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# Coping Resources and the Effects of a Cognitive-Behavioral Stress Management Intervention Among Women at Different Points in Breast Cancer Treatment

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COPING RESOURCES AND THE EFFECTS OF A COGNITIVE-BEHAVIORAL  
STRESS MANAGEMENT INTERVENTION AMONG WOMEN AT DIFFERENT  
POINTS IN BREAST CANCER TREATMENT

By

Sara Vargas

A DISSERTATION

Submitted to the Faculty  
of the University of Miami  
in partial fulfillment of the requirements for  
the degree of Doctor of Philosophy

Coral Gables, Florida

December 2012

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Stress Management Intervention Among Women at Different  
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Breast cancer diagnosis and treatment constitute stressors that can lead to both temporary and long-lasting problems with psychosocial adaptation. The types of stressors and available coping resources may vary by point in cancer treatment (e.g., immediately after surgery versus months after the completion of adjuvant treatment). Cognitive-behavioral stress management (CBSM) is an intervention aimed to buffer against the negative effects of having breast cancer by enhancing protective factors that may facilitate psychosocial adaptation (i.e., use of relaxation, adaptive coping strategies, and social support). Two studies at the University of Miami have assessed the effects of a 10-week CBSM program among women with early-stage breast cancer: one study delivered CBSM in the weeks following surgical treatment (Coping and Recovery [C&R]; N=197) and the other study delivered CBSM in the months following completion of all surgical and adjuvant treatment (Coping After Treatment [CAT]; N=122). Both studies used randomized, controlled designs with a one-day psychoeducation seminar as the comparison group. For my doctoral dissertation, I have used these samples to examine whether point in treatment moderates intervention effects on coping resources (i.e., the proximal intervention outcomes) from pre- to post-intervention and in trajectories of change across four time points (pre-intervention, immediately post-intervention, and two follow-ups). Measures include selected subscales of the Measure of Current Status,

Sources of Social Support Scale, Brief COPE, Emotional Approach Coping Scale, Benefit Finding scale, Affect Balance Scale, and Sickness Impact Profile (i.e., social disruption). Missing data was examined and estimated using multiple imputation. Specific aims were tested using repeated measures analysis of covariance in SPSS software as well as multiple group latent-growth modeling in MPLUS software. A moderation effect by sample was found for cancer-related interference in recreations and pastimes using RMANCOVA analysis of changes from Time 1 to Time 2 such that there was less interference over time in the CAT sample and slightly more interference over time in the C&R sample. Time by condition effects on relaxation were replicated in this sample, and time by condition effects were also found for bonding with other breast cancer patients and benefit finding.

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## CHAPTER 1: INTRODUCTION

Breast cancer is the most common cancer among women in all racial and ethnic groups, and is one of the top leading causes of cancer deaths among women. In 2007, more than 200,000 US women were diagnosed with breast cancer, and more than 40,000 US women died from breast cancer (U.S. Cancer Statistics Working Group, 2010). For women with early-stage breast cancer (i.e., cancer that has not metastasized), treatment typically consists of surgical treatment (i.e., lumpectomy or mastectomy) with lymph node biopsy, as well as indicated adjuvant treatment (e.g., radiation or chemotherapy; Zujewski & Manrow, 2010).

Breast cancer diagnosis and treatment constitute stressors that can lead to both temporary and long-lasting problems with psychosocial adjustment. With current treatment advances, many women with early-stage breast cancer have a good prognosis. However, even for non-metastatic disease, cancer-related stressors may cause impairments in functioning, and the types of stressors breast cancer patients face will vary along the treatment continuum from initial diagnosis to survivorship (Fawzy, Fawzy, Hyun, & Wheeler, 1997). Studies have shown marked declines in psychosocial functioning in the months immediately following a breast cancer diagnosis, a time that includes surgical and/or adjuvant treatment (Caffo et al., 2003; Jenkins, 1992; Shimozuma, Ganz, Petersen, & Hirji, 1999). For many women, distress peaks during adjuvant treatment (e.g., chemotherapy or radiation) and then dissipates as she transitions into the post-treatment phase (Heim, Valach, and Schaffner, 1997). Other women do not return to pre-diagnosis levels of functioning and continue to experience declines in psychosocial adjustment years after the active treatment period (Montazeri et al., 2008).

In the post-treatment period, there may be ongoing cancer-related stressors, including fears of recurrence and uncertainty about the future, which are associated with higher distress (Waldrop, O'Connor, & Trabold, 2011). Mast (1998) found that fear of cancer recurrence is related to illness uncertainty and higher emotional distress among non-metastatic breast cancer patients one to six years after the end of treatment. In another study, breast cancer patients who were assessed 3-36 months after completion of chemotherapy reported lower quality of life compared with healthy controls (Broekel, Jacobsen, Balducci, Horton, & Lyman, 2000). There is also some evidence to suggest that standardized measures of distress may not fully capture the distress associated with a cancer diagnosis and, in some cases, distress may be even higher than reflected in self-report measures (Koopman et al., 2001).

As the literature has shown, distress may vary depending on the phase of cancer diagnosis and treatment (e.g., around the time of surgery versus once the patient enters into the post-treatment survivorship period; e.g., Stanton et al., 2005). At each phase, different demands are placed on the patient. For example, the patient will need to cope with treatment side effects during active treatment, but may need to enhance social support if and when social support from friends, family, and medical personnel is withdrawn as the patient enters the survivorship phase (Arnold, 1999 as cited in Stanton et al., 2005). Therefore, different types of risk and protective factors for future distress may be more or less salient depending on the phase of the cancer experience. It follows that certain components of psychosocial interventions for cancer patients may be more or less relevant depending on the phase of the cancer treatment, and that there may be more optimal times to deliver certain psychosocial interventions. Before presenting the specific

aims of the current analysis, and how I hoped to examine these hypotheses using previously collected data from women with non-metastatic cancer, I have included a discussion of 1) the phases of cancer treatment and how timing may matter in terms of psychosocial interventions, 2) risk and protective factors that may increase or decrease levels of psychosocial adaptation, and 3) aims and components of the current intervention of interest (cognitive-behavioral stress management; CBSM).

### **The Phases of Cancer Treatment**

The breast cancer experience is made up of phases that range from being at-risk for breast cancer to palliative care (as outlined in Ganz, 2000). At each phase along this continuum, different types of stressors may be most salient, and different types of coping resources may be the most beneficial for psychosocial adaptation. This begs the question: are there certain points during cancer treatment that provide better opportunities where we can address the most salient concerns and enhance psychosocial adaptation? Previous research suggests that timing of intervention delivery is worthy of investigation and gives us some suggestions for when this optimal time frame might be (Owen, Klapow, Hicken, & Tucker, 2011; Stull, Snyder, & Demark-Wahnefried, 2007).

Bloom and Kessler (1994) suggested that initiating psychosocial interventions in the first months after surgical treatment for cancer might help to prevent mood disturbances that sometimes occur during that period. Vos, Visser, Garssen, Duivenvoorden, & de Haes (2006) conducted a study to examine the effects of early versus delayed 12-week psychosocial intervention (group psychotherapy or a social support group) on 67 women with non-metastatic breast cancer for up to 6 months after the conclusion of the group treatments. In the early intervention condition, women began

to receive the intervention within 4 months after surgical treatment, while those in the delayed intervention condition started the intervention at least 3 months later or roughly 7 months after surgical treatment for cancer. Women showed lower distress, more positive body image, and greater involvement in recreational activities regardless of whether they were in the early or delayed intervention groups, but those who were delayed reported higher levels of distress at the 6-month post-intervention follow-up. Based on these findings, the authors concluded that offering psychosocial interventions (psychotherapy or group support) as soon as possible after surgical treatment may be preferable in order to prevent distress. This study had a relatively small N considering the 2 (type of intervention) by 2 (timing of intervention delivery) design, and the limited findings should be considered in this context. In addition, the authors point out that there was a relatively small difference in terms of the timing intervention initiation (4 months versus 7 months post-surgery) and suggested that future studies examine larger differences in the timing of intervention initiation using larger samples.

In another study, Edgar, Rosberger, and Nowlis (1992) compared early (i.e., immediately after diagnosis) versus a 4-month delayed delivery of a 5-week individual psychosocial intervention among 205 cancer patients. The intervention focused on problem-solving, goal setting, cognitive-reappraisal, relaxation training, and effective use of medical resources. Similar to Vos et al. (2006), participants assigned to both groups showed improvements in emotional well-being, but seemingly contrary to Vos et al. (2006) and Bloom and Kessler (1994), the results from this analysis found that a delayed intervention was preferable to earlier intervention. However, it is important to note the difference in timing relative to cancer treatment that was considered “early intervention”

in these studies. Vos et al. (2006) referred to “early intervention” as being initiated shortly after surgical treatment for cancer, while Edgar et al. (1992) delivered their intervention shortly after the cancer diagnosis. In fact, the 4-month “delayed” intervention that Edgar et al. (1992) recommended is likely to overlap with the “early” post-surgical intervention that Vos et al. (2006) recommended. However, Edgar et al. did not provide information about timing of surgery, so this is unclear.

So if you are not able to initiate psychosocial interventions with cancer patients shortly after their early treatment, is it worth offering such an intervention further into their treatment, or once they reach the post-treatment survivorship period? Demark-Wahnefried, Peterson, McBride, Lipkus, and Clipp (2000) mailed a questionnaire to 531 breast cancer survivors. Fifty-two percent of these women reported that they would be ‘very’ or ‘extremely’ interested in a healthy lifestyle intervention (e.g., fruit and vegetable consumption) either at or immediately after cancer diagnosis. These percentages fell as the time frame lengthened from diagnosis to intervention delivery: 3-6 months (21%), 7-11 months (9%), 1-2 years (7%), and more than 2 years (5%). However, 48% of the breast cancer survivors who completed the questionnaire said that they would be ‘very’ or ‘extremely’ interested in a lifestyle intervention at anytime. While this type of healthy lifestyle intervention may be perceived differently than a psychosocial intervention targeting social support or positive coping, it does indicate that women report interest in making life changes shortly after cancer diagnosis. Another limitation is the retrospective nature of the question, as some of the women may have been more reluctant to actually participate in such an intervention shortly after diagnosis due to sickness or competing demands on their time.

While there is some inconsistency in terms of what “early” and “delayed” intervention means, these studies taken together suggest that initiating a psychological intervention shortly after surgical treatment for breast cancer may be preferable to initiating such an intervention around the time of cancer diagnosis or after a 7-month post-surgical delay. It may be that patients are not physically or psychologically ready or able to engage in a psychosocial intervention shortly after receiving the cancer diagnosis, and that a more optimal time may involve waiting until they had had time to recover from surgical treatment. However, waiting until 7 months later may miss out on that teachable moment to affect change. Alternatively, given that women deal with different stressors at different points in cancer treatment, it may be that different types of interventions may be more or less effective at different phases along the cancer continuum. As Vos et al. (2006) pointed out, it is also unclear how cancer patients might respond to a psychosocial intervention that is delivered up to a year after the completion of treatment as these patients enter the post-treatment survivorship period.

### **Risk and Protective Factors for Psychosocial Adaptation**

While distress and reduced quality of life may be a reality for some women who undergo treatment for breast cancer, research has revealed some factors that may put a cancer patient at risk for future distress or might encourage future psychosocial adjustment. These risk or protective factors may include demographics (e.g., age and race/ethnicity; Hulbert-Williams, Neal, Morrison, Hood, & Wilkinson, 2011; Sohl et al., 2011), cancer-related variables (e.g., cancer stage and type of surgery; Sohl et al., 2011), and personality factors (e.g., pessimism; Sohl et al., 2011). Others include factors that are amenable to psychosocial intervention such as cognitive appraisal (Hulbert-Williams et



al., 2011) and perceived social support (Alferi, Carver, Antoni, Weiss, & Durán, 2001). One study examined multiple risk and protective factors for anxiety, depression, and quality of life in a group of mixed cancer patients (i.e., breast, colorectal, lung, and prostate; Hulbert-Williams et al., 2011). In this study, cognitive appraisals were significant predictors of the outcomes even after relevant demographic, cancer-related, and personality factors were controlled. The authors suggested that interventions focusing on cognitive restructuring and acceptance of distress might lead to improved psychosocial adjustment among patients coping with cancer diagnosis and treatment.

In the current study, I aimed to examine the effects of one specific intervention, cognitive-behavioral stress management (CBSM). CBSM not only targets cognitive restructuring and acceptance, but also targets other protective factors for psychosocial adaptation. These other factors include use of other adaptive coping strategies, relaxation training, and maintaining and enhancing social support networks (Antoni, 2003). The proximal goal of the intervention is to enhance these protective factors, with the long-term (i.e., distal) aim to facilitate better psychosocial adaptation (e.g., less reported negative affect) among medically ill patients. The literature is mixed regarding whether or not psychological interventions are effective in improving psychosocial adaptation (Andersen, 1992; Coyne, Lepore, & Palmer, 2006; Newell, Sanson-Fisher, & Savoleinen, 2002; Owen et al, 2001; Smedslund & Ringdal, 2004), but results from CBSM interventions in various medical populations have been promising (Antoni et al., 2001, 2006a, 2006b; Carrico et al., 2005). Before presenting the specific goals and components of the CBSM intervention, I will first present relevant studies that have established

training in relaxation, coping, and social skills as important proximal outcomes for psychosocial intervention studies with breast cancer patients.

**Relaxation Training.** The physiological effects of relaxation training on the body's stress response are well-documented. Studies have demonstrated that engaging in relaxation exercise is linked with lower cortisol levels (a marker of the body's stress response; Iglesias et al., 2012; McGrady, Woerner, Bernal, & Higgins, 1987), lower blood pressure (McGrady et al., 1987), and improved glucose tolerance among diabetics (Surwit & Feinglos, 1983). Relaxation training has also been linked with psychological outcomes such as lowered distress and anxiety (Baider, Uziely, & De-Nour, 1994; Iglesias et al., 2012).

Baider et al. (1994) found that a six-week intervention involving progressive muscle relaxation and guided imagery was associated with improvements in distress and coping among cancer patients in Israel. It should be noted that this study by Baider et al. (1994) did not include randomization or a control group; however, other studies with more sound methodologies have found similar results. For example, in a clinical trial of approximately 150 women with early-stage breast cancer, women were randomized into one of three six-week groups: muscle relaxation, muscle relaxation plus imagery, or a control (Bridge, Benson, Pietroni, & Priest, 1988). Women who were assigned to the two intervention groups had lower total mood disturbance than those in the control group immediately post-intervention. In addition, those in the muscle relaxation plus imagery reported feeling more relaxed than the muscle relaxation only group. In another clinical trial of alprazolam (an anxiolytic medication) versus progressive muscle relaxation, both were associated with significant reductions in symptoms of anxiety and depression

among a sample of mixed cancer patients who were on active cancer treatment (Holland et al., 1991). Those who were in the muscle relaxation group were trained in-session with a psychologist and provided with audiotapes for at-home practice.

In the context of the CBSM intervention, relaxation training has shown some evidence of association with intervention effects on psychosocial outcomes among breast cancer patients who are in the midst of treatment for breast cancer (i.e., a subset of those in the current analysis). Antoni et al. (2006a) found that CBSM intervention reduced self-reported social disruption and improved emotional well-being, positive states of mind, benefit finding, positive lifestyle change, and positive affect out to one year after the pre-intervention assessment. Those in CBSM also reported significant improvements in one's confidence in being able to relax at will, and this one subscale of the Measure of Current Status has been found to be associated with intervention-related changes in various psychosocial outcomes. This study by Antoni (2006a) examined changes in the relaxation subscale of the MOCS-A in a subset of the sample being used in this dissertation analysis. It is plausible that there would be a moderating effect of sample as a proxy for point in cancer treatment (i.e., post-surgery/pre-adjuvant treatment versus post-adjuvant), since relaxation training may be particularly effective for women as they manage treatment side effects such as pain or nausea occurring earlier in the treatment process (Luebbert, Dahme, & Hasenbring, 2001).

**Coping Strategies.** A number of different coping strategies have been related to psychosocial outcomes among breast cancer patients. Carver et al. (1993) prospectively examined whether specific coping strategies were associated with subsequent distress among 59 women with early-stage breast cancer. Initial interviews with demographic and

personality (e.g., coping) measures were conducted at diagnostic appointment with their doctor, and follow-ups assessing mood and coping were conducted the day before surgery, 7-10 days after surgery, and at 3-, 6- and 12- month medical follow-up appointments. Findings showed that coping strategies involving acceptance, humor, and positive reframing were associated with lower levels of distress, and acceptance and humor had prospective effects on less future distress at post-surgery and medical follow-ups, while denial and disengagement were associated prospectively with greater distress.

Stanton, Danoff-Burg, and Huggins (2002) also assessed coping and adjustment in the week before surgery for early-stage breast cancer and at 3- and 12-month follow-ups. They found that active acceptance coping at diagnosis was associated with greater adjustment over time while avoidance was associated with less distress at 3 month, but greater fear of recurrence at 1 year. Age was again used as a control, as younger women were more distressed at one year after surgery.

Epping-Jordan et al. (1999) prospectively examined optimism, coping, and distress among 80 breast cancer patients (stages 0 – IV). The initial assessment was conducted an average of 14 days pre-surgery and follow-ups were at 3 and 6 months after the first assessment. Pessimism was associated with greater distress, and was partially mediated by use of emotion-focused disengagement coping (i.e., self-criticism and social withdrawal), both at the time of diagnosis and at the follow-ups. Problem-focused coping was associated with less distress, while emotion-focused disengagement coping was associated with more distress at baseline and at 6 months, but not at the 3-month follow-up. The authors suggested that it is difficult to predict distress at approximately 3-months after diagnosis and/or surgery because the demands of adjuvant therapy may overwhelm

coping resources. These authors also suggested that women would benefit from psychosocial interventions that are implemented early in the cancer experience (i.e., closer to diagnosis) in order to facilitate adjustment.

In a post-treatment sample, Stanton et al. (2000) studied coping and distress among 92 early-stage breast cancer patients who were assessed within 20 weeks of the completion of cancer treatment (i.e., surgery or adjuvant treatment) and at 3-month follow-up. They found that emotional expression was associated with less distress, more vigor, and improved self-perceived health status. These analyses controlled for age (and initial levels of dependent variables) and reported use of other coping strategies. Interestingly, the use of emotional processing was associated with increased distress over time. The authors concluded that distress is reduced if emotional processing involves emotional expression, and not just ruminative thinking.

The Carver et al. (1993), Stanton et al. (2002), and Epping-Jordan et al. (1999) studies all assessed coping and psychosocial outcomes longitudinally starting right around the time of surgery and following participants in the subsequent treatment period, while the Stanton et al. (2000) study assessed coping and distress after the completion of cancer treatment. The first three studies examined and found significant effects of coping strategies such as acceptance, humor, positive reframing, denial and disengagement on distress, while the fourth study examined and found significant effects of emotional expression on subsequent distress. It is possible that these findings are entirely a result of selection of scales in each study. For example, had emotional expression been examined beginning at the time of surgery, perhaps there would be similar effects to those found in the post-treatment period. In this analysis, I aimed to explore this hypothesis, as well as

an alternative hypothesis that there is a moderating effect of time of treatment and that different coping strategies are associated with various psychosocial outcomes, depending upon the point in the cancer treatment.

**Social Support.** Numerous studies have found associations between social support and distress among breast cancer patients. In a correlational study with a convenience sample of 100 women with breast cancer, participants reported moderate levels of distress that were similar to those women newly diagnosed with no treatment and those who had just finished radiation therapy (Manning-Walsh, 2005). In addition, higher levels of personal support were associated with higher quality of life up to 24 months post-surgery and that personal support helped to buffer against the effects of distress on quality of life. The authors suggested that the need for support may last beyond adjuvant therapy; however, it is difficult to draw conclusions from this study due to methodological limitations.

In another study, Alferi et al. (2001) prospectively examined the relationships between distress and emotional and instrumental social support from various sources (i.e., spouse, family, friends) among Hispanic early-stage breast cancer patients. Women completed assessments before and after surgery, as well as at 3-, 6- and 12- month follow-ups. Emotional support from friends and instrumental support from a spouse before surgery were associated with lower levels of distress after surgery. Additionally, higher levels of patient distress were associated with less instrumental support from female family members at subsequent follow-ups. However, women who reported that cancer interfered with her social and recreational activities received increased social support from friends and family.

While these correlational and prospective studies suggest that adequate social support – particularly emotional support – is linked with lower levels of distress, supportive intervention studies have had mixed results. Helgeson and Cohen (1996) reviewed descriptive, correlational, and intervention studies examining the relationship between social support and distress. They found consistent evidence in descriptive and correlational studies for the importance of emotional support in distress-reduction, but were surprised by the lack of strong support for the efficacy of emotionally-supportive group interventions. The authors note that, among the studies they examined, the evidence was just as strong – or stronger – for educational group interventions aimed at providing informational support compared with the group discussion interventions aimed at providing emotional support. The authors suggested that group discussion interventions may actually reduce feelings of self-efficacy or may not be as effective in reducing distress as naturally occurring social support networks. The CBSM intervention in the current study differs from the purely discussion-based supportive interventions described above in that it combines both a supportive group environment and education in specific interpersonal skills aimed to empower the women to enhance their social networks. Therefore, it is important to see how the CBSM intervention affects women's social interactions within the peer group (i.e., fellow breast cancer patients in the intervention group) and their broader social network (i.e., family and friends).

As previously discussed, salient stressors may vary depending on whether a woman is about to undergo surgery for breast cancer, is in the midst of adjuvant treatment, or has completed all treatment and regular medical follow-ups (see Ganz, 2000). Therefore, women's needs for informational support, instrumental support, and

emotional support may differ depending on the point in cancer treatment. For example, women may have a high perceived need for informational support shortly after the cancer diagnosis as they are making treatment decisions, but a high perceived need for instrumental support (e.g., someone delivering meals or cleaning their house) while they are recovering from surgery and adjuvant treatment. Once they complete all cancer treatment, women may have a high need for emotional support as they lose some of the support that comes from regular medical follow-ups and instrumental support from friends and family during the recovery process (Arnold, 1999 as cited in Stanton et al., 2005). In fact, in an article in the *Journal of Clinical Oncology*, Schnipper (2001) noted that in her clinical practice women tend to seek out social support more in the post-treatment phase than other phases of the cancer continuum. Therefore, it is possible that there may be a moderating effect of sample (as a proxy for point in cancer treatment) in whether women report improvements in social support from pre- to post-treatment and whether specific types of support are associated with improvements in psychosocial outcomes. For example, do women who are in the midst of treatment learn strategies for obtaining greater instrumental support at the CBSM interventions that they then use to garner greater instrumental support, while women who are finished with treatment learn strategies to garner greater emotional support? If women perceive greater support in the area of greatest need, are those changes associated with distal psychosocial outcomes (e.g., distress)? For example, are improvements in instrumental support associated with less distress in the post-surgical sample while improvements in emotional support are associated with less distress in the post-treatment sample?



**General Stress Management Skills.** In some studies, multiple protective factors that may facilitate psychosocial adjustment to cancer have been grouped together for analysis and thus do not fit neatly into the previous sections dedicated to relaxation training, coping skills training, and social support. Faul, Jim, Willias, Loftus, & Jacobsen (2010) found that baseline (i.e., pre-intervention) levels of stress management skills were associated with lower self-reported levels of anxiety and depression and higher self-reported mental quality of life among patients with mixed cancer types. These relationships were significant even after including relevant demographic variables (i.e., age and income). Faul et al. (2010) examined relaxation, awareness of tension, assertiveness, and coping confidence both as a single score of “stress management skills” and as separate scales. The only subscale that was not associated with anxiety and depression was awareness of tension.

In an analysis of CBSM intervention effects, Penedo et al. (2006) found that prostate cancer patients assigned to a 10-week CBSM intervention reported increased benefit finding compared with those assigned to a one-day psychoeducation control. Changes in benefit finding were mediated by a single scale score assessing multiple intervention-targeted skills including awareness of tension, cognitive reframing, use of social support, and adaptive anger expression.

In summary, multiple studies have shown associations among use of relaxation, use of specific coping strategies, and perceived social support with outcomes such as anxiety, depression, and quality of life. Many of these studies have used cross-sectional (Faul et al., 2010) or prospective (Carver et al., 1993) designs to explore these relationships, while others have looked at the associations in the context of psychosocial

interventions with various medical populations (Antoni et al., 2006a; Penedo et al., 2006). In the current study, I have simultaneously examined multiple measures of perceived stress management skills that are targeted by the CBSM intervention as well as whether the phase of cancer treatment may function as a moderator of intervention effects.

### **Cognitive-Behavioral Stress Management**

*“...psychosocial interventions teaching new cognitive strategies (e.g., cognitive restructuring, coping-skills training) and interpersonal skills (e.g., assertion training, anger management) in the context of a supportive group environment may significantly improve a woman’s adjustment to breast cancer and its treatment.” (Antoni, 2003, p 13)*

CBSM was developed as an intervention to facilitate psychosocial adjustment in medically ill populations. Namely, CBSM aims to enhance protective factors (i.e., use of relaxation, adaptive coping strategies, and social support) that can buffer against the negative effects of cancer diagnosis and treatment (Antoni, 2003). The long-term goals of the CBSM intervention are “to reduce the distress, depression, and maladaptive behaviors that may accompany the diagnosis and treatment for breast cancer and to make patients aware of any beneficial experiences they might have during this period” (Antoni, 2003, p 86). To achieve these long-term goals, Antoni and colleagues identified proximal goals including promoting adaptive coping strategies, teaching relaxation skills, and enhancing social support networks. In order to target these proximal goals, they identified five specific aims, including 1) increased awareness of the stress response, 2) learning skills to reduce anxiety, 3) modifying cognitive appraisals, 4) building coping skills and

increasing emotional expression, and 5) increasing perceived social support (Antoni, 2003; see Table 1 for more details).

This multi-component intervention has previously shown success in promoting psychosocial adjustment among patients with HIV (e.g., Carrico et al., 2005) and breast cancer patients (e.g., Antoni et al., 2001, 2006a, 2006b). CBSM was originally developed by Antoni and colleagues in a sample of gay men who had recently been diagnosed with HIV. In this population, the goals of the intervention were to buffer against the initial effects of receiving an HIV diagnosis and facilitate adjustment. CBSM was successful in improving psychosocial adjustment in this sample at up to one-year follow-up (Carrico et al., 2005). The CBSM intervention was then adapted for use with women with early-stage breast cancer using focus groups and assessing concerns that are relevant to breast cancer patients (Antoni, 2003). The intervention was similarly efficacious in improving psychosocial adaptation in this population (Antoni et al., 2001, 2006a, and 2006b). One component of the CBSM intervention, relaxation training, has shown some evidence of being an important mediator of intervention effects on quality of life among breast cancer patients (Antoni et al., 2006a). However, our research group has not examined the potential mediating role of other intervention targets, such as specific types of coping strategies and self-reported changes in social support in samples of women with breast cancer.

As part of the rationale for CBSM with breast cancer patients, Antoni (2003) reviewed relevant literature and proposed a theoretical model by which a breast cancer diagnosis may be linked with poorer psychosocial adjustment. Specifically, a cancer diagnosis is a significant stressor and may pose a threat to social support. Many aspects

of the cancer experience are uncontrollable (e.g., having cancer, needing certain treatments) and, thus, may strain a woman's coping resources. In addition, women may not have well-established social support networks, or the cancer experience may strain those networks that are well established. For example, even if a good social support network is in place, women may react to the cancer experience by withdrawing from friends and family. On the other hand, many women may rely heavily on social support and thus fatigue their support networks. The cognitive and emotional burdens of tapped out coping and social support resources may lead to an increase in maladaptive coping strategies, for example, denial and disengagement coping. When this happens, women may be less aware or less able to express their emotions. The ultimate result may be increased feelings of helplessness, hopelessness, and depression, as well as lower self-esteem and self-efficacy.

As part of the pilot work for tailoring the CBSM intervention to women with breast cancer, Spencer et al. (1999) examined the cancer-related concerns that are most salient to women throughout the breast cancer experience. These concerns may include fears of recurrence, concern about being sick or damaged from adjuvant treatment, as well as concerns about dying prematurely, not seeing their children grow, and having their life cut short with their partner. Antoni (2003) proposed that a number of skills taught in the CBSM intervention may alleviate excessive distress that may result from these concerns. The intervention directly targets a number of coping strategies that may help to address stress-related cognitions and reduce emotional distress. These include adaptive cognitive coping strategies (e.g., cognitive reframing), relaxation to manage pain and treatment side effects, and assertiveness training to maintain and enhance social

support. In addition, the group format of the intervention may create an environment that can indirectly improve adjustment. For example, the group itself may confer some of the benefits of a social support network.

In sum, CBSM for women with breast cancer is based on two primary assumptions. First, there is some distress associated with breast cancer diagnosis and treatment that may be short-term or long-lasting and may affect quality of life and emotional well-being. Second, previous work provides evidence of protective factors that may facilitate psychosocial adjustment to cancer including training in relaxation, adaptive coping, and social interactions. In this dissertation, I examined whether the intervention was able to effect change in these identified protective factors (i.e., the skills targeted by the intervention) in two cohorts of women. These two groups of women differed in terms of the point in cancer treatment at which they receive the CBSM intervention. One sample, Coping and Recovery (C&R), received CBSM in the weeks post-surgery (approximately 2 – 8 weeks post surgery). The other sample, Coping After Treatment (CAT), received CBSM 6 to 26 months after surgery and after the completion of all adjuvant treatment. This difference in the timing of intervention delivery may have implications for the effects of the CBSM intervention and was an integral part of the proposed specific aims.

### **The Current Study**

Since CBSM aimed to facilitate adaptation to cancer diagnosis and treatment by way of relaxation training, coping skills training, and enhancing social support, I examined CBSM-related changes in these targeted skills in two samples of breast cancer patient samples from baseline (pre-intervention) to the post-intervention assessments. The

C&R study administered the intervention in the weeks following surgery and concurrent with any adjuvant therapy. The CAT study administered the CBSM intervention in the months following the completion of adjuvant therapy. The current analyses included sample (C&R versus CAT) as a potential moderator of intervention effects on proximal and distal outcomes. Where appropriate, I determined whether significant changes in proximal outcomes were linked to longer term distal psychosocial outcomes at the follow-up time points. Again, sample was considered as a moderator in order to determine whether different coping strategies are most beneficial at different points in cancer treatment.

Examining the components of the intervention that reveal the largest changes, and whether or not this varies by point in cancer treatment, is an important step in making the intervention more acceptable in a clinical setting. A 10-week, group-based intervention may not be feasible for all venues that provide mental health services for women with breast cancer. If we can identify the coping strategies and resources that are most affected by CBSM during cancer treatment and in the months following cancer treatment, and those that are associated with lasting improvements in psychosocial adjustment, we can offer guidance and suggestions about tailoring the intervention in a clinical setting while encouraging fidelity within the specific components.

### **Specific Aims**

**Specific Aim 1.** I examined pre- to post-intervention changes in measures of the proximal outcomes (i.e., CBSM targets) and determined whether there were significant differences in CBSM effects on these proximal outcomes between the two samples. In

other words, did point in cancer treatment moderate changes in proximal outcomes over time?

**Specific Aim 2.** I examined whether condition predicted the slope of change in both proximal and distal (i.e., psychosocial adaptation) outcomes across four time points (pre-intervention, post-intervention, and two follow-ups in the months following the intervention) and whether sample (C&R versus CAT) moderated these effects. Where indicated, I planned to examine whether the slopes of change in the proximal outcomes were associated with the slopes of change in the distal outcomes and, again, whether sample moderated these effects; however, these analyses were not indicated based on the results of the first part of Specific Aim 2.

## CHAPTER 2: METHOD

### General Study Procedures

The Coping and Recovery (C&R) and Coping After Treatment (CAT) studies at the University of Miami have examined the effects of cognitive-behavioral stress management (CBSM) on psychosocial functioning among women with breast cancer. These studies have investigated similar group-based, 10-week CBSM interventions versus a 1-day psycho-education control condition (see Table 2) and used similar outcome measures (see Table 3). Both C&R (N = 197) and CAT (N = 126) have completed enrollment and follow-ups. The studies have many similar exclusion criteria, including previous cancer diagnosis, major psychopathology, metastatic breast cancer, and immune-modulating conditions and medications. One major difference in eligibility criteria is that C&R participants must not have undergone adjuvant treatment at the time of baseline assessment (i.e., having had only surgical treatment for breast cancer was required for enrollment in the study), whereas in CAT, women were excluded if they had not received any type of adjuvant treatment (e.g., chemotherapy, radiation). Additionally, the CAT study only enrolled women with stage 1-3 cancer (excluding those who reported cancer at stage 0), while the C&R study included women with stage 0-3 cancer. Both studies excluded participants with stage 4 (i.e., metastatic) cancer.

Another major difference between the studies is the time in cancer treatment at which participants were enrolled and the CBSM intervention was delivered. In C&R, women were enrolled early in cancer treatment and baseline measures were collected roughly 2-8 weeks post-surgery and before the start of adjuvant treatment. The CBSM intervention (or 1-day control) was often delivered concurrently with adjuvant treatment.



Follow-up assessments were conducted immediately after the intervention, as well as approximately 3 and 9 months post-intervention. In CAT, women were enrolled if they had completed surgery or adjuvant treatment within the past 3-12 months. The CBSM intervention was delivered after the completion of all breast cancer treatment. Follow-up assessments were conducted immediately after the intervention, as well as approximately 6 and 12 months post-intervention.

### **The CBSM Intervention**

The content of the 10-week CBSM intervention was very similar in both the C&R and CAT studies (see Table 4). Cognitive-behavioral skills training included information and awareness regarding the stress response, automatic thoughts and cognitive distortions, cognitive restructuring, coping strategies, social support, anger management, and assertiveness training. One notable exception was that while coping strategies spanned two sessions (sessions 5 and 6) in C&R, it was condensed to one session (session 5) in CAT. The major elements (e.g., definition of coping, aspects of coping) were retained with the move from two sessions to one session, but the content, examples, and discussion were condensed. In its place, CAT included a session that focused on personal goals, values, and spirituality (session 9). In this session, the interventionist led discussions on how priorities change after a major life event, individual needs and values, urgent versus important tasks, goal-setting, and spirituality and religion.

C&R and CAT used the same relaxation training exercises including breathing, progressive muscle relaxation, imagery, autogenics, and meditation. The specific types of exercises (e.g., progressive muscle relaxation, autogenics) were identical from sessions 1-5. Sessions 6-10 included the same types of relaxation exercises, but the order in which

the exercises were introduced varied slightly between the studies (see Table 4). In the CAT study, women attended an average of 7.14 group sessions (SD = 2.70; range = 0-10) and, in the C&R study, women attended an average of 6.49 group sessions (SD = 2.88; range = 0-10).

### **Psychoeducation Control**

The psychoeducation (PE) seminar consisted of a five to six hour, condensed educational version of the intervention information. The seminar delivered some information on most of the main components of the intervention, but it lacked the therapeutic group environment, emotional support, and opportunity to role play techniques, as well as the feedback and modeling from other group members and home practice aspects of the CBSM intervention.

### **Measures**

Demographic, medical, and cancer-related variables were collected at the first assessment including age, cancer stage, type of surgery (lumpectomy versus mastectomy), and type of adjuvant treatment (chemotherapy, radiation therapy, or tamoxifen therapy).

### **Assessment of Proximal Outcomes**

The proximal outcomes are a selection of measures representing coping behaviors that are targeted by the CBSM intervention or that may be indirectly affected by the supportive group environment (e.g., feelings of cohesiveness with other breast cancer patients).

**Intervention-Targeted Skills.** The Measure of Current Status (MOCS; Carver, 2006a) has two sections: Part A measures participants' perception of their status on skills

targeted by the CBSM intervention (e.g., ability to recognize bodily tension, use relaxation strategies, engage in effective coping) and Part B measures nonspecific effects of the intervention (e.g., feelings of normalcy and cohesiveness with other breast cancer patients). Part A uses a 5-point Likert scale to assess how well a person believes she can perform specific intervention-targeted skills from 'I cannot do this at all' to 'I can do this extremely well.' Part B uses a 5-point Likert scale to assess level of agreement with various statements from 'strongly disagree' to 'strongly agree' (see Appendix A). Cronbach's alphas ranged from .67 (MOCS-B Downward Comparison subscale) to .89 (MOCS-A Coping subscale).

**Social Support.** The Sources of Social Support Scale (SSSS; Carver, 2006b) measures perceived social support. The items include different types of support (i.e., emotional, informational, instrumental, and negative), and there are separate sections (each using the same set of items) for different potential sources of support. Potential sources are spouse, adult women in the family, other family members, friends, and health care workers. For the current analysis, each of the four types of support was examined individually for romantic partners and friends. The items assess the degree to which a person receives different types of support from different sources on a 5-point Likert scale from 'not at all' to 'a lot' (see Appendix B). Informational support and instrumental support are each single item subscales, while two items were summed for the negative support subscale and six items were summed for the emotional support subscale. Negative support was highly skewed and kurtotic for both romantic partners (skew = 2.77 [standard error = 0.18] and kurtosis = 8.90 [standard error = 0.36]) and friends (skew = 4.27 [standard error = 0.16] and kurtosis = 25.92 [standard error = 0.31]), with most

women reporting very low levels of negative support on a scale from 2 to 9 from both partners (Mean = 2.59; SD = 1.19) and friends (Mean = 2.29; SD = 0.78). Therefore, negative support was dropped from the analysis. Cronbach's alphas averaged across four time points were .88 for the husband/partner emotional support subscale and .84 for the friends emotional support subscale.

**Coping Strategies.** The Brief COPE Inventory (Carver, 1997) is a 28-item measure that assessed different types of coping strategies that women use to deal with breast cancer treatment. Since the women in the C&R and CAT samples differed in terms of the phase of cancer treatment, the instructions for the COPE measure varied between the two samples at the baseline assessment. Specifically, C&R participants were instructed to think about reactions they had to their surgery when responding to the Brief COPE items at Time 1, while CAT participants were instructed to think about their cancer treatment in general which may have included both surgery and adjuvant treatment. For all subsequent assessments (Times 2-4) both C&R and CAT participants were instructed to think about cancer treatment. Participants in both studies were given a modified version of the original Brief COPE in which the three original social support items were asked separately for spouses and friends. All six social support items were eliminated from further analysis since they were not part of the original scale, many participants did not respond to the spousal support items because they were not married or partnered, and the SSSS provides a more detailed measure of social support in the current study.

For the current analysis, I was specifically interested in the denial, disengagement, active coping, positive reframing, humor, and acceptance subscales, as these are the

scales that have shown to be associated with psychosocial outcomes in previous studies (Carver et al., 1993; Epping-Jordan et al., 1999; Stanton et al., 2000; Stanton et al., 2002). The denial, disengagement, and acceptance subscales were skewed and/or kurtotic with few women reporting use of denial ( $M=0.78$ ,  $SD=1.29$ , possible range 0-6) and disengagement coping ( $M=0.39$ ;  $SD=1.04$ ; possible range 0-6) and women reporting high levels of acceptance coping ( $M=5.01$ ;  $SD=1.32$ ; possible range 0-6). Scores on these three subscales were log-transformed. After transformation, the acceptance subscale was still skewed and kurtotic. However, due to the prominence of acceptance as a coping strategy in the relevant literature (e.g., Stanton et al., 2002), I cautiously analyzed the acceptance subscale of the COPE measure. The Brief COPE items assess the frequency with which a person uses these different types of coping strategies on a 4-point Likert scale from 'I haven't been going this at all' to 'I've been doing this a lot' (see Appendix C). Cronbach's alphas averaged across four time points ranged from .62 (COPE Behavioral Disengagement subscale) to .82 (COPE Humor subscale).

**Emotional Coping.** I used the emotional expression and emotional processing subscales of the Emotional Approach Coping scale (Stanton, Kirk, Cameron, & Danoff-Burg, 2000). The items assess the frequency with which a person engages in emotional expression or processing on a 4-point Likert scale from 'I haven't been going this at all' to 'I've been doing this a lot' (see Appendix D). Cronbach's alpha averaged across four time points was .93 for emotional expression and .92 for emotional processing.

### **Assessment of Distal Outcomes**

The distal outcomes represent multiple indices of psychosocial functioning such as negative affect and involvement in social interactions and recreational activities that

may be affected by the coping strategies learned in the CBSM intervention. The distal outcome measures have been previously examined in the context of CBSM interventions with cancer patients (Antoni et al., 2006a, 2006b).

**Benefit Finding.** Benefit finding was measured by a series of statements that began with “Having had breast cancer...” and was followed by domains of benefit finding including family and social relations, life priorities, spirituality, career goals, self-control, and ability to accept (Tomich & Helgeson, 2004; see Appendix E). Cronbach’s alpha averaged across four time points was .94.

**Negative Affect.** The Affects Balance Scale (Derogatis, 1975) measures positive and negative emotional experiences. For the current analysis, the negative affect subscale was used which is a composite of the depression, hostility, guilt, and anxiety subscales. Items assess the frequency of various emotions on a 5-point Likert scale from ‘never’ to ‘always’ (see Appendix F). Cronbach’s alpha averaged across four time points was .93.

**Interpersonal Disruption.** I used two selected subscales from the Sickness Impact Profile: the impact of cancer on social interactions and on recreations and pastimes (Bergner, Bobbitt, Carter, & Gilson, 1981). Items assess the applicability of a series of statements and are measured by dichotomous responses “no” or “yes, this applies to me” (see Appendix G). Scores for the social interactions subscale were highly skewed and kurtotic and were log transformed before using these scores for further analysis. Cronbach’s alphas averaged across four time points were .86 for the social interactions subscale and .73 for the recreations and pastime subscales, respectively.

## **Data Analysis Plan**

Missing data patterns were examined for all proximal and distal outcomes and these variables were assessed for normality by examining skewness and kurtosis. Multiple imputation with ten iterations was performed in PASW Statistical Software.

Specific Aim 1 was to examine pre-post intervention changes in proximal and distal outcomes (i.e., CBSM targets) and determine whether there were significant differences in CBSM effects on these proximal outcomes between the two samples. Specific Aim 1 was tested using repeated measures analysis of covariance (RMANCOVA) in PASW statistical software. I conducted between-subjects RMANCOVAs with time (i.e., pre- and post-intervention) as a within subject factor, and condition (i.e., CBSM versus PE) and sample (i.e., C&R versus CAT) as the between-subjects factors. I also examined the following interaction terms: time by condition (i.e., effects of CBSM versus PE over time across the two samples), time by sample (i.e., effects of C&R versus CAT over time across the two conditions), and time by condition by sample (i.e., whether sample moderates the effects of CBSM versus PE over time). Cancer stage and days from surgery to the baseline assessment were included as covariates in all models (Blomberg et al., 2009). Participant age was used as a covariate for all analyses of distal outcomes, as it has been associated with distress-related outcomes in previous studies (e.g., Stanton et al., 2000) and is theoretically relevant for the analysis of long-term psychosocial adjustment. Each ANOVA model was conducted separately in each imputed data set, and test statistics and standard errors have been combined across the multiply imputed data sets as outlined by Schafer (1997).

Specific Aim 2 was to examine whether condition predicted the slope of change in both proximal and distal outcomes across four time points (pre-intervention, post-intervention, and two follow-ups in the months following the intervention), and whether sample moderated these effects. Additionally, where indicated, I examined whether the slopes of change in the proximal outcomes were associated with the slopes of change in the distal outcomes. Again, sample was tested as a potential moderator of these effects. Specific Aim 2 was tested using multiple-group latent growth modeling (LGM; Duncan, Duncan, Strycker, Li, & Alpert, 1999; Llabre, Spitzer, Saab, & Schneiderman, 2001; Muthén, 1997) in MPLUS software. MPLUS software is capable of combining multiple imputed data sets in order to calculate model fit and parameter estimates. Cancer stage and days from surgery to the baseline assessment were included as covariates in all models, while participant age was also included as a covariate in all analyses of the distal outcomes.

In LGM, the intercept (starting point) and slope (change over time) of the selected proximal and distal outcomes were modeled as latent variables from data at the immediate post-intervention assessment (Time 2) and the two follow-ups time assessments (Times 3 and 4). Time 1 was not included in this analysis as growth from T2-T4 was expected to be linear, which is an assumption that must be met in order to directly compare the two samples which have varying follow-up time points (6 and 12 months after baseline in C&R and 9 and 15 months after baseline in CAT). The main predictor was intervention versus control condition (coded as 1 versus 0) and the C&R and CAT samples were analyzed as two groups.



Multiple group analysis allowed us to determine whether there were moderating effects of sample (C&R versus CAT) by comparing two models for each outcome of interest in which 1) all paths were constrained and 2) the paths from condition to intercept and slope were allowed to vary between the two samples. The second model represented the hypothesis that the condition effects on the intercept and slope of the outcome measures was different in the C&R sample than it is in the CAT sample (i.e., sample is a moderator of those condition effects). The first model represented the alternative hypothesis that there were differences in condition effects on the intercept and slope of the outcome measures between the two samples. Each model had an associated chi-square value and degrees of freedom. If the second model did not offer a significant chi-square improvement over the first model, then the first model – being the most parsimonious – was retained, indicating no moderating effect of sample for that outcome.

For all LGM models, multiple indicators of model fit were calculated: chi-square (in which the ideal is a non-significant chi-square); comparative fit index (CFI), for which values above .95 indicate good fit; the root-mean-square error of approximation (RMSEA), for which values below .05 indicate good fit; and the standardized root-mean-square residual (SRMR), for which values below .10 indicate good fit (Kline, 2005). Specific effects were tested with the  $z$  statistic, with a .05 two-tailed significance level.

I planned to perform analyses to determine whether changes in trajectories of proximal outcomes were associated with changes in the trajectories of distal outcomes; however, there were no significant differences in slope between the control and intervention groups in the combined C&R and CAT samples for any of the proximal

outcome measures. Therefore, this portion of the data analytic plan was not indicated based on the results of analyzing Specific Aim 2.

## CHAPTER 3: RESULTS

### Preliminary Analyses

Due to a protocol change after the trial had commenced, the Time 2 assessment was not administered to the first 43 women in the Coping and Recovery (C&R) study (cognitive-behavioral stress management [CBSM] n=19; psychoeducation [PE] n=24). These women were removed from the data set before further analysis bringing the total N for the two samples to 319 (C&R n=197; Coping After Treatment [CAT] n=122). Comparisons of those C&R participants that were administered the Time 2 assessment and those who were not demonstrated that women to whom that assessment was not administered were less likely to have received radiation therapy while taking part in the C&R study ( $\chi^2[1]=10.98, p<.01$ ). Women who were not administered the Time 2 assessment did not differ from women who were given the assessment in terms of condition assignment, age, days from surgery to baseline assessment, type of surgical treatment (i.e., lumpectomy or mastectomy), cancer stage, and whether or not they received chemotherapy or tamoxifen.

In addition, in order to have a well-matched sample, 72 participants who reported either stage 0 (or missing stage information) or no adjuvant treatment (or missing adjuvant treatment information) were removed from the analysis as these were exclusion criteria for the CAT study. The majority of these participants were in the C&R sample; however, there were 3 CAT participants who reported stage 0 breast cancer, 4 CAT participants who reported no adjuvant treatment, 1 CAT participant who reported both stage 0 cancer and no adjuvant treatment, and 10 CAT participants for whom stage and/or adjuvant treatment information was unavailable. Not surprisingly, women who were

excluded from the analysis due to having stage 0 breast cancer or not undergoing adjuvant treatment had a significantly shorter average number of days from surgery to the Time 1 assessment ( $M=89.20$ ;  $SD=133.24$  days) compared with those who were retained in the analysis ( $M=200.88$ ;  $SD=210.74$ ) as those who were excluded were primarily members of the C&R sample ( $F[1,309]=16.26, p<.01$ ). There were no differences between those excluded or retained based on stage and adjuvant treatment in average condition assignment, age, or type of surgical treatment (i.e., lumpectomy versus mastectomy).

Missing values were examined for extent of missing data. At all time points, no more than 25% of the outcome values were missing with the exception of the SSSS subscales related to husband or partner support. Women who did not have a current husband or romantic partner left those items blank which results in approximately 26% missing data at Time 1, 38% missing data at Time 2, 38% missing data at Time 3, and 44% missing data at Time 3. Newman (2003) demonstrated that data estimation with 25% missing data only modestly increased error in the parameter estimates, while missing data of 50% or 75% introduced greater error. Therefore, I expected data estimation to be fairly accurate for most of the variables and note that analyses related to the SSSS for husband or partner would need to be interpreted with greater caution. For the current analysis, I conducted multiple imputation in PASW software and 10 imputed data sets were created. For RMANCOVA analyses in PASW, F statistics were averaged and standard errors were combined per Schafer (1997). For latent growth model analysis, MPLUS has the ability to integrate multiply imputed data sets and produce one set of model fit indices and parameter estimates.

The current sample and study attrition by sample and condition assignment can be found in Figure 1. There were 14 participants in the sample used for the current analysis (C&R N=143; CAT N=104) who dropped out of the study after Time 1 meaning that they failed to complete any further assessments (i.e., Time 2, 3, or 4). All of the participants who dropped out of the study after Time 1 were in the CAT sample. Compared with women who remained in the study after Time 1, these women who dropped out were more likely to have received radiation ( $\chi^2[1]=6.72, p=.01$ ). In fact, every woman who dropped out of the study after Time 1 had received radiation therapy as part of their cancer treatment. Not surprisingly, the women who dropped out also averaged a greater number of days from surgery to the baseline assessment (Mean = 374.28; SD = 115.81) versus those who remained in the study (Mean = 190.46; SD = 210.76;  $F[1,245]=10.43, p<.01$ ). There were no differences between those who dropped out after Time 1 and those who remained on age, stage, type of surgery, or whether or not they had received chemotherapy or tamoxifen. In terms of outcomes, women who dropped after Time 1 were more likely to report using behavioral disengagement as a coping strategy (Mean = 1.28; SD = 1.73 versus those who remained in the study (Mean = 0.38; SD=1.02;  $F[1,244]=9.31, p<.01$ ), less likely to report using active coping (Mean = 3.36; SD = 1.60 versus those who remained in the study Mean = 4.31, SD=1.58;  $F[1,245]=4.86, p<.03$ ), and endorsed greater negative affect (Mean = 49.78; SD = 14.98 versus those who remained in the study (Mean = 43.18; SD=11.41;  $F[1,245]=4.26, p=.04$ ).

In the final sample (N=247), there were no statistically significant differences at baseline between the C&R and CAT samples on age or the type of surgical treatment (i.e., lumpectomy versus mastectomy). There were significant differences, as expected, in

days from surgery to the Time 1 assessment ( $F[1,245]=894.04, p<.01$ ; C&R Mean=41.98,  $SD=25.35$  days; CAT Mean=419.38,  $SD=148.09$  days). Eighty percent (80%) of the CAT participants underwent radiation while 62% of the C&R participants underwent radiation ( $\chi^2[1]=8.41, p<.01$ ). Compared to the CAT study, participants in the C&R sample reported greater emotional and informational support from friends (SSSS), greater instrumental support from husband or partner (SSSS), more use of active coping, positive reframing, and humor (COPE), and more use of emotional expression (EAC) at baseline (see Table 5 for complete information on demographic, cancer treatment, and outcomes of interest at baseline).

### **Results for Specific Aim 1**

I conducted 2 (time point: pre- and post-intervention) x 2 (condition: CBSM and PE) x 2 (sample: C&R and CAT) RMANCOVAs for all proximal and distal outcomes of interest. For the proximal outcomes, stage and days from surgery to the baseline assessment were included as covariates. For the distal outcomes, age, stage, and days from surgery to the baseline assessment were included as covariates. Results averaged across the 10 imputed data sets can be found in Table 6.

In these 2x2x2 RMANCOVAs, there were statistically significant time by condition effects for two subscales of the MOCS: MOCS-relaxation from the MOCS-A ( $F[1,241]=13.52, p<.01$ ) and MOCS-bonding from the MOCS-B ( $F[1,241]=6.72, p<.02$ ) such that those in CBSM reported greater increases in confidence in their ability to relax (see Figures 2 and 3 for these effects broken down by sample for additional information) and bonding with other breast cancer patients (see Figures 4 and 5) from Time 1 to Time 2 versus the PE control condition. There was a statistically significant time by condition

effect for benefit finding from the BFS ( $F[1,238]=3.93, p<.05$ ) such that those in CBSM reported greater increases in benefit finding over time compared with the PE control (see Figures 6 and 7). Means and standard errors for time by condition effects can be found in Table 7. There were also statistically significant time by sample interaction for cancer-related interference in recreations and pastimes on the SIP ( $F[1,238]=5.19, p<.03$ ) indicating that there was a statistically significant differences in this subscale between the C&R and CAT samples over time irrespective of condition assignment such that participants in the CAT sample tended to report less interference from baseline to the immediate post-intervention assessment, while those in the C&R sample tended to report slightly more interference over the same time period (see Figure 8). Means and standard errors for this time by sample effect can be found in Table 8. There were no other significant time by condition or time by sample interactions with any of the other proximal or distal outcomes. There were also no statistically significant time by condition by sample interactions, indicating that there were no differences in the effect of CBSM versus PE on the proximal and distal outcomes between the C&R and CAT samples over time.

### **Results for Specific Aim 2**

I first conducted a series of multiple group analyses in MPLUS to determine whether the paths from the covariates to the intercept should be constrained or unconstrained across the two samples. I first constrained the path from each covariate to the intercept of the proximal or distal outcomes to be equal in the two samples. Then, I allowed that parameter to vary between the samples and conducted chi-square difference tests to determine if the unconstrained model offered a significant improvement in model

fit over the constrained model. There were no significant improvements in model fit ( $p < .05$ ) for the unconstrained model and, thus, the more parsimonious constrained models were retained. Therefore, for all of the following multiple group analyses, the effects of the covariates on the intercepts were set to be equal between the two groups.

In order to test for a moderating effect of sample, I ran a series of multiple group analyses. In the first step, I set all paths to be equal across the two samples including the condition effect on intercept and slope. In the second step, I allowed the paths representing the condition effects on the intercept and the slope to vary between the two samples. For all proximal outcomes including the COPE, MOCS, EAC, and SSSS subscales, cancer stage and days from surgery to the baseline assessment were included as covariates on the intercept. For all distal outcomes including the ABS, benefit finding, and SIP subscales, age, cancer stage, and days from surgery to the baseline assessment were included as covariates on the intercept. Per the previous set of analyses, the association between the covariates and the intercepts were constrained equal across the two samples. There were no significant improvements in model fit ( $p < .05$ ) for the second model and, thus, the more parsimonious constrained models were retained. This indicated that there were no moderating effects of sample. Detailed results can be found in Table 9.

In the constrained models, I examined whether there were any significant effects of condition on the slope of change in the proximal and distal outcomes from Time 2 to Time 4. There were no significant condition effects on the slopes of change in the proximal and distal outcome over the post-intervention follow-up period. Thus, none of the proximal or distal scales were indicated for further analyses to determine whether



slopes of changes in proximal outcomes were associated with slopes of change in the distal outcomes (see Table 10 for full results).

### **Additional Analyses**

As noted earlier, the C&R study conducted follow-up assessments at 3- and 9-months post-intervention while the CAT study conducted follow-up assessments at 6- and 12-months post-intervention. Given the unequal follow-up periods in these two samples, I performed the multiple group LGM analysis using time points 2 through 4 (the post-intervention assessment and the two follow-up assessments) to try to meet the linear growth assumption for this type of analysis. However, there appeared to be very little change from Time 2 to Time 4, relative to the change from Time 1 to Time 2, and thus, I sought to conduct additional analyses including the Time 1 (pre-intervention/baseline) assessment. With all four time points included, I no longer expected a linear growth pattern across the four time points (Antoni et al., 2006a; Vargas et al., 2010) and could not include both samples in a direct comparison in a single statistical model. For these additional analyses, I conducted LGMs in MPLUS software separately on each sample for the proximal and distal outcomes and using all four time points. While this was not a direct comparison of intervention effects or the moderating effects of sample, it allowed me to examine relative effect sizes in the two samples.

These additional LGMs modeled the intercept (starting point) and slope (change over time) of the selected proximal and distal outcomes from data at the pre-intervention/baseline assessment, the immediate post-intervention assessment, and the two follow-up assessments. Once again, the main predictor was intervention versus control condition (coded as 1 versus 0) and cancer stage and days from surgery to the

baseline assessment were included as covariates in all models, while participant age was also included as a covariate in all analyses of the distal outcomes. Chi-square, CFI, RMSEA, and SRMR were provided for model fit, and specific effects were tested with the  $z$  statistic with a .05 two-tailed significance level. Standardized effect sizes are reported as Cohen's  $d$ , for which values of 0.20 are regarded as small, 0.50 as medium, and 0.80 as large (Cohen, 1992). Effect sizes were calculated without measurement error, as described by Raudenbush and Xiao-Feng (2001).

All of the LGM models with non-significant chi-square tests ( $p > .05$ ) and/or reasonably sufficient CFI, RMSEA, and SRMR indices except for the MOCS-Relaxation subscale in the C&R sample. When the loading associated with the third and fourth time points for the MOCS-Relaxation subscale were allowed to freely vary, the model fit the data ( $\chi^2[14, N = 143] = 5.34, p > .9$ ; CFI = 1.00; RMSEA = .00; SRMR = .04). The condition effect on the intercept was not significant ( $z = 0.08, p > .9$ ) indicating that the CBSM and PE conditions did not differ at baseline. There was a significant condition effect on slope ( $z = 2.85, p < .01$ ) such that those in the CBSM group reported greater confidence in their ability to use relaxation skills. The third and fourth time points were estimated at 2.09 months and 2.35 months, respectively, indicating that there was some drop off and leveling of condition effects after the completion of the CBSM intervention. Condition effects on intercept were also found for the MOCS-Tension, EAC processing, and SIP-Recreations and Pastimes subscales within the C&R sample only, indicating that those assigned to CBSM versus PE significantly differed in their abilities to recognize bodily tension and express emotions at study baseline (see Table 11 for full results).

## CHAPTER 4: DISCUSSION

In this paper, I was interested in determining whether timing of cognitive-behavioral stress management (CBSM) intervention delivery (i.e., in the weeks after surgical treatment for breast cancer versus the months following the completion of adjuvant treatment) moderated intervention effects on CBSM-targeted coping resources (i.e., the proximal outcomes) and measures of psychosocial adaptation (i.e., the distal outcomes). To examine this question, I first conducted 2x2x2 RMANCOVAs with time (pre-post intervention), condition (CBSM versus PE), and sample (Coping and Recovery [C&R] versus Coping After Treatment [CAT]) as factors. In these models, I also examined three interaction terms: time by condition, time by sample, and time by condition by sample.

The RMANCOVA analysis of the MOCS-A replicated previous findings (Antoni et al., 2006a) that showed that women assigned to CBSM had significant improvements in their confidence in their ability to relax versus those in the PE control group. In this analysis, this association held even after statistically controlling for cancer stage and days from surgery to the baseline assessment. Relaxation training was the only component of CBSM that was addressed at each of the 10 group sessions. The other stress management skills, such as coping and assertiveness training, received one to two sessions of coverage. Not only did the women learn about different relaxation exercises at each group, but they also had an opportunity to practice the exercises in-group and were encouraged to engage in the exercises outside of group. Given the time dedicated to relaxation training relative to other CBSM-targeted skills, it is not surprising that CBSM effects on confidence in one's ability to relax is such a robust finding.

Contrary to the Antoni et al. (2006a) findings, RMANCOVA analysis of the MOCS-B revealed that women assigned to CBSM had greater perceived bonding with other breast cancer patients compared to those in the PE control group. Similar to relaxation training, women had an opportunity to bond with the other women in the group at each of the 10 weekly sessions. Many types of social interactions within the group offer bonding opportunities, while other non-specific factors assessed by the MOCS-B (i.e., downward comparison and normalization) are particular types of social experiences that may or may not occur during the group sessions. As with relaxation, with the relative time spent bonding with other women, it is not surprising that CBSM effects were found for the MOCS-B Bonding subscale. In this analysis, the condition effect on bonding was found across samples, and thus, being in C&R versus CAT sample did not moderate this association. In the Antoni et al. (2006a) study, MOCS-Bonding was not significantly affected by condition assignment. However, it should be noted that in the current analysis, both C&R and CAT participants were included, and the subset of C&R participants that were included here is different from those included in Antoni et al. (2006a).

The condition effects on the MOCS Relaxation and Bonding subscales parallel similar effects found by Barbara Andersen's group at Ohio State University (Andersen, Shelby, & Golden-Kreutz, 2007). Andersen's group studied the effects of an intervention similar to CBSM that was targeted to women who had recently received surgery for non-metastatic breast cancer. The multi-component intervention included relaxation training, problem solving, positive coping, using social support, and assertiveness training. Unlike CBSM, Andersen's intervention also included information related to diet, exercise,

physical functioning, patient-provider communication, and symptom and medical treatment management. Also unlike CBSM, Andersen's intervention was more intensive, with an initial phase of 18 weekly sessions (versus 10 in CBSM), followed by a maintenance phase with 8 monthly sessions.

In their analysis of the intervention effects on psychosocial adjustment, Andersen et al. (2004) found that those in the intervention group exhibited lower anxiety, greater perceived social support, better diet, less smoking, more variability in chemotherapy dose, and improved immune profiles versus an assessment-only control group. It should be noted that the CBSM studies in the current paper offered a one-day seminar covering many of the same topics that are covered in the 10-week version of the intervention, including relaxation exercises and coping. Using an assessment-only control may have biased the analysis in favor of finding positive significant results in the intervention group more so than in the current analysis where the PE group was used as the comparison group in the C&R and CAT studies.

As a follow-up, Andersen et al. (2007) investigated some potential mechanisms of change by which the intervention may have had effects on emotional distress, social adjustment, diet, exercise, physical functioning, and chemotherapy dose intensity. Similar to the current analysis, Andersen et al. (2007) found that group cohesion and utilizing relaxation training were associated with positive outcomes such as distress reduction and improved symptomology; thus, these findings are mirrored in the literature outside of Antoni's CBSM studies.

There were no other significant condition effects on changes in any of the proximal outcomes in the RMANCOVA analysis. Most of these subscales were not

examined in the Antoni et al. (2006a) and, thus, there is no basis for comparison with the current analysis within our previous research. However, I will speak to the lack of condition effects on these proximal outcomes in the current analysis. As I have already noted, most of the other proximal outcomes (e.g., specific coping resources) receive less coverage compared to weekly topics like relaxation and women have ample opportunity to bond in the CBSM groups, but may encounter few, if any, opportunities to experience other non-specific factors of the interventions (e.g., downward comparison).

Additionally, it is possible that there are small, non-significant intervention effects on the various proximal outcomes that combine to influence psychosocial adaptation. Since the CBSM intervention is very broad and includes multiple intervention targets, and is much shorter than Andersen's multi-component intervention, there is limited coverage of each target. This is especially true for targets like specific types of coping, assertiveness training, and enhancing social support, which are the focus of only one or two sessions each. Thus, merging multiple proximal targets into a latent factor of intervention-targeted skills may yield more significant findings. It is also possible that the C&R intervention effects that have been previously shown in the literature are, in fact, due mostly to changes in relaxation confidence and a sense of bonding with other women with breast cancer. There may be very little change in the other intervention targets and, subsequently, little effect on psychosocial adaptation.

In the RMANCOVA analyses, those assigned to CBSM (irrespective of sample) reported greater increases in benefit finding compared with those assigned to the PE control. This replicates previous findings using a subset of the C&R sample utilized for the current analysis (Antoni et al., 2006a) and findings within the other cancer

populations (e.g., prostate; Penedo et al., 2006). There were no significant condition effects on any of the other distal outcomes including negative affect, cancer-related interference on social interactions, and cancer-related interference in recreations and pastimes. It should be noted that Antoni et al. (2006a) did previously find condition effects on these scales in a subset of the current C&R sample. There are several possible reasons why I was unable to replicate these earlier findings. First, the current sample not only included both C&R and CAT participants (versus only C&R participants in Antoni et al., 2006a; 2006b), but also it was a different subset of C&R participants than those analyzed in the Antoni et al. (2006a) paper. After the Antoni et al. (2006a; 2006b) papers, the C&R study accrued 41 more cases for a total N of 240. For the current analysis, I removed 43 participants who were not asked to complete an immediate post-intervention assessment (none of which overlapped with that 41 additional cases). Also, I removed any C&R participants who were not Stage 1-3 and did not report at least one type of adjuvant treatment (i.e., chemotherapy, radiation therapy, or tamoxifen therapy). In sum, this sample varies markedly from the one used in the previous papers.

In addition to these differences in sample composition, the Antoni et al. (2006a; 2006b) papers utilized LGM using data collected at baseline, and then at 6- and 12-months after baseline. The current RMANCOVAs were conducted using data collected at baseline and then at 3 months after baseline (i.e., immediately post-intervention). It is possible that intervention-related changes in the distal outcomes were not solidified by the 3-month follow-up time point and, thus, there were later changes that occurred between 3 and 12 months after baseline that contributed to the significant findings in the

Antoni et al. (2006a) manuscript. It is also possible that no such effects exist when examining this subset of C&R combined with the CAT participants.

In order to make a direct comparison between the C&R and CAT samples over a longer post-intervention follow-up period, I conducted multiple group LGM analysis on the proximal and distal outcomes using times 2, 3, and 4. Eliminating the Time 1 assessment meant that I could assume a linear slope across the three time points, a necessary assumption for a direct comparison between the two samples due to their unequal follow-up time periods. I examined moderation by sample by assigning two groups (i.e., C&R and CAT) and comparing models that set the pathways to be equal between the samples with models that allowed the pathways to vary between the samples. There were no significant differences in model fit between the constrained and unconstrained models, and thus the more parsimonious constrained models were retained, indicating no moderation of condition effects by sample. Additionally, there were no condition effects on slope of change in any of the proximal and distal outcome measures.

It was possible that I did not find any significant condition effects on slope in the multiple group LGM analysis because many of the outcome measures change the most from Time 1 to Time 2 or Time 3 (i.e., during and following the active intervention period), and that there is not enough change in outcome measures from Time 2 to Time 4 (i.e., months after the active intervention period) to produce significant condition effects on the slope. In the Antoni et al. (2006a) paper, some of the intervention effects reached a plateau at 7 or 8 months post baseline where there was no longer the same rate of linear growth that occurred from baseline up until that point. In order to address this issue, I conducted additional LGM analyses separately in each of the two samples. In LGM



analysis, only the relaxation subscale of the MOCS demonstrated a significant condition effect on slope when the loading associated with the third and fourth time points were able to freely vary. The condition effect was such that those in the CBSM group reported greater confidence in their ability to use relaxation skills.

Overall, I did not find many condition effects on proximal or distal outcomes except for increases in confidence in one's ability to relax and enhanced feelings of bonding with other cancer patients. Once again, the current sample included a different subset of the C&R data set than was previously published, as well as the unpublished CAT data set. In order to match these samples for a more direct comparison, many cases were removed from the data sets, particularly the C&R data set. I removed C&R cases that did not have the immediate post-intervention assessment, as well as cases that were not reported as stage 1-3 and those that did not receive any type of adjuvant treatment. Also, the Time 2 assessment was not used in previous analyses.

With regard to the proximal outcomes, it is also possible that the intervention may be influencing psychosocial adaptation through alternative pathways that are not measured in the current study. While CBSM-skills such as coping confidence and enhancing social support are targeted in the intervention, it is entirely possible that there are other mechanisms operating through which the intervention may lead to changes in psychosocial functioning. For example, we previously found that improvements in sleep quality for up to a year after baseline were associated with improvements in positive states of mind, decreased social disruption, and decreased fatigue-related dysfunction in daily activities over the follow-up period (Vargas et al., 2010). Sleep was not part of the current analysis, but could be examined in the future with these two samples as the

Pittsburgh Sleep Quality Index was collected in both studies. Also, changes in health behaviors represent an entire subset of mechanisms by which psychosocial interventions may influence outcomes (Andersen et al., 2007; Spiegel, Kraemer, Bloom, & Gottheil, 1989).

In Spiegel et al.'s seminal study (1989), the researchers found increased survival time for women with metastatic breast cancer who participated in a group psychological therapy intervention. In their discussion of their findings, Spiegel's team noted that one mechanism by which the intervention may have increased survival time was by improved mental health that was associated with improved health behaviors such as adherence to treatment and physical activity. While survival was not an outcome of interest in the present study, it is possible that the intervention may have improved health behaviors and this was not examined in the current analysis.

Similarly, when Andersen's group (2007) explored mechanisms of change for their multi-component psychosocial intervention study, they included a number of proximal outcomes that were targeted in their intervention but were not explicitly targeted in CBSM. Those additional intervention targets included patient-provider communication training and content focused on diet and physical activity. Reported use of patient-provider communication training was associated with quicker recovery time, and the authors hypothesized the other lifestyle changes, such as more physical activity, may have improved women's symptom management and distress. Again, while these types of medical and health behaviors were not targeted directly, it is possible that patient-provider communication was discussed during assertiveness training or that some of the CBSM content encouraged women to live healthier lifestyles.

Previous research has suggested that the timing of the delivery of a psychosocial intervention for cancer patients may moderate intervention effects and participant well-being (Vos et al., 2006; Edgar et al., 1992). There were gaps in the literature that I attempted to address by lengthening the time frame between the “early” and “delayed” delivery periods to a gap of about a year (377 days on average) and examining two samples assessed in two very similar studies. However, only change in SIP-Recreations and Pastimes from Time 1 to Time 2 was moderated by sample (C&R versus CAT). Irrespective of condition, participants in the CAT sample tended to report less interference in recreations and pastimes from baseline to the immediate post-intervention assessment, while those in the C&R sample tended to report slightly more interference over the same time period. This finding is best considered in the context of the cancer treatment continuum. CAT participants are administered the baseline assessments in the months following the completion of active cancer treatment and, thus, do not face disturbances in functioning and side effects that may come along with adjuvant treatment between Time 1 and Time 2. However, most of the C&R participants received adjuvant treatment between baseline and Time 2. It is likely that the effects of cancer treatment overwhelm any beneficial effects of the CBSM and intervention and are associated with these observed detriments in recreational functioning.

In addition to some of the limitations already noted, there are other factors that limit my ability to draw conclusions about the potential moderating effects of timing of intervention delivery. First, these two studies were not developed or administered with the intention of being directly compared to one another. Therefore, there are differences between measures and protocol. Specifically, women in the CAT study were exposed to

standardized group-delivered information about religion and goal setting, while this was minor to non-existent in the C&R study. The two studies had unequal time frames for follow-up intervention, which impeded direct statistical comparison between the two groups. The groups also differed by the days from surgery to the baseline assessment. This was not surprising, given that women in the C&R study were enrolled when they were roughly 4-8 weeks post-surgery, while women in the CAT study were enrolled in the months following the completion of adjuvant treatment. The instructions for the scales sometimes referred to different experiences (e.g., the COPE). Finally, the women in the CAT sample were more likely to have undergone radiation therapy than those in the C&R study. Therefore, while these two studies were similar in most aspects of intervention content and delivery, there were enough differences that I am unable to draw any definite conclusions about the effects of timing.

In the future, I recommend proactively considering timing of the delivery of the intervention in relevant models – and the importance of this in terms of the clinical application of this work. Ideally, we could have at least 2-3 arms of the sample where some women would receive the intervention immediately after diagnosis, others immediately after surgery, and still other after the completion of all adjuvant treatment. This type of methodological control would provide excellent evidence for or against the role of the timing of the intervention delivery in the intervention outcomes.

Second, some of the outcomes of interest had very high means at baseline. This may have caused a ceiling effect such that there was little room for scores to improve over time. For example, participants across both samples reported a mean of about 25 (possible range 5-30) on the emotional support subscales of the SSSS for both partner and

friends. It is possible that non-significant findings reflect limited growth potential for those in the CBSM condition.

Third, the selection of measures may have limited my ability to find psychosocial effects and potential mechanisms of change. All of the measures are self-report, and there are no objective indicators of any of the proximal or distal outcomes of interest. I chose a subset of the distal outcomes that have been previously examined in the C&R sample, and there are numerous measures of psychosocial functioning that were not explored in the current analysis. In addition, I considered benefit finding as one of the distal outcomes. It could be argued that the items in the benefit finding measure resemble a specific coping strategy, like positive reframing. It is possible that benefit finding is better conceptualized as a proximal outcome. In terms of the proximal outcomes, and potential mechanisms of change, the assessments varied in tone and instruction. For example, the COPE scale asks how frequently women have actually engaged in different behaviors, while the MOCS-A scale asks the participants to report their perceived level of ability in terms of intervention-targeted behaviors. The difference comes down to being asked if they are engaging in a behavior in the COPE versus if they think they could engage in a behavior in the MOCS-A. It is a subtle difference, but a notable one. The EAC and SSSS scales also assess actually engaging in the behavior. Perhaps women were not actually engaging in the specific coping strategies assessed, and this is why there were only significant findings on the perception-oriented proximal scale (i.e., the MOCS). In addition, I did not include measures of personality factors such as optimism, which could have had a moderating effect on the uptake of CBSM-targeted behaviors, such as use of adaptive coping strategies (Epping-Jordan et al., 1999).

Finally, the C&R samples are fairly homogenous in that most participants were White (67% in both samples) and well-educated (average greater than 15 years in both samples). Additionally, women with metastatic cancer were not enrolled in the study, while women with Stage 0 cancer were removed from the analysis to improve the match between the two samples. This homogeneity of demographics and cancer stage may improve confidence in research findings, but it also limits generalizability to women of color, women with lower SES, and women with Stage 0 or metastatic cancer.

The results of this analysis suggest that initiating a psychosocial intervention in the weeks after the completion of surgical cancer treatment may be equally beneficial for breast cancer patients as initiating an intervention in the post-treatment survivorship phase. There were no moderating effects of sample on condition effects on proximal outcomes. Only changes in SIP-Recreations and Pastimes from Time 1 to Time 2 were moderated by sample, and that is likely an artifact of phase in cancer treatment with adjuvant treatment interfering with recreational activities for the C&R sample. However, without proactively setting up these studies for such a strict statistical comparison, it is impossible to offer any definite conclusions. The main conclusion is that more work in this area is warranted, as a well-designed comparison of a psychosocial intervention delivered at various points during treatment could help streamline delivery of such interventions in clinical settings. If certain components of the psychosocial interventions are, in fact, more relevant and more greatly associated with future well-being, then it would be most time and cost-effective to selectively offer intervention components targeted to the woman and her point in cancer treatment.

Table 1.

*Aims, strategies, and techniques of the cognitive-behavioral stress management intervention (reproduced from Antoni, 2003)*

<b>Aims</b>	<b>Strategies</b>	<b>Techniques</b>
Increase awareness of stress response	Provide information (i.e. on stress responses); provide in-session experiences	Didactic and written information, self-monitoring exercises
Teach anxiety reduction skills	Provide relaxation training	PMR, guided imagery, autogenics, deep breathing exercises
Modify cognitive appraisals	Teach CBSM techniques	Cognitive restructuring, rational thought replacement
Build coping skills and increase emotional expressiveness	Provide cognitive, behavioral, and interpersonal skills training; facilitate disclosures	Coping skills training, assertion training, anger management
Reduce social isolation	Build social support network	Group support, raising awareness of social network

Table 2.

*Comparison across Coping and Recovery (C&R) and Coping After Treatment (CAT) samples on numerous participant and study characteristics*

	<b>C&amp;R</b>	<b>CAT</b>
Participant Cancer Stage	Stage 0-3 (non-metastatic)	Stage 1-3 (non-metastatic)
Participant Race/Ethnicity	Mixed	Mixed
Timing of Baseline Assessment	2-8 weeks post- surgery/pre-adjuvant	3-12 months post- surgery/post-adjuvant
Intervention Format	Group-based 10-week CBSM	Group-based 10-week CBSM
Control Condition Format	Group-based 1-day seminar	Group-based 1-day seminar



Table 3.

*Scales used in Coping and Recovery (C&R) and Coping After Treatment (CAT)*

	<b>C&amp;R</b>	<b>CAT</b>
CBSM-Targeted Skills	MOCS-A	MOCS-A
Non-Specific Effects	MOCS-B	MOCS-B
Social Support	SSSS	SSSS
Coping Strategies	Brief COPE	Brief COPE
Emotional Approach Coping	EAC	EAC
Benefit Finding	BFS	BFS
Negative Affect	ABS	ABS
Social Disruption	SIP	SIP

MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile

Table 4.

*Weekly cognitive-behavioral stress management content in Coping and Recovery (C&R) and Coping After Treatment (CAT)*

	<b>C&amp;R</b>	<b>CAT</b>
Week 1	Rationale for Stress Management 7 Group Progressive Muscle Relaxation	Rationale for Stress Management 7 Group Progressive Muscle Relaxation
Week 2	Stress and Awareness Diaphragmatic Breathing, 4 Group Progressive Muscle Relaxation, and Beach Scene Imagery	Stress and Awareness Diaphragmatic Breathing, 4 Group Progressive Muscle Relaxation, and Beach Scene Imagery
Week 3	Automatic Thoughts and Cognitive Distortions Deep Breathing and Counting, Passive Progressive Muscle Relaxation, and Special Place Imagery	Automatic Thoughts and Cognitive Distortions Deep Breathing and Counting, Passive Progressive Muscle Relaxation, and Special Place Imagery
Week 4	Rational Thought Replacement Introduction to Autogenics	Rational Thought Replacement Introduction to Autogenics
Week 5	Coping Autogenics, continued	Coping Autogenics, continued
Week 6	<b><i>Coping, continued*</i></b> Light Meditation	Social Support Colorful Garden Imagery
Week 7	Social Support Color Garden Imagery	Anger Management Meditation
Week 8	Anger Management Meditation and Beach Scene Imagery	Assertiveness Training Mindfulness
Week 9	Assertiveness Training Mindfulness	<b><i>Personal Goals and Values*</i></b> Enchanted Cove
Week 10	Review and Wrap-Up The Enchanted Cove	Review and Wrap-Up Light Meditation

Table 5.

*Demographics and cancer-related variables at baseline for the final Coping and Recovery (C&R; N=143) and Coping After Treatment samples (CAT; N=104)*

	<b>C&amp;R</b>	<b>CAT</b>	<b>F</b>	<b>df</b>	<b>p-</b>
	<b>mean (SD)</b>	<b>mean (SD)</b>			<b>value</b>
Age	50.55(9.36)	49.93(7.64)	0.30	1,243	p>.5
Years of Education	15.47(2.40)	15.29(3.27)	0.24	1,244	p>.6
Days From Surgery to Baseline Assessment	41.98(25.35)	419.38(148.09)	894.04	1,245	p<.01
MOCS-Tension	9.29(2.58)	9.45(2.72)	0.21	1,241	p>.6
MOCS-Relaxation	4.36(1.98)	4.36(2.12)	0.00	1,245	p>.9
MOCS-Coping	15.24(4.08)	15.77(4.28)	0.98	1,245	p>.3
MOCS-Assertiveness	9.49(2.81)	9.79(2.50)	0.75	1,245	p>.3
MOCS-Bonding	8.00(1.57)	8.35(1.83)	2.54	1,245	p>.1
MOCS-Downward Comparison	7.52(1.69)	7.65(1.68)	0.35	1,245	p>.5
MOCS-Normalization	8.17(3.09)	7.68(3.35)	1.38	1,245	p>.2
SSSS-Emotional Support-Partner	25.40(5.17)	24.68(5.51)	0.09	1,181	p>.7
SSSS-Emotional Support-Friends	26.36(3.82)	24.59(5.08)	9.61	1,241	p<.01

SSSS-Informational Support-Partner	2.58(1.18)	2.36(1.29)	1.42	1,180	p>.2
SSSS-Informational Support-Friends	3.07(1.22)	2.43(1.04)	18.43	1,242	p<.01
SSSS-Instrumental Support-Partner	3.85(1.18)	3.31(1.31)	8.28	1,178	p<.01
SSSS-Instrumental Support-Friends	2.88(1.43)	2.67(1.41)	1.30	1,236	p>.2
Brief COPE- Denial	0.78(1.23)	0.72(1.32)	0.14	1,245	p>.7
Brief COPE-Behavioral Disengagement	0.43(1.11)	0.44(1.07)	0.01	1,244	p>.9
Brief COPE- Active Coping	4.50(1.50)	3.93(1.66)	7.79	1,245	p<.01
Brief COPE- Positive Reframing	3.93(1.84)	3.39(1.93)	4.90	1,245	p<.03
Brief COPE- Humor	2.34(1.93)	1.62(1.76)	8.80	1,245	p<.01
Brief COPE- Acceptance	4.94(1.35)	4.90(1.38)	0.04	1,245	p>.8
EAC-Expression	16.68(4.80)	15.01(4.88)	7.17	1,245	p<.01
EAC-Processing	16.50(4.71)	15.40(5.14)	3.04	1,245	p>.05

BFS	55.86(15.58)	55.71(13.05)	0.01	1,245	p>.9
ABS-Negative	43.22(11.42)	44.01(12.12)	0.27	1,245	p>.6
SIP-Recreations and Pastimes	325.08(66.36)	307.61(75.77)	3.67	1,243	p>.05
SIP-Social Interactions	912.58(167.76)	878.42(179.72)	2.31	1,241	p>.1
	<b>C&amp;R</b>	<b>CAT</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>p-</b>
	<b>n (%)</b>	<b>n (%)</b>			<b>value</b>
Race/Ethnicity					
White	95(67%)	69(67%)	0.23	3	p>.9
Hispanic	33(23%)	24(23%)			
Black	11(8%)	7(7%)			
Asian	3(2%)	3(3%)			
Stage					
1	66(46%)	43(41%)	0.78	2	p>.6
2	63(44%)	48(62%)			
3	14(10%)	13(13%)			
Surgery					
Lumpectomy	77(54%)	63(61%)	1.11	1	p>.2
Mastectomy	66(46%)	41(39%)			
Received Chemotherapy	97(68%)	76(73%)	0.79	1	p>.3
Received Radiation	88(62%)	82(80%)	8.41	1	P<.01
Received Tamoxifen	106(74%)	77(74%)	0.00	1	p>.9

MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile

Table 6.

*Test statistics (F values) and significance (p values) for time by condition, time by sample, and time by condition by sample effects in Time 1 to Time 2 repeated measures analysis of variance*

<b>Scale</b>	<b>Time by Condition</b>	<b>Time by Sample</b>	<b>Time by Condition by Sample</b>
<b>PROXIMAL OUTCOMES</b>			
MOCS-Tension (df=1,241)	F=2.71, p>.1	F=0.43 p>.5	F=1.03, p>.3
MOCS-Relaxation (df=1,241)	F=13.52, p<.01*	F=0.69, p>.4	F=0.45, p>.5
MOCS-Coping (df=1,241)	F=0.12, p>.7	F=0.44, p>.5	F=0.24, p>.6
MOCS-Assertiveness (df=1,241)	F=0.46, p>.4	F=0.39, p>.5	F=0.16, p>.6
MOCS-Bonding (df=1,241)	F=6.72, p=.01*	F=0.70, p>.4	F=0.24, p>.6
MOCS-Downward Comparison (df=1,241)	F=0.47, p>.4	F=0.41, p>.5	F=0.92, p>.3
MOCS-Normalization (df=1,241)	F=0.58, p>.4	F=0.26, p>.6	F=0.48, p>.4
SSSS-Emotional Support-Partner (df=1,241)	F=0.92, p>.3	F=0.60, p>.4	F=1.56, p>.2
SSSS-Emotional Support-Friends (df=1,241)	F=0.40, p>.5	F=2.22, p>1	F=0.41, p>.5
SSSS-Informational Support-Partner (df=1,241)	F=2.01, p>.1	F=0.54, p>.4	F=0.98, p>.3
SSSS-Informational Support-Friend (df=1,241)	F=3.70, p>.05	F=0.71, p>.4	F=1.90, p>.1
SSSS-Instrumental Support-Partner (df=1,241)	F=0.63, p>.4	F=1.05, p>.3	F=1.47, p>.2

SSSS-Instrumental Support-Friend (df=1,241)	F=2.54, p>.1	F=0.70, p>.4	F=0.71, p>.4
Brief COPE-Denial (df=1,241)	F=2.33, p>.1	F=0.90, p>.3	F=1.14, p>.2
Brief COPE-Behavioral Disengagement (df=1,241)	F=0.61, p>.4	F=0.36, p>.5	F=1.49, p>.2
Brief COPE-Active Coping (df=1,241)	F=2.03, p>.1	F=0.71, p>.4	F=0.50, p>.4
Brief COPE-Positive Reframing (df=1,241)	F=0.44, p>.5	F=0.22, p>.6	F=2.58, p>.1
Brief COPE-Humor (df=1,241)	F=0.85, p>.3	F=0.23, p>.6	F=0.30, p>.5
Brief COPE-Acceptance (df=1,241)	F=0.55, p>.4	F=0.85, p>.3	F=1.93, p>.1
EAC-Expression (df=1,241)	F=1.14, p>.2	F=0.55, p>.4	F=0.33, p>.5
EAC-Processing (df=1,241)	F=1.42, p>.2	F=0.59, p>.4	F=2.08, p>.1
<b>DISTAL OUTCOMES</b>			
BFS (df=1,238)	F=3.93, p<.05*	F=0.32, p>.5	F=0.39, p>.5
ABS-Negative Affect (df=1,238)	F=0.19, p>.6	F=0.30, p>.5	F=0.49, p>.4
SIP-Recreations and Pastimes (df=1,238)	F=0.51, p>.4	F=5.19, p<.03*	F=0.39, p>.5
SIP-Social Interactions (df=1,238)	F=0.29, p>.5	F=0.38, p>.5	F=0.99, p>.3

\*=*Significant F values*

MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile



Table 7.

*Means and standard errors for statistically significant condition by time effects for Measure of Current Status (MOCS)-Relaxation, MOCS-Bonding, and Benefit Finding Scale (BFS) by sample (Coping and Recovery and Coping After Treatment)*

<b>MOCS-Relaxation</b>	<b>Time 1</b>	<b>Time 2</b>
Coping and Recovery		
CBSM	4.42 (0.33)	6.33 (0.40)
PE	4.25 (0.32)	5.03 (0.39)
Coping After Treatment		
CBSM	4.53 (0.43)	6.07 (0.59)
PE	4.26 (0.39)	4.87 (0.61)
<b>MOCS-Bonding</b>	<b>Time 1</b>	<b>Time 2</b>
Coping and Recovery		
CBSM	8.19 (0.27)	8.76 (0.31)
PE	8.09 (0.26)	8.05 (0.30)
Coping After Treatment		
CBSM	8.02 (0.36)	8.67 (0.43)
PE	8.30 (0.32)	8.38 (0.50)
<b>BFS</b>	<b>Time 1</b>	<b>Time 2</b>
Coping and Recovery		
CBSM	55.81 (2.34)	61.43 (3.25)
PE	57.32 (2.27)	59.11 (3.61)
Coping After Treatment		
CBSM	55.05 (3.08)	59.40 (4.84)
PE	54.78 (2.86)	56.18 (8.53)

Table 8.

*Means and standard errors for statistically significant condition by sample effect for Sickness Impact Profile (SIP) – Recreations and Pastimes*

<b>SIP-Recreations &amp; Pastimes</b>	<b>Time 1</b>	<b>Time 2</b>
Coping and Recovery	314.43 (10.78)	324.46 (31.80)
Coping After Treatment	321.68 (12.68)	281.30 (140.19)

Table 9.

*Model fit indices and chi-square difference tests for multiple group analysis*

<b>Scale</b>	<b>Constrained Model</b>	<b>Unconstrained Model</b>	<b>Chi-Square Difference</b>	<b>df</b>	<b>p-value</b>
PROXIMAL OUTCOMES					
MOCS-Tension	$\chi^2=15.07$ df=28 p>.90	$\chi^2=15.03$ df=25 p>.90	0.04	3	p>.90
MOCS-Relaxation	$\chi^2=15.45$ df=28 p>.90	$\chi^2=14.68$ df=25 p>.90	0.77	3	p>.80
MOCS-Coping	$\chi^2=14.40$ df=28 p>.90	$\chi^2=12.91$ df=25 p>.90	1.49	3	p>.60
MOCS-Assertiveness	$\chi^2=13.70$ df=28 p>.90	$\chi^2=12.34$ df=25 p>.90	1.36	3	p>.70
MOCS-Bonding	$\chi^2=19.78$ df=28 p>.80	$\chi^2=17.84$ df=25 p>.80	1.94	3	p>.50
MOCS-Downward Comparison	$\chi^2=26.72$ df=28 p>.50	$\chi^2=26.83$ df=25 p>.30	0.10	3	p>.90
MOCS-Normalization	$\chi^2=20.68$ df=28 p>.80	$\chi^2=18.70$ df=25 p>.80	1.99	3	p>.50
SSSS-Emotional Support-Partner	$\chi^2=6.30$ df=28 p>.90	$\chi^2=4.72$ df=25 p>.90	1.57	3	p>.60
SSSS-Emotional Support-Friends	$\chi^2=11.54$ df=28 p>.90	$\chi^2=9.95$ df=28 p>.90	1.59	3	p>.60
SSSS-Informational Support-Partner	$\chi^2=5.16$ df=28 p>.90	$\chi^2=5.09$ df=25 p>.90	0.07	3	p>.90
SSSS-Informational Support-Friends	$\chi^2=18.92$ df=28 p>.90	$\chi^2=16.54$ df=28 p>.80	2.38	3	p>.40

SSSS-Instrumental Support-Partner	$\chi^2=3.88$ df=28 p>.90	$\chi^2=2.88$ df=25 p>.90	1.00	3	p>.80
SSSS-Instrumental Support-Friends	$\chi^2=15.35$ df=28 p>.90	$\chi^2=11.32$ df=25 p>.90	4.03	3	p>.20
Brief COPE-Denial	$\chi^2=16.98$ df=28 p>.90	$\chi^2=13.82$ df=25 p>.90	3.15	3	p>.30
Brief COPE-Behavioral Disengagement	$\chi^2=17.57$ df=28 p>.90	$\chi^2=15.16$ df=25 p>.90	2.41	3	p>.40
Brief COPE-Active Coping	$\chi^2=14.39$ df=28 p>.90	$\chi^2=13.89$ df=25 p>.90	0.50	3	p>.90
Brief COPE-Positive Reframing	$\chi^2=15.55$ df=28 p>.90	$\chi^2=13.59$ df=25 p>.90	1.96	3	p>.50
Brief COPE-Humor	$\chi^2=15.98$ df=28 p>.90	$\chi^2=15.58$ df=25 p>.90	0.40	3	p>.90
Brief COPE-Acceptance	$\chi^2=14.14$ df=28 p>.90	$\chi^2=12.43$ df=25 p>.90	1.71	3	p>.60
EAC-Expression	$\chi^2=14.62$ df=28 p>.90	$\chi^2=13.06$ df=25 p>.90	1.57	3	p>.60
EAC-Processing	$\chi^2=9.54$ df=28 p>.90	$\chi^2=7.08$ df=25 p>.90	2.46	3	p>.40
<b>DISTAL OUTCOMES</b>					
BFS	$\chi^2=11.81$ df=33 p>.90	$\chi^2=10.88$ df=30 p>.90	0.93	3	p>.80
ABS-Negative Affect	$\chi^2=15.52$ df=33 p>.90	$\chi^2=15.28$ df=30 p>.90	0.23	3	p>.90
SIP-Recreations and Pastimes	$\chi^2=13.61$ df=33 p>.90	$\chi^2=10.23$ df=30 p>.90	3.37	3	p>.30

SIP-Social Interactions	$\chi^2=8.00$ df=33 p>.90	$\chi^2=6.20$ df=30 p>.90	1.79	3	p>.60
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MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile

Table 10. *Condition effects on intercept and slope in multiple group analysis over 3 time points collapsed across the two samples (Coping and Recovery and Coping After Treatment)*

<b>Scale</b>	<b>Intercept</b>		<b>Slope</b>	
	<b>z</b>	<b>p</b>	<b>z</b>	<b>P</b>
MOCS-Tension	2.58	.01*	-0.38	>.7
MOCS-Relaxation	3.96	<.01*	-1.64	>.1
MOCS-Coping	0.22	>.8	0.11	>.9
MOCS-Assertiveness	0.79	>.4	0.14	>.8
MOCS-Bonding	1.96	<.05*	-0.63	>.5
MOCS-Downward Comparison	-0.08	>.9	0.88	>.3
MOCS-Normalization	0.60	>.5	0.07	>.9
SSSS-Emotional Support- Partner	-0.23	>.8	0.23	>.8
SSSS-Emotional Support- Friends	-0.38	>.7	0.07	>.9
SSSS-Informational Support-Partner	-0.45	>.6	-0.18	>.8
SSSS-Informational Support-Friends	0.47	>.6	0.24	>.8
SSSS-Instrumental Support-Partner	-0.17	>.8	-0.76	>.4
SSSS-Instrumental Support-Friends	0.72	>.4	-0.42	>.6
Brief COPE-Denial	1.22	>.2	-1.22	>.2

Brief COPE-Behavioral Disengagement	1.09	>.2	-0.19	>.8
Brief COPE-Active Coping	0.60	>.5	-0.19	>.8
Brief COPE-Positive Reframing	0.00	>.8	0.24	>.8
Brief COPE-Humor	0.14	>.8	-0.15	>.8
Brief COPE-Acceptance	-0.07	>.9	0.19	>.8
EAC-Expression	1.31	>.1	-0.27	>.7
EAC-Processing	1.64	>.1	-0.78	>.4
BFS	1.71	>.08	-1.24	>.2
ABS-Negative Affect	-0.32	>.7	-0.36	>.7
SIP-Recreations and Pastimes	0.77	>.4	-0.68	>.4
SIP-Social Interactions	-0.19	>.8	-0.42	>.6

\*=*Significant F values*

MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile

Table 11. *Condition effects on intercept and slope over 4 time points by sample (Coping and Recovery and Coping After Treatment)*

Scale	Coping and Recovery				Coping After Treatment			
	Intercept		Slope		Intercept		Slope	
	z	p	z	p	z	p	z	p
MOCS-Tension	2.56	<.02*	0.03	>.9	0.64	>.5	0.75	>.4
MOCS-Relaxation <sup>†</sup>	0.08	>.9	2.85	<.01*	1.68	>.09	0.02	>.9
MOCS-Coping	-0.64	>.5	0.93	>.3	0.61	>.5	-0.23	>.8
MOCS-Assertiveness	0.11	>.9	0.75	>.4	0.66	>.5	0.03	>.9
MOCS-Bonding	1.68	>.08	0.10	>.9	-0.49	>.6	0.45	>.6
MOCS-Downward Comparison	-1.58	>.1	1.37	>.1	-0.98	>.3	0.51	>.6
MOCS-Normalization	1.14	>.2	0.01	>.9	0.82	>.4	-0.02	>.9
SSSS-Emotional Support-Partner	0.31	>.7	0.16	>.8	0.43	>.9	-0.09	>.9
SSSS-Emotional Support-Friends	-1.29	>.1	-0.22	>.8	0.80	>.4	0.14	>.8
SSSS-Informational Support-Partner	-1.26	>.2	1.32	>.1	-0.45	>.6	0.34	>.7
SSSS-Informational Support-Friends	0.95	>.3	-0.41	>.6	0.48	>.6	-0.39	>.6
SSSS-Instrumental Support-Partner	0.02	>.9	-0.36	>.7	-0.29	>.7	-0.69	>.4
SSSS-Instrumental Support-Friends	-0.46	>.6	0.92	>.3	0.17	>.8	-0.43	>.6



Brief COPE-Denial	1.79	>.06	-0.55	>.5	0.42	>.6	-0.69	>.4
Brief COPE-Behavioral Disengagement	0.73	>.4	0.07	>.9	0.61	>.5	0.21	>.8
Brief COPE-Active Coping	0.43	>.6	0.08	>.9	0.16	>.8	0.36	>.7
Brief COPE-Positive Reframing	0.01	>.9	0.47	>.6	-0.28	>.7	0.27	>.7
Brief COPE-Humor	-0.42	>.6	0.22	>.8	0.12	>.9	-0.04	>.9
Brief COPE-Acceptance	-0.12	>.9	0.31	>.7	-0.61	>.5	0.24	>.8
EAC-Expression	0.52	>.6	1.21	>.2	1.58	>.1	-0.78	>.4
EAC-Processing	2.17	<.04*	0.26	>.7	0.35	>.7	-0.52	>.6
BFS	0.34	>.7	0.15	>.8	0.66	>.5	-0.65	>.5
ABS-Negative Affect	0.07	>.9	-0.95	>.3	0.26	>.7	-0.24	>.8
SIP-Recreations and Pastimes	2.00	<.05*	-1.61	>.1	-0.79	>.4	0.90	>.3
SIP-Social Interactions	-0.82	>.4	-1.12	>.2	-0.81	>.4	0.15	>.8

\*=*Significant F values*

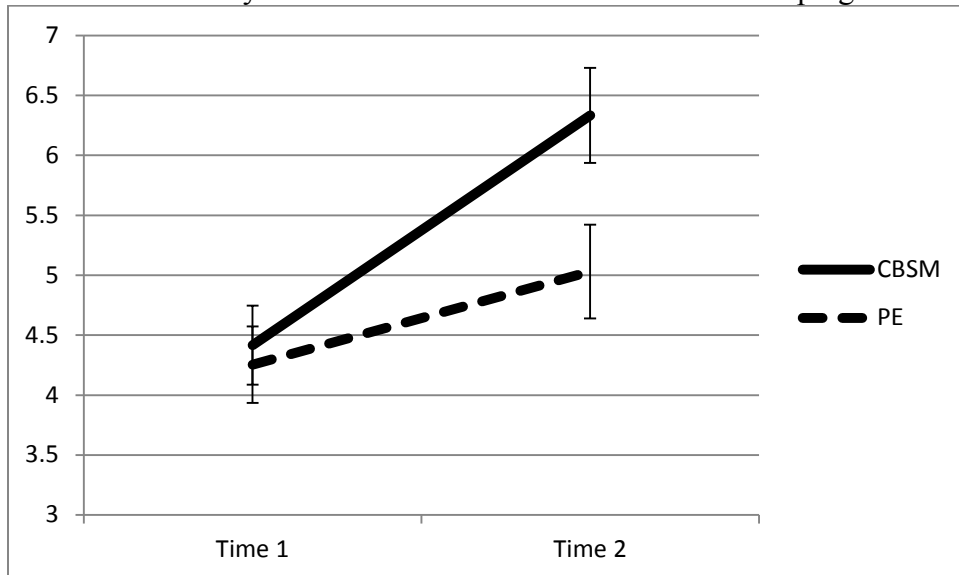
‡As noted in the text, in the latent growth model for the MOCS-Relaxation in the Coping and Recovery sample, the loading associated with the third and fourth time points were estimated in order to achieve good model fit

MOCS = Measure of Current Status; SSSS = Sources of Social Support Scale; Brief COPE = Brief COPE Inventory; EAC = Emotional Approach Coping; BFS = Benefit Finding Scale; ABS = Affect Balance Scale; SIP = Sickness Impact Profile

Figure 1. Study flow chart and attrition by sample and condition

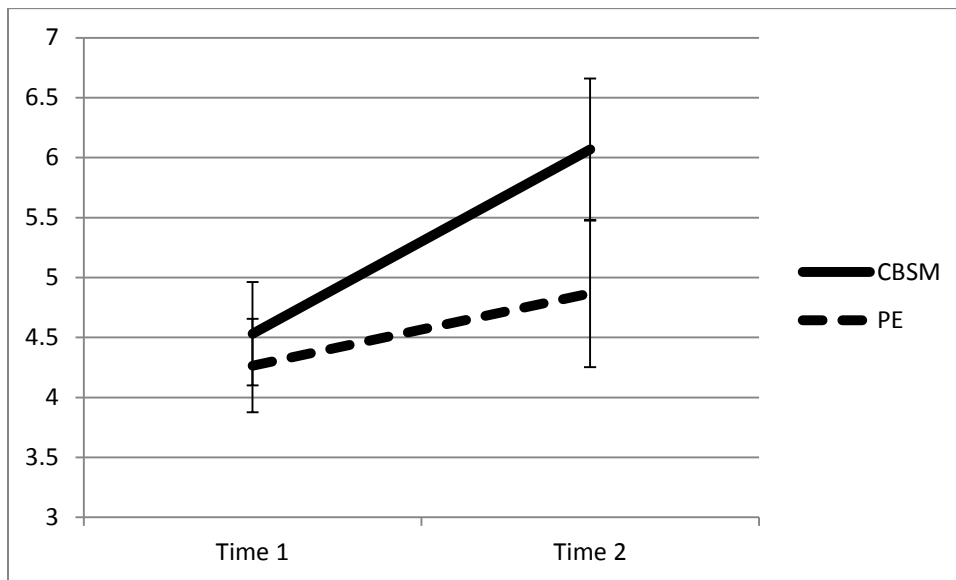
Coping After Treatment			Coping and Recovery	
CBSM	PE		CBSM	PE
120	120	Original Sample	64	58
(19)	(24)	Not Given T2 Assessment	(0)	(0)
(31)	(23)	Stage 0 or No Treatment	(12)	(6)
70	73	Completed T1 Assessment	52	52
63	59	Completed T2 Assessment	45	42
63	65	Completed T3 Assessment	40	44
64	61	Completed T4 Assessment	37	37

Figure 2. RMANCOVA results: Estimated means and standard errors of the MOCS-Relaxation scale by condition at Time 1 and Time 2 in the Coping and Recovery sample



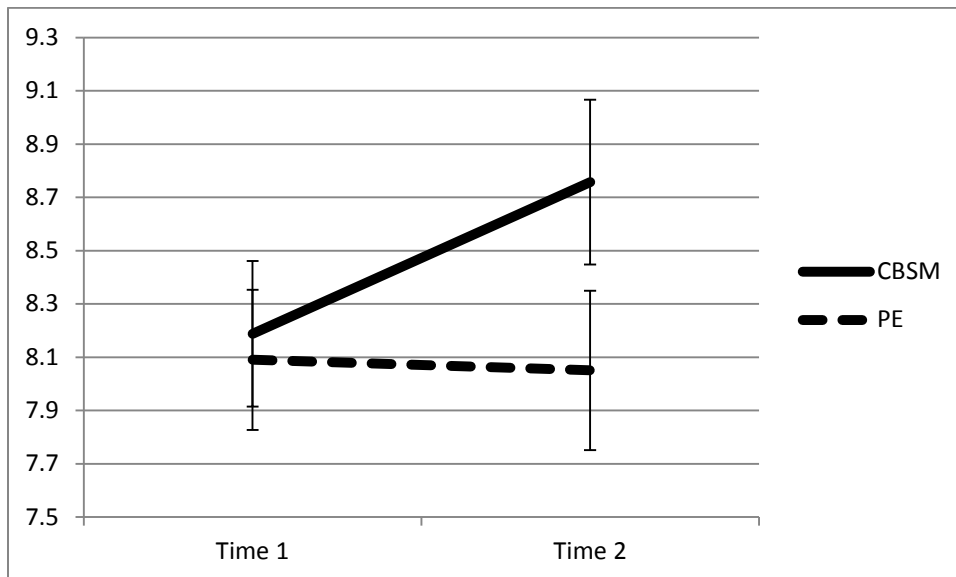
CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control

*Figure 3.* RMANCOVA results: Estimated means and standard errors of the MOCS-Relaxation scale by condition at Time 1 and Time 2 in the Coping After Treatment sample



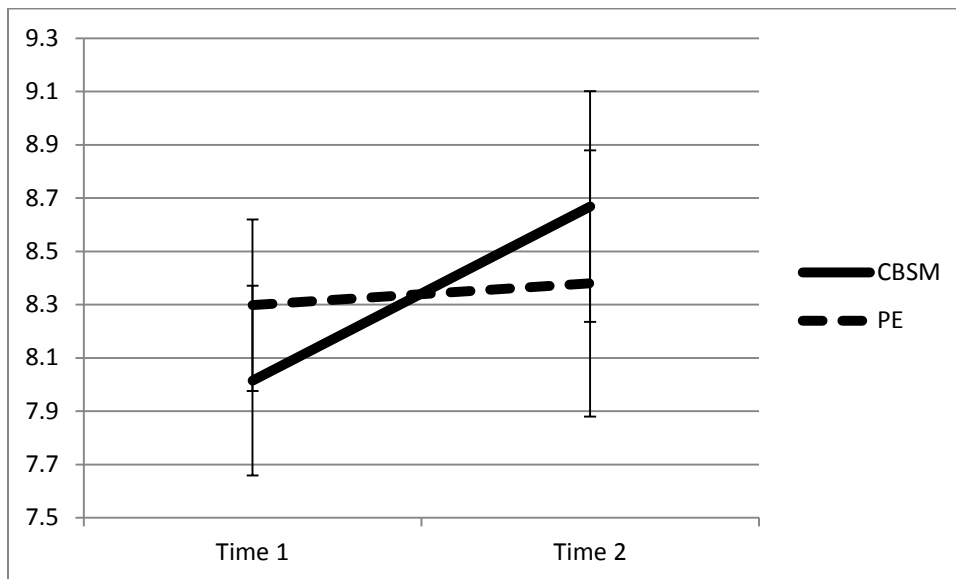
CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control

Figure 4. RMANCOVA results: Estimated means and standard errors of the MOCS-Bonding scale by condition at Time 1 and Time 2 in the Coping and Recovery sample



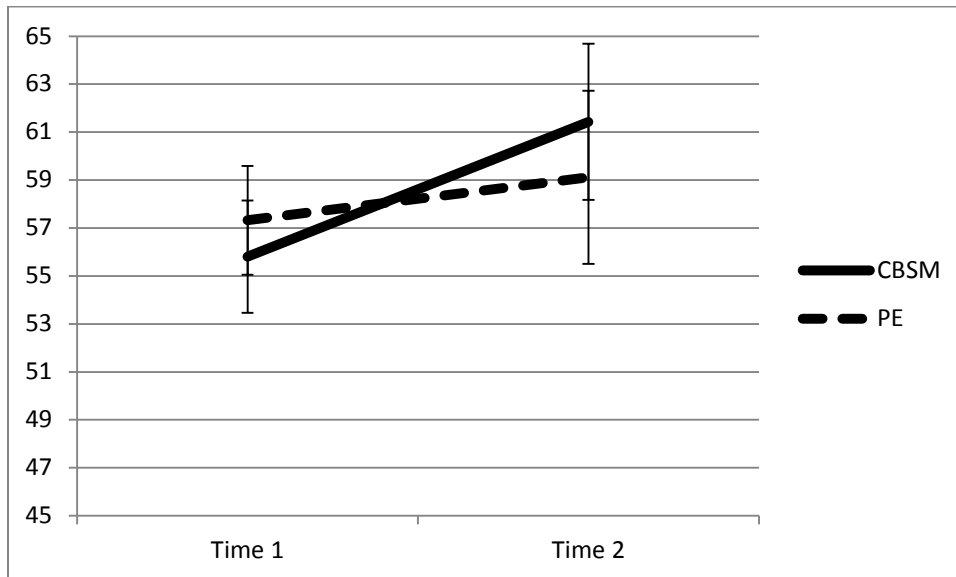
CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control

Figure 5. RMANCOVA results: Estimated means and standard errors of the MOCS-Bonding scale by condition at Time 1 and Time 2 in the Coping After Treatment sample



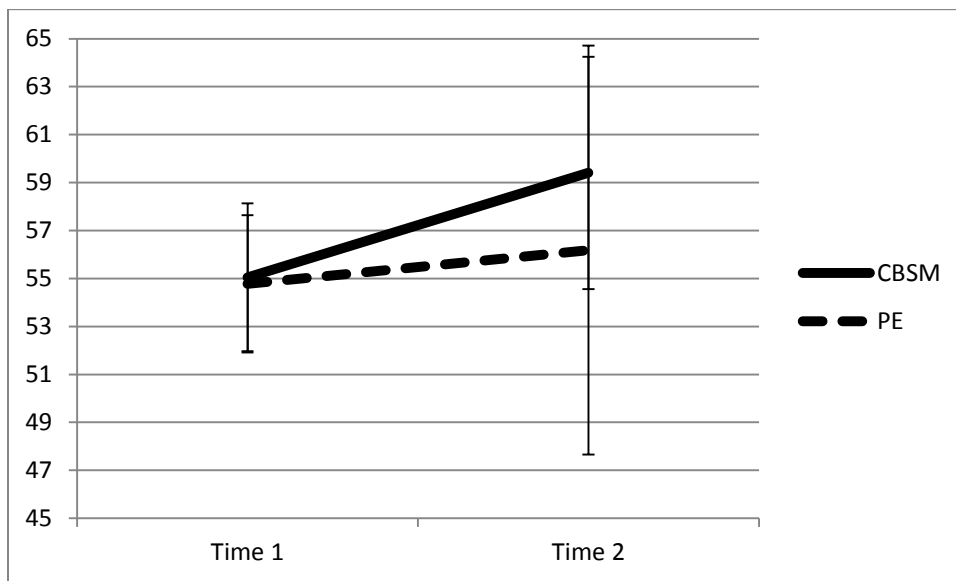
CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control

Figure 6. RMANCOVA results: Estimated means and standard errors of the Benefit Finding Scale by condition at Times 1 and 2 in the Coping and Recovery sample



CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control

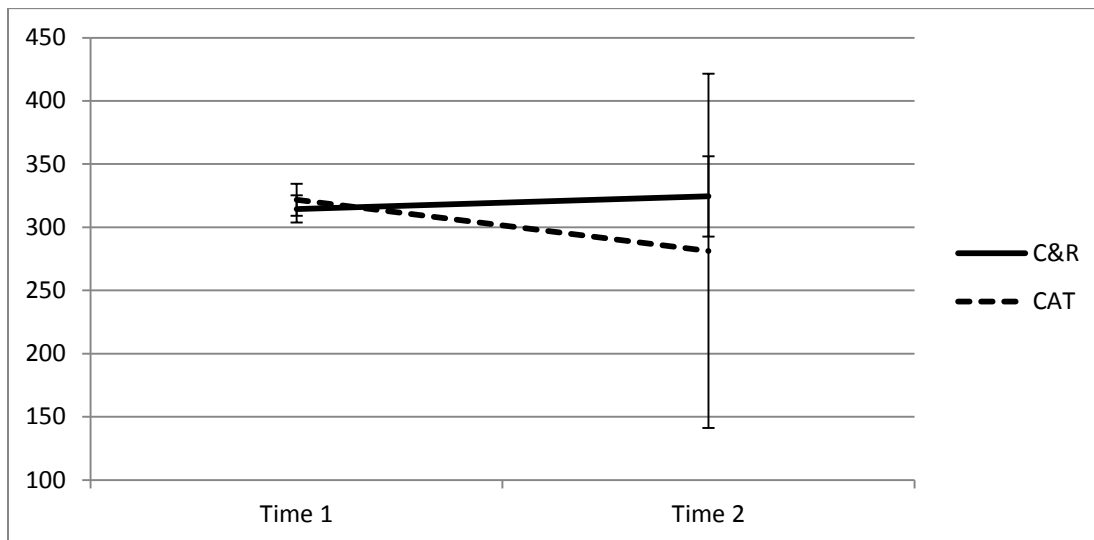
*Figure 7.* RMANCOVA results: Estimated means and standard errors of the Benefit Finding Scale by condition at Times 1 and 2 in the Coping After Treatment sample



CBSM = Cognitive-Behavioral Stress Management; PE = Psychoeducation Control



*Figure 8.* RMANCOVA results: Estimated means and standard errors of the Sickness Impact Profile-Recreations and Pastimes by sample (Coping and Recovery [C&R] versus Coping After Treatment [CAT]) at Times 1 and 2 collapsed across both conditions



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## APPENDIX A: The Measure of Current Status

### MOCS Part A

People have different levels of various skills for responding to the challenges and demands of everyday life. The following items list several things that people are able to do—to a greater or lesser degree—to deal with daily stresses. For each item, indicate how well you *currently can do what it describes*. Please don't indicate what you think you *should* be able to do, or what you *wish* you could do. Be as accurate as you can in reporting your degree of confidence about being able to do each of these things. Choose from the following responses:

- 1 = I cannot do this at all
- 2 = I can do this just a little bit
- 3 = I can do this a medium amount
- 4 = I can do this pretty well
- 5 = I can do this extremely well

- \_\_\_ 1. I am able to use muscle relaxation techniques to reduce any tension I experience
- \_\_\_ 2. I become aware of any tightness in my body as soon as it develops
- \_\_\_ 3. I can clearly express my needs to other people who are important to me
- \_\_\_ 4. I can easily stop and re-examine my thoughts to gain a new perspective
- \_\_\_ 5. It's easy for me to decide how to cope with whatever problems arise
- \_\_\_ 6. I can easily recognize situations that make me feel stressed or upset
- \_\_\_ 7. If I get angry, I can express the anger openly without overdoing it
- \_\_\_ 8. When problems arise I know how to cope with them
- \_\_\_ 9. I notice right away whenever my body is becoming tense
- \_\_\_ 10. It's easy for me to go to people in my life for help or support when I need it
- \_\_\_ 11. I am aware of the stream of thoughts that pass through my mind as events occur
- \_\_\_ 12. I can stand up for my rights without violating the rights of others
- \_\_\_ 13. I am able to use mental imagery to reduce any tension I experience
- \_\_\_ 14. I can express my anger in a balanced and reasonable manner
- \_\_\_ 15. I am confident about being able to choose the best coping responses for hard situations
- \_\_\_ 16. I can come up with emotionally balanced thoughts even during negative times
- \_\_\_ 17. I can ask people in my life for support or assistance whenever I need it

### Part B

People who are dealing with treatment for cancer have many different perceptions and reactions. The following items list several kinds of reactions that people sometimes have. For each item, indicate how much you *currently agree or disagree with what the item says*. Please don't tell us what you think your perceptions and reactions *should* be, or what you *wish* they were. Be as accurate as you can in reporting your degree of agreement or disagreement with each statement. Choose from the following responses:

- 1 = Strongly Disagree
- 2 = Mostly Disagree
- 3 = Neutral—neither agree nor disagree
- 4 = Mostly Agree
- 5 = Strongly Agree

- \_\_\_ 1. Knowing that I've been diagnosed with cancer makes me feel like an outsider in life.

..... Continue with these response choices:

- 1 = Strongly Disagree
- 2 = Mostly Disagree
- 3 = Neutral—neither agree nor disagree
- 4 = Mostly Agree
- 5 = Strongly Agree

- \_\_\_ 2. I'm receiving a lot of positive attention from the people around me
- \_\_\_ 3. I feel strange knowing that I've been treated for cancer
- \_\_\_ 4. I'm better off than most people who have cancer
- \_\_\_ 5. People are making it known to me that they care about my situation and support me
- \_\_\_ 6. I feel a bond to other breast cancer patients
- \_\_\_ 7. I feel grateful I'm not any worse off than I am
- \_\_\_ 8. The fact that I've been treated for cancer makes me feel different from other people.
- \_\_\_ 9. I definitely feel as though people care about my well being
- \_\_\_ 10. I feel a sense of connection to other people who have cancer
- \_\_\_ 11. Most people who have cancer have life a lot harder than I do

## APPENDIX B: Sources of Social Support Scale

*\*Please note that the questions below pertain to the participant's husband or partner. There were separate sections consisting of the same set of items for adult women in your family, other family members, friends, and health care providers*

The next sets of items concern the kinds of help and support you get from various people *regarding your illness*. The items ask about several *different* sets of people, but apply the same questions to each. Use the following choices for these items:

- 1 = Not at all
- 2 = A little
- 3 = A moderate amount
- 4 = A pretty large amount
- 5 = A lot

A. The first items concern your **husband/partner**. [*If you do not have a husband/partner, leave these items blank and skip to section B, number 11*].

- \_\_\_\_\_ 1. How much does your husband/partner give you **advice or information** about your breast cancer (whether you want it or not)?
- \_\_\_\_\_ 2. How much does your husband/partner give you **assistance** with things related to your breast cancer (for example, helping you with daily chores, driving you places, dealing with bills and paperwork)?
- \_\_\_\_\_ 3. How much does your husband/partner give you **reassurance, encouragement, and emotional support** (affection) concerning your breast cancer?
- \_\_\_\_\_ 4. How much does your husband/partner **listen to and try to understand** your worries about your breast cancer?
- \_\_\_\_\_ 5. How much can you **relax and be yourself** around your husband/partner?
- \_\_\_\_\_ 6. How much can you **open up to** your husband/partner if you need to talk about your worries about your cancer?
- \_\_\_\_\_ 7. How often does your husband/partner **argue** with you relating to your cancer?
- \_\_\_\_\_ 8. How often does your husband/partner **criticize** you relating to your cancer?
- \_\_\_\_\_ 9. How often does your husband/partner **let you down** when you are counting on him?
- ~~\_\_\_\_\_ 10. How often does your husband/partner **withdraw from discussions** about your illness or try to **change the topic** away from your illness?~~

## APPENDIX C: Brief COPE Inventory

The next items ask about specific ways that people try to deal with hard situations. We're interested in how many of these reactions *you've* had in trying to deal with *your* surgery. Obviously, different people deal with things in different ways, but we're interested here in how *you've* tried to deal with it. Each item says something about a particular way of coping. We want to know to what extent you've been doing what the item says. How *much* or how *frequently*. *Don't* answer on the basis of whether it seems to be *working* or not—just whether or not you're doing it. Make your answers as true FOR YOU as you can. Use the following response choices:

- 1 = I haven't been doing this at all
- 2 = I've been doing this a little bit
- 3 = I've been doing this a medium amount
- 4 = I've been doing this a lot

- \_\_\_\_\_ 1. I've been turning to work or other activities to take my mind off things.
- \_\_\_\_\_ 2. I've been concentrating my efforts on doing something about the situation I'm in.
- \_\_\_\_\_ 3. I've been saying to myself "this isn't real."
- \_\_\_\_\_ 4. I've been using alcohol or other drugs to make myself feel better.
- \_\_\_\_\_ 5. I've been getting emotional support from my husband/partner.
- \_\_\_\_\_ 6. I've been getting emotional support from my friends.
- \_\_\_\_\_ 7. I've been giving up trying to deal with it.
- \_\_\_\_\_ 8. I've been taking action to try to make the situation better.
- \_\_\_\_\_ 9. I've been refusing to believe that it's really happened.
- \_\_\_\_\_ 10. I've been saying things to let my unpleasant feelings escape.
- \_\_\_\_\_ 11. I've been using alcohol, medications, or other drugs to help me get through it.
- \_\_\_\_\_ 12. I've been spending time, or talking with, my husband/partner to make me feel better.
- \_\_\_\_\_ 13. I've been spending time, or talking with, my friends to make me feel better.
- \_\_\_\_\_ 14. I've been trying to see it in a different light, to make it seem more positive.
- \_\_\_\_\_ 15. I've been trying to come up with a strategy, or plan, about what to do.
- \_\_\_\_\_ 16. I've been getting comfort and understanding from my husband/partner.
- \_\_\_\_\_ 17. I've been getting comfort and understanding from my friends.
- \_\_\_\_\_ 18. I've been giving up the attempt to cope.
- \_\_\_\_\_ 19. I've been looking for something good in what's happening.
- \_\_\_\_\_ 20. I've been making jokes about it.
- \_\_\_\_\_ 21. I've been doing something to think about it less—like going to movies, watching TV, reading, daydreaming, sleeping, or shopping
- \_\_\_\_\_ 22. I've been accepting the reality of the fact that this has happened.
- \_\_\_\_\_ 23. I've been expressing my negative feelings.
- \_\_\_\_\_ 24. I've been trying to find comfort in my religion or spiritual beliefs.
- \_\_\_\_\_ 25. I've been learning to live with it.
- \_\_\_\_\_ 26. I've been thinking hard about what steps to take.
- \_\_\_\_\_ 27. I've been praying or meditating.
- \_\_\_\_\_ 28. I've been making fun of the situation.

## APPENDIX D: Emotional Approach Coping

Continue with these response options:

- 1 = I haven't been doing this at all
- 2 = I've been doing this a little bit
- 3 = I've been doing this a medium amount
- 4 = I've been doing this a lot

- \_\_\_\_\_ 1. I've been letting my feelings come out freely.
- \_\_\_\_\_ 2. I've been taking time to figure out what I'm really feeling.
- \_\_\_\_\_ 3. I've been expressing the feelings I am having.
- \_\_\_\_\_ 4. I've been trying to understand my feelings.
- \_\_\_\_\_ 5. I've been letting my mind be a blank.
- \_\_\_\_\_ 6. I've been finding a way to express my emotions.
- \_\_\_\_\_ 7. I've been trying to figure out what my feelings mean.
- \_\_\_\_\_ 8. I've been trying to remove myself from my thoughts and feelings about it.
- \_\_\_\_\_ 9. I've been getting my feelings out in the open.
- \_\_\_\_\_ 10. I've been exploring my emotions.
- \_\_\_\_\_ 11. I've been taking time to express my emotions.
- \_\_\_\_\_ 12. I've been realizing that my feelings are valid and important.
- \_\_\_\_\_ 13. I've been trying not to have feelings about it.
- \_\_\_\_\_ 14. I've been allowing myself to express my emotions.
- \_\_\_\_\_ 15. I've been working on understanding my feelings.

## APPENDIX E: Benefit Finding

Cancer patients sometimes feel that having cancer makes contributions to their lives, as well as causing problems. Indicate how much you agree with each of the following, using these response options.

- 1 = Not at all
- 2 = A little
- 3 = Moderately
- 4 = Quite a bit
- 5 = Extremely

Having had breast cancer . . .

- \_\_\_\_\_ 1. has led me to be more accepting of things.
- \_\_\_\_\_ 2. has taught me how to adjust to things I cannot change.
- \_\_\_\_\_ 3. has helped me take things as they come.
- \_\_\_\_\_ 4. has brought my family closer together.
- \_\_\_\_\_ 5. has made me more sensitive to family issues.
- \_\_\_\_\_ 6. has made me more grateful for each day.
- \_\_\_\_\_ 7. has taught me that everyone has a purpose in life.
- \_\_\_\_\_ 8. has shown me that all people need to be loved.
- \_\_\_\_\_ 9. has confirmed my faith in God
- \_\_\_\_\_ 10. has made me realize the importance of planning for my family's future.
- \_\_\_\_\_ 11. has made me more aware and concerned for the future of all human beings.
- \_\_\_\_\_ 12. has taught me to control my temper.
- \_\_\_\_\_ 13. has taught me to be patient.
- \_\_\_\_\_ 14. has made me a more responsible person.
- \_\_\_\_\_ 15. has given my life better organization.
- \_\_\_\_\_ 16. has made me more productive.
- \_\_\_\_\_ 17. has led me to deal better with stress and problems.
- \_\_\_\_\_ 18. has helped me to budget my time better.
- \_\_\_\_\_ 19. has led me to have more friends
- \_\_\_\_\_ 20. has led me to meet people who have become some of my best friends.
- \_\_\_\_\_ 21. has renewed my interest in participating in different activities.
- \_\_\_\_\_ 22. has contributed to my overall emotional and spiritual growth.
- \_\_\_\_\_ 23. has helped me become more aware of the love and support available from other people.
- \_\_\_\_\_ 24. has helped me realize who my real friends are.
- \_\_\_\_\_ 25. has helped me become more focused on priorities, with a deeper sense of purpose in life.
- \_\_\_\_\_ 26. has helped me become a stronger person, more able to cope effectively with future life challenges.
- \_\_\_\_\_ 27. has led me to eat a healthier diet.
- \_\_\_\_\_ 28. has led me to exercise more regularly.
- \_\_\_\_\_ 29. has led me to try to live a healthier lifestyle.

## APPENDIX F: Affect Balance Scale

Next is a list of words that describe the way people sometimes feel. Please indicate whether you have been having any of these feelings **during the past week, including today**. Indicate the degree to which you have felt *each emotion* by choosing from one of the following responses:

- 1 = Never
- 2 = Rarely
- 3 = Sometimes
- 4 = Frequently
- 5 = Always

- |                       |                     |                        |
|-----------------------|---------------------|------------------------|
| _____ 1. nervous      | _____ 14. calm      | _____ 27. guilty       |
| _____ 2. sad          | _____ 15. energetic | _____ 28. enraged      |
| _____ 3. regretful    | _____ 16. loving    | _____ 29. delighted    |
| _____ 4. irritable    | _____ 17. tense     | _____ 30. relaxed      |
| _____ 5. happy        | _____ 18. worthless | _____ 31. vigorous     |
| _____ 6. pleased      | _____ 19. ashamed   | _____ 32. affectionate |
| _____ 7. excited      | _____ 20. angry     | _____ 33. afraid       |
| _____ 8. passionate   | _____ 21. cheerful  | _____ 34. unhappy      |
| _____ 9. timid        | _____ 22. satisfied | _____ 35. remorseful   |
| _____ 10. hopeless    | _____ 23. active    | _____ 36. bitter       |
| _____ 11. blameworthy | _____ 24. friendly  | _____ 37. joyous       |
| _____ 12. resentful   | _____ 25. anxious   | _____ 38. contented    |
| _____ 13. glad        | _____ 26. miserable | _____ 39. lively       |
|                       |                     | _____ 40. warm         |

## APPENDIX G: Sickness Impact Profile

Next are some questions about how well you've resumed your normal activities since your surgery. Following is a list of statements. Tell us which, if any, apply to you. In each case, the statement refers to a negative change in some activity or behavior, compared to what you did before you were diagnosed. Think about the statements as they apply to your activities of **the past few weeks**, and think of them *specifically as they relate to your illness*. That is, if there's some other reason why you haven't been doing an activity or have been behaving differently, something that has nothing to do with your illness or your surgery, then we don't count that. Use these responses:

[1] no      [2] yes, this applies to me

- \_\_\_\_\_ 1. I am going out less to visit people.
- \_\_\_\_\_ 2. I am not going out to visit people at all.
- \_\_\_\_\_ 3. I show less interest in other people's problems, for example, don't listen when they tell me about their problems, don't offer to help.
- \_\_\_\_\_ 4. I often act irritable toward those around me, for example, snap at people, give sharp answers, criticize easily.
- \_\_\_\_\_ 5. I show less affection.
- \_\_\_\_\_ 6. I am doing fewer social activities with groups of people.
- \_\_\_\_\_ 7. I am cutting down the length of visits with friends.
- \_\_\_\_\_ 8. I am avoiding social visits from others.
- \_\_\_\_\_ 9. I talk less with those around me.
- \_\_\_\_\_ 10. I stay alone much of the time.
- \_\_\_\_\_ 11. I isolate myself as much as I can from the rest of the family.
- \_\_\_\_\_ 12. I do my hobbies and recreation for shorter periods of time.
- \_\_\_\_\_ 13. I am going out for entertainment less often.
- \_\_\_\_\_ 14. I am cutting down on some of my usual recreation and pastimes, for example, watching TV or reading.
- \_\_\_\_\_ 15. I am not doing any of my usual recreation and pastimes, for example, watching TV or reading.
- \_\_\_\_\_ 16. I am doing fewer community activities, for example, going to church or doing volunteer work.