utilizing CBT. With the exception of Kissane *et al.* (2003), six of the trials demonstrated improvements in emotional distress and/or quality of life (Antoni, Lechner *et al.*, 2006; Cohen & Fried, 2007; Dirksen & Epstein, 2008; Edelman, Bell & Kidman, 1999; Savard *et al.*, 2005; Simpson, Carlson & Beck, 2002). Further evidence comes from an important psychosocial RCT trial that included elements of CBT (Andersen, Shelby & Golden-Kreutz, 2007; Andersen *et al.*, 2004) which reported reduced anxiety, improved social support and health outcomes.

While these results are encouraging, it is recommended that further research with well-designed CBT trials in breast cancer is needed (Fors *et al.*, 2011). As the interventions during the adjuvant treatment phase utilized to date have ranged from 9 to 20 weeks, there is a high investment in time for women, and a significant financial burden on service providers, it is important to ascertain whether a briefer CBT programme would be as effective and therefore more amenable to a real-world setting.

While lowering stress has been identified as the main goal for intervention trials (Andersen, 2002; Andersen *et al.*, 2004), few studies report on reduction in stress levels. Exceptions are Antoni *et al.* (2001) and Antoni, Wimberly *et al.* (2006) who tested the effect of an intervention on cancer-specific stress and Cohen and Fried (2007) who assessed the effect on global stress but used only a single-item measure. The importance of appropriate stress measures in future studies is also underscored by a finding that global stress is related to adjustment in breast cancer (Golden-Kreutz *et al.*, 2005).

While negative sequelae such as distress have regularly been reported in women with breast cancer, increasingly there is a focus on identifying positive outcomes from the experience. Antoni *et al.* (2001) and Antoni, Lechner *et al.* (2006) showed that a 10-week group-based cognitive-behavioural stress management (CBSM) intervention enhanced positive outcomes including benefit finding, which lasted up to 12 months. These studies are noteworthy as longitudinal investigations of positive sequelae of CBT interventions are in a minority. Patients in these studies were, however, accrued through diverse methods (e.g., letter from American Cancer Society or physician or through flyers). As few CBT interventions to date have included benefit finding, further research with consecutive patients attending for treatment is desirable.

Also, stress management interventions may not be effective or necessary for all patients, and so, it is essential to identify subgroups of participants who benefit most.

A meta-analysis by Schneider *et al.* (2010) showed that pre-intervention distress significantly moderated effects with the most distressed participants showing better adjustment. Other studies have shown that interventions may be differentially effective depending on baseline differences in optimism (Antoni *et al.*, 2001), social support (Helgeson, Cohen, Schultz & Yasko, 2000) and cancer-specific stress (Andersen *et al.*, 2004). Identification of the women most in need of intervention remains an ongoing research and health care issue (e.g., Jassim *et al.*, 2010; Tamagawa, Garland, Vaska & Carlson, 2012). It is of note that the most recently published high-quality RCTs in breast cancer (Fors *et al.*, 2011) emanated from the United States, Australia, Israel and Canada. This CBT trial set in a European context offers comparative data in this domain.

Aim

The current RCT tests the efficacy of a 5-week (3 hr per week) CBSM intervention (briefer than the norm of 9–20 weeks) on adjustment in women with primary breast cancer recruited from a clinic setting with follow-up at 12 months. The study further aims to identify the characteristics of those women most likely to benefit from the intervention.

Hypotheses

We hypothesize that stress, anxiety and depression (primary outcomes) would be reduced and that benefit finding would increase (secondary outcome).

We further hypothesize that women who are high on stress and low on optimism would receive the greatest benefit from this CBSM intervention.

Method

Participants and procedure

The study protocol was approved by the University Hospital Ethics Committee.

Consecutive women presenting at a Breast Symptomatic Centre in a University-affiliated hospital were eligible to participate. All women referred by physicians for breast cancer diagnosis in the West of Ireland attend this Breast Symptomatic Centre.

Inclusion criteria were women with a first diagnosis of cancer having undergone surgery. Exclusion criteria were prior cancer diagnosis, prior psychiatric treatment for a serious disorder (e.g., clinical depression), other major co-existing disease conditions (e.g., diabetes, coronary heart disease), 75 years or older, diagnosis of intellectual disability and lack of literacy skills. Eligible women were given an information leaflet by breast care nurses in the clinic inviting them to participate in a study examining the psychological impact of diagnosis and treatment of breast cancer. It also informed them that patients would be selected randomly to attend a series of sessions on managing the stress of the illness. Those who agreed to take part provided informed written consent.

Patients were accrued over a 4-year period. A total of 949 patients attended the centre during that time. Figure 1 illustrates the flow of participants through the study. All information in that diagram is consistent with Consolidated Standards of Reporting Trials criteria (Altmann *et al.*, 2001).

Applying the exclusion criteria, 613 patients were eligible and were invited to participate. Of these, 355 (61.3%) completed a pre-surgery assessment within a semi-structured interview at the hospital by members of the research team (mean time = 40 min, range 30–50 min).

Following this, participants were randomized based on a random number-generated list to the intervention or control conditions. Sequentially numbered envelopes were used to conceal allocation. These patients were contacted 4 months later by mail, and of those contacted, 123 controls and 118 in the intervention group completed the pre-intervention phase assessment (67.8%). The remainder did not wish to continue in the study.

Assessments were also conducted for both groups post-intervention and 12 months later (thus study duration was 5 years). One reminder letter was sent to participants who did not return their questionnaires. Intervention and control retention from accrual to 12 months were comparable across conditions, 49.1% and 51.6%, respectively (for those

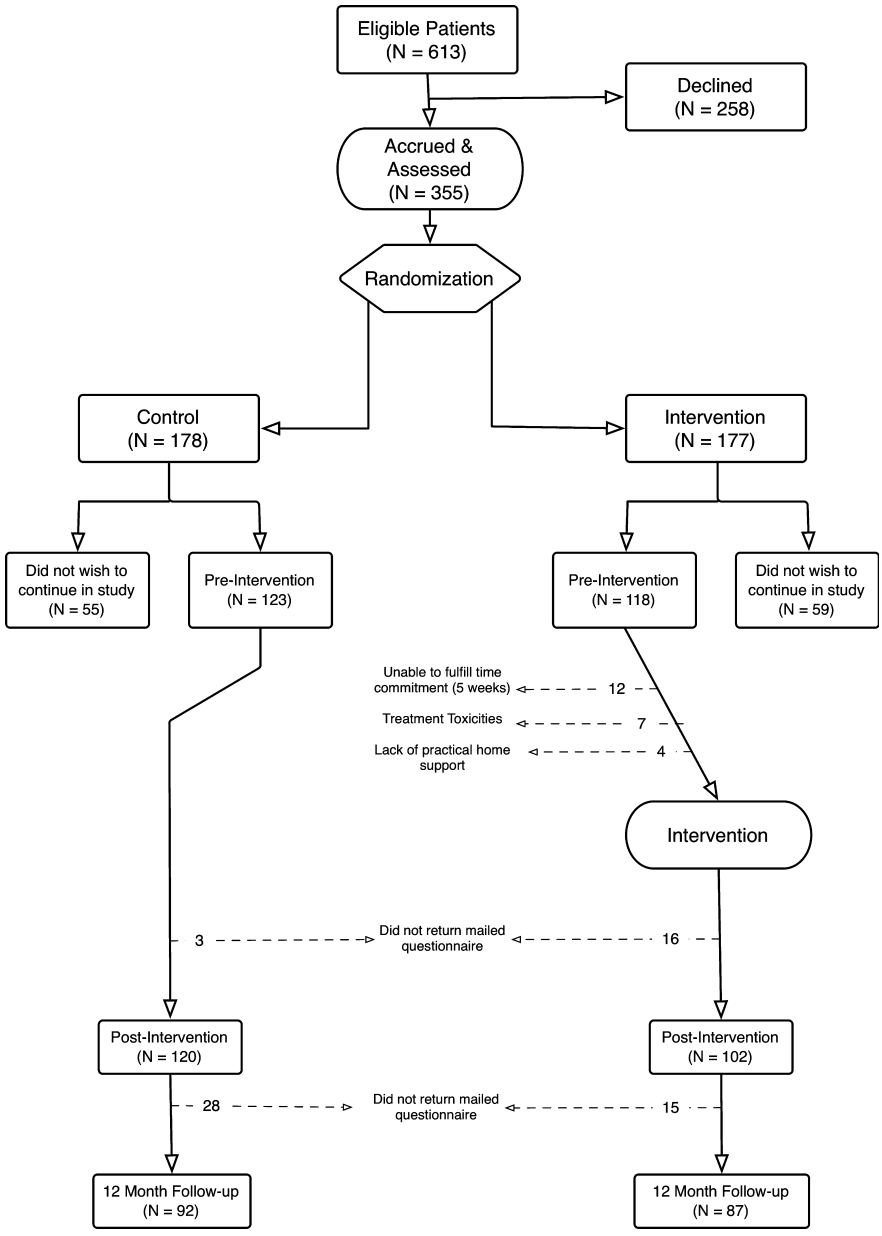

Figure 1. Experimental design and flow of participants through the study.

who agreed to continue in the study at pre-intervention phase, retention was 73.7% for intervention and 74.8% for control).

Attrition

At each time point, that is, from initial accrual to 12-month follow-up, the attrition groups were compared to participants and no differences were found on demographic, disease or psychological study variables (all *p*s > .05). Specifically, women who did and did not

complete (n = 179 and 176, respectively) the study showed no differences at baseline (all ps > .17). Those who did not wish to continue in the study after randomization (n = 114) did not differ to those who returned a pre-intervention assessment (n = 241) on any variables at baseline (all ps > .18).

Of participants who were randomized to the intervention arm, those who did not wish to continue (n = 59) did not differ from those who returned the pre-intervention assessment (n = 118) (all ps > .22). This pattern of findings was replicated in the control arm (all ps > .09).

Those who did not return a mailed questionnaire at post-intervention (n = 19) or at 12 months (n = 43) did not differ to those who completed the study (n = 179) on any variables at any time point (all ps > .15).

Data were analysed according to intention to treat; thus, the findings include data from 23 (19.5%) of the intervention patients who did not participate but remained in the trial.

To achieve 80% power for a 2 × 3 ANOVA design with an effect size of 0.10, the required sample size is 164 women (Cohen, 1992).

Intervention

The structured manualized intervention was based on Antoni's (2003) CBSM programme. This well-structured and effective intervention aims to manage daily stressors and enhance coping resources focusing on cancer and treatment-related issues. A key focus, in comparison with other CBT interventions, is provision of relaxation training at every session with daily home practice to address the physiological, cognitive and emotional aspects of stress. The current intervention maintained this focus while completing 8 of the 10 sessions on stress management, fatigue reduction, adaptive coping, through relaxation training, guided imagery and cognitive restructuring (it did not incorporate the anger management and assertion training sessions). The current intervention designed with a shorter time frame (5 weeks × 3 hr vs. 10 weeks × 2 hr) emphasized the stress and coping elements of the Antoni (2003) programme. Women were provided with relaxation audiotapes (created by the facilitator), resource manuals and a diary in which they were asked to keep a record of experiences and feelings throughout the intervention. Each week they were given homework assignments related to the session topic (e.g., identifying daily stressors and appropriate coping strategies). The women met on the university campus, in groups of 8–12 for 3 hr per week for 5 weeks. The group was facilitated by an experienced clinical psychologist. To achieve reliability, this trial utilized the same facilitator throughout and used a session-by-session manual for the eight intervention cohorts.

The catchment area for the Breast Symptomatic Centre extends along the western seaboard of Ireland with many women travelling long distances to attend the Centre, which made recruitment to this trial challenging. To offset this, women who were randomized to the intervention were offered transport and/or overnight hotel accommodation by the study co-coordinator and a quarter of participants availed of this during the intervention. Compliance with the intervention was excellent with 95% of patients completing 4 of the 5 sessions. The control group received standard care, which included advice and support from oncology nurses at the Breast Symptomatic Centre.

Measures

The Perceived Stress Scale (PSS; Cohen, Kamarck & Mermelstein, 1983) is based on the Lazarus (1996) concept of appraisal and was designed to tap the degree to which

respondents find their lives unpredictable, uncontrollable and overloaded. It is a 14-item scale that refers to events occurring within a 1-month time frame. Respondents are asked to indicate how often they thought or felt a certain way on a 5-point Likert scale from 0 'never' to 4 'very often'. Scores can range from 0 to 56, with higher scores indicating more perceived stress. Cronbach's alpha coefficient was .82 in the current study.

The Impact of Events Scale (IES; Horowitz, Wilner & Alvarez, 1979) is a 15-item self-report measure of stress-related intrusive thoughts, denial of thoughts and avoidant behaviours. The intrusion subscale (seven items) measures the extent to which one has unwanted thoughts and images related to a life stressor (in this case the words your diagnosis and treatments were used). The avoidance subscale (eight items) assesses the extent to which respondents consciously take action to distract themselves in order to avoid thinking about a situation. Participants rated each item as experienced in the previous week by using a 4-point Likert scale: 0 (not at all), 1 (rarely), 3 (sometimes) and 5 (often). Higher scores (0–75) indicate higher levels of cancer-related stress. In the present sample, coefficient alpha reliability was .90.

Life Orientation Test (LOT; Scheier & Carver, 1987). Optimism was assessed with the LOT, which consists of 12 items (eight assessing optimism and four filler items). Each item is answered on a scale that ranges from 1 'I agree a lot' to 5 'I disagree a lot'. Some items are phrased positively (I enjoy my friends a lot), and some are phrased negatively (I rarely count on good things happening to me) and are reversed scored. High scores indicate high optimism. In the present sample, coefficient alpha reliability was .77.

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a 14-item scale with seven items measuring anxiety and seven depression. Respondents indicate their level of agreement with statements on a 4-point scale from 0 (e.g., most of the time) to 3 (e.g., not at all). Scores range from 0 to 21 for each scale, and higher scores indicate greater levels of anxiety or depression. Internal consistency coefficients demonstrated in the present study were 0.89 for anxiety and 0.85 for depression.

The Silver Lining Questionnaire (SLQ; Sodergren & Hyland, 2000) is a 38-item measure, which is described as a generic scale of positivity (Sodergren, Hyland, Singh & Sewell, 2002). Respondents rate items (e.g., my illness made me more mature; my illness strengthened my relationships with others) on a 5-point scale from 'strongly agree (5), 'agree' (4), 'not sure' (3), 'disagree' (2), to 'strongly disagree' (1). A bi-modal scoring system is used with 'strongly agree' and 'agree' coded as '1' and other choices as '0'. The total score reflects the number of items agreed with by the patient and ranges between 0 (agreement with no items) and 38 (agreement at some level with all the items). A high score corresponds to high positivity. In the present study, coefficient alpha reliability was .93.

Data analyses

Independent *t*-tests and chi-square tests of independence were used to assess the differences in demographic, medical and psychological variables between the attrition and follow-up groups and between control and intervention groups. To assess the need to incorporate theoretically relevant covariates (e.g., age and disease stage have been associated with psychological adaptation in breast cancer) (Baider *et al.*, 2003; McCaul *et al.*, 1999), Pearson's and point biserial correlations were used to examine the relationships between the demographic, medical and psychological variables.

Analyses of variance were conducted on the outcome variables. Data that were missing due to attrition were found to be missing not at random [Little's Missing Completely At Random (MCAR) $p < .05$]. Thus, complete case analysis was employed, such that

participants who did not return assessments at all three time points were removed from the analysis. For those participants included in the analysis (N = 179), missing values varied from 1% to 5% across the variables. Using Little's MCAR test (p > .05), data were found to be missing completely at random, and therefore, the expectation maximization algorithm was used to substitute missing values at each time point (Little, 1988).

The effect of primary interest was the two-way interaction with group (intervention or control) as the between-subjects factor and time (pre-intervention, post-intervention and 12 months) as the within-subjects factor. A mixed three-factor repeated-measures ANOVA was used with group and initial stress (low or high defined by a PSS median split) as the between-subjects factors and time as the within-subjects factor. A mixed three-factor ANOVA was used with group and initial optimism (low or high defined by a LOT median split) as the between-subjects factors and time as the within-subjects factor. These 4 three-way interactions tested whether the effectiveness of the intervention in reducing stress and distress was greater among patients with initially higher global stress or lower levels of optimism.

Results

Participants, the vast majority of whom were Caucasian, had a mean age of 53.7 years (SD = 10.2). Mean age for intervention group was 53.30 (SD = 9.86), and mean age for controls was 54.10 (SD = 10.62). Frequencies of medical variables by group are presented in Table 1, and the means and standard deviations of psychological study variables by group are presented in Table 2.

To assess the need to incorporate covariates into the main analyses, the intervention and control groups were compared with each other on age and medical variables (stage of disease, type of surgery and type of adjuvant treatment) and no differences emerged (all ps > .05). When age and medical variables were correlated with the five dependent variables, no significant correlations were observed (all ps > .05). Before conducting the

Table 1. Frequencies of medical variables by condition

	Control (%)	Intervention (%)	χ^2
Type of treatment			0.30
Surgery only	13.0	14.9	
Chemotherapy	15.2	15.9	
Radiotherapy	43.5	40.2	
Both	28.3	28.7	
Type of surgery			0.08
Mastectomy	37.0	37.9	
Excision (WL/WG/CS)	63.0	62.1	
Stage of disease			0.35
Unknown	1.1	3.4	
0	5.4	10.3	
I	25.0	28.7	
II (A, B)	58.7	40.0	
III (A, B, C)	7.7	17.1	
IV	2.2	0.5	

Note. All ps > .20, N = 179, Control n = 92, Intervention n = 87.
WL, wide local excision; WG, wire-guided excision; CS, central sector excision.

Table 2. Means and standard deviations of outcome variables by time and group

	Pre-intervention		Post-intervention		12-month follow-up		Group × time		Group	Time	
Outcome	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2, 354)	η^2	*F*(1, 177)	*F*(2, 354)	η^2
Stress											
PSS											
Intervention	21.58	8.42	19.58	6.72	20.77	7.54					
Control	19.82	7.84	20.75	8.05	20.65	8.11	3.87*	0.02	0.01	0.69	
IES (total)											
Intervention	24.34	15.95	19.55	13.67	18.51	17.88					
Control	19.00	16.62	19.27	16.07	15.72	14.95	1.94		0.82	0.51	
Distress (HADS)											
Anxiety											
Intervention	6.32	3.76	5.13	3.33	5.77	3.71					
Control	5.40	3.77	5.82	3.76	5.33	3.32	6.05**	0.03	0.23	1.45	
Depression											
Intervention	3.56	2.82	3.36	2.77	3.38	3.06					
Control	3.66	3.39	3.60	3.13	3.50	2.88	0.07		0.17	0.34	
Benefit Finding (SLQ)											
Intervention	17.18	8.55	21.49	8.54	21.13	9.87					
Control	17.45	10.33	17.00	9.85	19.80	11.45	8.10***	0.04	2.03	13.99***	0.07

Note. $N = 179$, control $n = 92$, intervention $n = 87$.
HADS, Hospital Anxiety and Depression Scale; IES, Impact of Events Scale; PSS, Perceived Stress Scale; SLQ, Silver Lining Questionnaire.
*$p < .05$, **$p < .01$, ***$p < .001$.

main analyses, the intervention and control groups were compared on the five dependent variables. The groups differed significantly on only one such variable, with the intervention group scoring higher on baseline total cancer-specific stress (IES) than controls, $t(177) = -2.19$, $p = .03$. Thus, a 2 × 2 ANCOVA controlling for baseline IES scores was conducted when assessing the effects of the intervention on cancer-specific stress.

Global stress

A mixed ANOVA with a Greenhouse–Geisser correction [$X^2(3) = 8.95$, $p < .05$] demonstrated that there was a significant interaction effect for group x time on global perceived stress [$F(1.91, 337.29) = 3.87$, $p = .02$, $\eta^2 = 0.02$]. Inspection of means in Table 2 shows that reports of global stress were lower for the intervention group than for controls at post-intervention, but this difference between groups had faded at 12-month follow-up. Examination of means, however, shows that the intervention group did not return to baseline stress levels.

Cancer-specific stress

After controlling for observed baseline differences in the IES, the interaction between group and time for cancer-specific stress was not significant [$F(1, 176) = 1.94$, $p > .05$].

Anxiety

A mixed ANOVA with a Greenhouse–Geisser correction [$X^2(3) = 9.25$, $p < .05$, $\varepsilon = 0.95$] demonstrated that there was a significant interaction effect for group × time on the HADS Anxiety scale [$F(1.90, 336.76) = 6.05$, $p = .003$, $\eta^2 = 0.03$]. Inspection of means in Table 2 shows that the intervention group reported significantly greater decreases in anxiety immediately post-intervention, but did not differ from controls at 12-month follow-up.

Depression

There was no significant group × time interaction for HADS depression [$F(2, 354) = 0.07$, $p = .937$].

Benefit finding

This group × time interaction effect for benefit finding using the SLQ was significant [$F(2, 354) = 8.10$, $p = .000$]. Inspection of means in Table 2 shows that women in the intervention reported significantly higher levels of benefit finding post-intervention as compared to the control group. The control group did not differ pre- to post-intervention, but their benefit finding increased significantly by 12-month follow-up almost reaching the same level as women in the intervention.

Moderator analyses

Stress

A significant three-way interaction was found such that global stress decreased more in the intervention arm than in the control arm for participants with high initial global stress [*F*

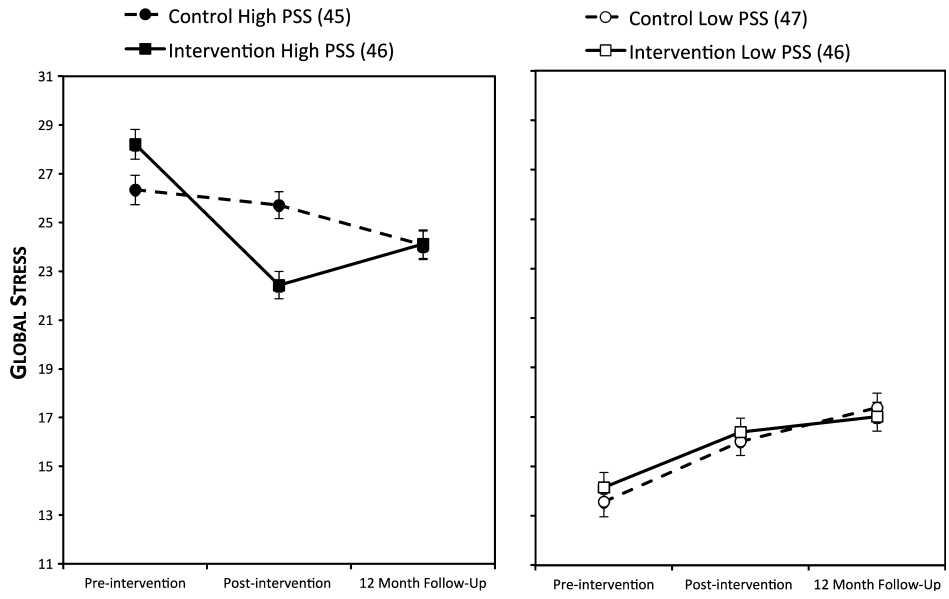

Figure 2. Global stress among patients with breast cancer in the intervention and control conditions, among participants who were high in initial stress (Perceived Stress Scale; left panel) and low in initial stress (right panel). Stress was reported at pre-intervention, post-intervention and at 12-month follow-up. Group Ns are in parentheses.

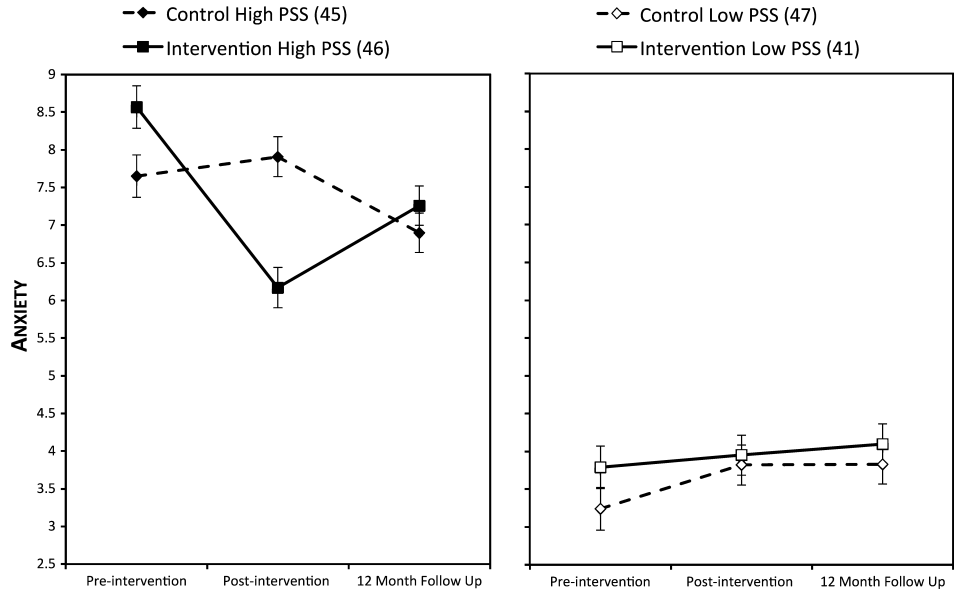

Figure 3. Anxiety among patients with breast cancer in the intervention and control conditions, among participants who had high initial stress (Perceived Stress Scale; left panel) and low initial stress (right panel). Anxiety was reported at pre-intervention, post-intervention and 12-month follow-up. Group Ns are in parentheses.

(1.90, 332.95) = 3.62, $p = .03$, $\eta^2 = 0.02$]. Inspection of Figure 2 shows that these differences were found at post-intervention, but not at 12-month follow-up. Stress levels of intervention participants, however, did not return to baseline level.

Anxiety

A significant three-way interaction was found such that anxiety decreased more in the intervention arm than in the control arm for participants with initial high global stress [F (1.89, 331.11) = 3.39, $p = .04$, $\eta^2 = 0.02$]. Inspection of Figure 3 shows that these differences were found post-intervention, but not at 12-month follow-up.

Optimism

There was no significant interaction for global stress in women with high and low initial optimism [$F(1.90, 342.00) = 1.25, p > .05$].

There was no significant interaction for anxiety in women with high and low initial optimism [$F(1.90, 342.44) = 1.66, p > .05$].

Discussion

This study provides clear evidence that a briefer than the norm group-based stress management intervention can produce significant improvements in adjustment in women undergoing treatment for non-metastatic breast cancer. Furthermore, it identifies the characteristics of those women for whom the intervention is most effective.

The intervention significantly reduced perceived global stress (primary outcome) post-treatment in a group of women with moderate stress levels. Differences with controls were not found at 12 months, but the intervention group, however, were still showing improvement from baseline.

Cohen and Fried (2007) also found that cognitive-behavioural therapy reduced global perceived stress post-intervention, but this effect did not hold up at a 4-month follow-up. The current study, with a larger sample and using a psychometrically robust scale, concurs with this finding. Reduction in global stress following a brief CBT intervention is an important finding.

Its inclusion in future interventions is recommended given that regression studies also show that global stress is implicated in psychological adjustment in women with breast cancer (Golden-Kreutz *et al.*, 2005; Groarke, Curtis & Kerin, 2011). Moreover, further evidence demonstrates that psychosocial stress can lower immune response (Andersen, Farrar *et al.*, 2007) and has a potential role in the aetiology of breast cancer tumour aggressiveness (Rauscher, Umaima & Warnecke, 2011). So early management of global stress may be pivotal.

There are only three studies to our knowledge that have included cancer-specific stress as an outcome in breast cancer interventions and the findings are inconclusive. The current study found no effect for the intervention on cancer-specific stress (primary outcome), which concurs with Antoni *et al.* (2001) in a sample of patients with breast cancer, who similar to the women in this study reported moderate levels of cancer-specific stress. Interestingly, however, a later study reported a reduction in cancer-specific stress post-intervention and at 12-month follow-up, but this sample had a higher mean stress score at study entry (Antoni, Wimberly *et al.*, 2006).

Antoni, Wimberly *et al.* (2006) posit that beneficial effects of CBSM depend partly on there being sufficient stress levels for change to occur. This may explain the lack of intervention effects on cancer-specific stress in the present study.

This study found no impact on depression (primary outcome) post-intervention or at follow-up similar to CBT studies with non-metastatic breast cancer patients by Edelman *et al.* (1999) and Kissane *et al.* (2003). Our findings contrast with others (Antoni *et al.*, 2001; Savard *et al.*, 2005) who showed immediate reduction in depression, but this was not maintained over time. A review of studies across diverse cancers (Williams & Dale, 2006) noted that benefits of CBT were somewhat more evident in studies where the outcome was a reduction in clinically significant depression using a categorical measure (e.g., Antoni *et al.*, 2001) rather than a continuous one as in the current study. It is of note that the women in this investigation reported a low rather than a high mean level of depression. Findings for the short-term effects of CBT interventions on depression in women with breast cancer thus remain mixed.

In this study, anxiety (primary outcome) was significantly reduced following the intervention, but not at 12-month follow-up. Other RCT studies showed similar reductions post-intervention, but in contrast to the present study did show stability at 4-month follow-up (Andersen *et al.*, 2004; Cohen & Fried, 2007), while others did not show a downward trajectory in anxiety levels at any time point (Antoni *et al.*, 2001; Kissane *et al.*, 2003). The only RCT in women with early breast cancer to demonstrate a reduction in anxiety at 12 months introduced a maintenance phase of 12 hr over that period of time (Andersen *et al.*, 2007). Anxiety is a key emotion for some women facing the uncertainty of treatment and prognosis. It is therefore encouraging that a 5-week stress management programme can have a beneficial impact on this distress. The mean level of anxiety in the present sample was not high concurring with evidence that only a significant minority experience serious adjustment problems (Andrykowski, Lykins & Floyd, 2008; Sollner *et al.*, 2004). Therefore, not all women with breast cancer require psychological intervention. To facilitate optimal and cost-effective health care, it is important to identify those most in need (King, Ahn, Atienza & Kraemer, 2008). The current study identified that the benefits of a brief CBT stress management intervention are more salient for women who reported high global stress at study entry.

Those participants who had higher global stress pre-intervention showed the greatest reduction in both perceived global stress and anxiety post-intervention. This replicates a similar finding where pre-intervention cancer-specific stress moderated reduction in anxiety (Andersen *et al.*, 2004). No previous study has examined the moderating role of global stress on intervention outcome, and this finding together with one showing that global stress was a powerful predictor of adjustment (Groarke *et al.*, 2011) demonstrates its potential role in screening women at risk for poor adaptation. The PSS, a short psychometrically robust instrument, could easily and with little financial cost be incorporated into routine clinical practice for this purpose.

In the current study, optimism did not moderate the effect of the intervention on stress or anxiety. The latter finding on mood is similar to previous research (Antoni *et al.*, 2001), but in that study optimism moderated benefit finding.

A growing literature demonstrates that despite the adversity associated with cancer diagnosis, treatment and survivorship, benefit may also be found in this experience (e.g., Lelorain, Bonnaud-Antignac & Florin, 2010; Tomich & Helgeson, 2004). This is one of the few intervention studies to include benefit finding (secondary outcome), and the results confirm that an intervention can enhance this aspect of the experience of breast cancer.

The intervention group maintained improved levels of benefit finding at 12 months. The control group, however, improved to an equivalent level at that time.

Several theoretical models, ranging from social-cognitive to biological-evolutionary, offer explanations for the occurrence of post-traumatic growth (Christopher, 2004; Linley & Joseph, 2004; Taylor, 1983; Tedeschi & Calhoun, 1995, 2004). They are, however, complementary in that the main thrust of explanation focuses on people's intrinsic motivation towards growth. It is possible that the control group when faced with a diagnosis of breast cancer engaged in this search for meaning and so reported benefit 12 months post-diagnosis. While this intervention was not designed explicitly with benefit finding in mind, it is interesting that it accelerated this phenomenon. This concurs with the findings by Antoni *et al.* (2001) who showed an increase in benefit finding in the post-intervention phase, but not at 9-month follow-up. In a later study, with a larger and more distressed sample, however, they found significant effects in favour of an intervention group at 12 months (Antoni, Lechner *et al.*, 2006). These are the only studies in breast cancer to date to test a CBT intervention on benefit finding and give further impetus to including positive as well as negative outcomes in psycho-oncology research. Future research should perhaps examine the extent to which finding benefit early in the cancer experience has a positive impact on other facets of psychological adaptation.

This may be of particular importance as studies conducted with cancer patients show associations between benefit finding and physiological systems relevant to physical health including decreases in cortisol (McGregor & Antoni, 2009) and improvement in T-cell proliferative response (Bower & Segerstrom, 2004).

Given this potential importance of benefit finding, identifying elements in the intervention which were critical to its effects is also of relevance. The supportive group dimension of the current intervention may have contributed to this outcome. Studies do suggest that talking about the experience with supportive others may facilitate processing of the event and subsequent benefit finding (Calhoun & Tedeschi, 1999; Cordova, Cunningham, Carlson & Andrykowski, 2001; Folkman & Greer, 2000; Lepore & Revenson, 2007).

Moreover, the diary keeping exercise throughout the intervention, which asked participants to write about their cancer experience, may have encouraged insights related to benefit finding. A number of expressive writing studies have shown that meaning was made through the process of writing (Owen *et al.*, 2005; Park, 2010; Smyth, Hockemeyer & Tullock, 2008), so the role of this writing process on benefit finding merits further investigation.

Overall, the present study showed that both intervention and control groups had comparable levels of adjustment at 12 months, suggesting that patients without intervention also gradually improved in adjustment over time. This is not surprising as there is evidence that the majority of women adapt well within a year of diagnosis (e.g., Ganz, Kwan, Stanton, Bower & Belin, 2011). The present study, however, clearly demonstrated that an intervention can accelerate adjustment (reduce stress, anxiety and enhance benefit finding) within 6 months particularly for those reporting initial high levels of stress. This is important, not only for the psychological well-being of patients but is also relevant in the light of findings suggesting links between psychosocial stress, benefit finding and physiological markers (Andersen, Farrar *et al.*, 2007; Bower & Segerstrom, 2004; McGregor & Antoni, 2009; Rauscher *et al.*, 2011).

A possible limitation of the study is that some of the women in the control group could have sought professional psychological help during the course of the study, but due to the paucity of services in the designated region, it is unlikely that many would

have had such services available. The response rate overall in the study was disappointing, but longitudinal studies of women with breast cancer face a number of challenges. Caution should be exercised when interpreting the results as listwise deletion in ANOVA may yield biased estimates in that those who completed the study may be different to those who failed to complete all assessments. However, comparisons revealed no significant differences in any of the study variables between those who completed the study and those who dropped out. We suggest therefore that this bias may have been reduced.

Despite these limitations, the findings of the study have important implications for adjustment in women with breast cancer. Completion of a shorter version of a well-designed published intervention did enhance adjustment within 6 months of diagnosis and was particularly effective for women with initial high global stress. This briefer intervention reduces time investment for women and financial burden for service providers, so the focus here on efficient delivery (how long and to whom?) is appropriate and timely for intervention research.

Conclusion

The study findings demonstrate reduction in global stress, distress and enhancement of benefit finding in women with breast cancer participating in a shorter CBSM intervention. The intervention did not, however, show stability of effects over time. This study further identified the characteristics of those women who showed the greatest decrease in stress and anxiety and emphasizes that perceived global stress is an important screening variable for referral to psychological intervention.

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