

2016-07-22

Brief Psychosocial Intervention Effects on Benefit Finding Among Women with Breast Cancer and the Roles of Distress and Ethnicity

Lisa M. Gudenkauf
University of Miami, lgudenkauf@gmail.com

Follow this and additional works at: https://scholarlyrepository.miami.edu/oa_dissertations

Recommended Citation

Gudenkauf, Lisa M., "Brief Psychosocial Intervention Effects on Benefit Finding Among Women with Breast Cancer and the Roles of Distress and Ethnicity" (2016). *Open Access Dissertations*. 1695.
https://scholarlyrepository.miami.edu/oa_dissertations/1695

This Embargoed is brought to you for free and open access by the Electronic Theses and Dissertations at Scholarly Repository. It has been accepted for inclusion in Open Access Dissertations by an authorized administrator of Scholarly Repository. For more information, please contact repository.library@miami.edu.

UNIVERSITY OF MIAMI

BRIEF PSYCHOSOCIAL INTERVENTION EFFECTS ON BENEFIT FINDING
AMONG WOMEN WITH BREAST CANCER AND THE ROLES OF DISTRESS
AND ETHNICITY

By

Lisa M. Gudenkauf

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

August 2016

©2016
Lisa M. Gudenkauf
All Rights Reserved

UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

BRIEF PSYCHOSOCIAL INTERVENTION EFFECTS ON BENEFIT FINDING
AMONG WOMEN WITH BREAST CANCER AND THE ROLES OF DISTRESS
AND ETHNICITY

Lisa M. Gudenkauf

Approved:

Michael H. Antoni, Ph.D.
Professor of Psychology

Amy G. Weisman de Mamani, Ph.D.
Associate Professor of Psychology

Charles S. Carver, Ph.D.
Professor of Psychology

Bonnie B. Blomberg, Ph.D.
Professor of Microbiology and
Immunology

Suzanne C. Lechner, Ph.D.
Assistant Professor of Psychiatry and
Behavioral Sciences

Guillermo J. Prado, Ph.D.
Dean of the Graduate School

GUDENKAUF, LISA M.
Brief Psychosocial Intervention
Effects on Benefit Finding Among Women with Breast Cancer
and the Roles of Distress and Ethnicity

(Ph.D., Psychology)
(August 2016)

Abstract of a dissertation at the University of Miami.

Dissertation supervised by Professor Michael H. Antoni.
No. of pages in text. (87)

Even while dealing with significant stressors related to breast cancer diagnosis and treatment, many women describe benefits derived from their cancer experience. Previous psychosocial interventions have been shown to increase benefit finding (BF) in post-surgical breast cancer patients, but these interventions have been rather lengthy and comprehensive in nature, raising the question of whether briefer, more specific psychosocial interventions would have similar effects on BF. Additionally, control groups were not attention-matched in previous studies, so the potential impact of group social support could not be controlled. Further, previous psychosocial interventions have examined intervention effects on women regardless of initial distress level. Given that some level of distress may be necessary for the development of BF, it is important to determine the impact of initial distress on BF outcomes. Hispanic breast cancer patients may represent an ethnic subgroup with proportionally greater distress than non-Hispanic White (NHW) women, but few studies have specifically examined potential differential intervention effects on BF in these two ethnic subgroups.

The present study sought to address these limitations by testing whether a brief, 5-week group intervention with Cognitive-Behavioral Training [CBT] or Relaxation Training [RT] could increase BF relative to an attention-matched Health Education [HE] control group in women with breast cancer. This study also tested whether intervention-

related changes in BF were moderated by women's initial distress levels in order to determine if intervention effects were greater for women with higher initial distress. Finally, this study tested whether intervention-related changes in BF were moderated by ethnicity to determine if intervention effects were greater for Hispanic women compared to NHW women. The present sample included 183 women with non-metastatic breast cancer who were 2-10 weeks post-surgery at the time of their baseline assessment (T1) and were re-assessed post-intervention (T2; approximately 2 months post-baseline), 6 months post-baseline (T3), and 12 months post-baseline (T4).

In uncontrolled regression analyses, BF increased from T1 to T2 for women in all three conditions, but controlled analyses demonstrated T1 to T2 BF increase only for women in CBT. Latent growth modeling (LGM) tested intervention effects on BF at the three follow-up assessments (T2 to T4). A linear LGM model revealed a significant difference between CBT and HE groups in T2 to T4 change in BF, but no difference in BF slope was found between RT and HE groups. LGM results showed no significant moderation effects. Neither measures of distress nor ethnicity were found to moderate intervention-related changes in BF over time. Hispanic women showed significantly higher levels of BF compared to NHW women at all assessment timepoints.

Findings suggest that a brief, focused CBT intervention can help promote BF, with differences between CBT and HE increasingly evident with increased time since surgery. Results also suggest that Hispanic cultural factors may contribute to higher BF among Hispanic women compared to NHW women in the year following primary surgery for breast cancer. Future work should explore the specific factors contributing to higher BF among women receiving CBT intervention and among Hispanic women.

Future studies could also expand upon this work by testing brief CBT and RT group interventions with additional study populations, by extending the study period, and by providing these interventions at different points along the cancer survivorship trajectory. Finally, implementation studies are needed to determine whether use of these brief group-based psychosocial interventions can be of help to patients in real-world clinical settings.

TABLE OF CONTENTS

	Page
LIST OF TABLES	v
LIST OF FIGURES	vi
 Chapter	
1 INTRODUCTION	1
Theoretical Background	2
Psychological Interventions and Benefit Finding	3
The Role of Distress in Benefit Finding	9
Assessment of Initial Distress	10
Indicators of Distress	11
Ethnic Differences	15
Medical and Sociodemographic Correlates of Benefit Finding	17
Current Study Aims and Hypotheses	19
Aim 1	20
Aim 2	21
Aim 2a	21
Aim 2b	21
2 METHOD	23
Participants	23
Procedures	23
Intervention Conditions	25
Cognitive-behavioral training	26
Relaxation training	26
Health education	27
Measures	28
Benefit finding	28
General affective distress	28
Cancer-specific cognitive distress	29
Physiological distress.....	29
Ethnicity	30
Covariates	30
Analytic Approach	31
Aim 1	31
Aim 2	32
Aim 2a	32
Aim 2b	33
Covariates	33

3	RESULTS	34
	Sample Demographics	34
	Aim 1	36
	Aim 2	39
	Aim 2a	39
	Aim 2b	41
4	DISCUSSION	44
	Intervention Effects on Benefit Finding	45
	Distress and Ethnicity as Moderators of Intervention Effects	48
	Strengths and Limitations	52
	Strengths	52
	Limitations	53
	Future Directions	54
	TABLES	57
	FIGURES.....	62
	REFERENCES	71
	APPENDIX OF MEASURES	85

LIST OF TABLES

TABLE 1:	57
TABLE 2:	59
TABLE 3:	60
TABLE 4:	61

LIST OF FIGURES

FIGURE 1:	62
FIGURE 2:	63
FIGURE 3:	64
FIGURE 4:	65
FIGURE 5:	66
FIGURE 6:	67
FIGURE 7:	68
FIGURE 8:	69
FIGURE 9:	70

Chapter 1: Introduction

Breast cancer mortality rates in the United States have declined in recent decades thanks to increased public awareness as well as advances in screening and treatment (American Cancer Society, 2014). Yet breast cancer is still the second leading cause of cancer incidence and cancer-related deaths among women in the U.S., with a lifetime prevalence of 1 in 8 and a mortality rate of 1 in 36 (American Cancer Society, 2014). Not only do breast cancer patients report greater distress than healthy women (Christensen et al., 2009), research suggests that women with breast cancer endorse higher distress levels than most other cancer survivors (Herschbach et al., 2004). Following breast cancer diagnosis, women describe experiencing numerous cancer-related stressors, including financial burdens, treatment side-effects, fear of cancer recurrence, and fear of death (Ganz, 2008; Herschbach et al., 2004; Spencer et al., 1999). For many women with breast cancer, these acute and chronic stressors become so overwhelming that women describe the experience as a life crisis (Pascoe & Edvardsson, 2013; Spencer et al., 1999).

In the midst of this crisis, however, many women are able to find benefits in the experience. In fact, as many as 83% of women report finding some benefit in their cancer experience (Sears, Stanton, & Danoff-Burg, 2003). Women report benefits in the domains of family and social relations as well as life satisfaction, among others (Antoni et al., 2001). This ability to perceive positive life changes after crisis, or benefit finding (BF; Lechner, Park, Stanton, & Antoni, 2009) has been shown in some studies to predict psychological adjustment (Carver & Antoni, 2004) and health outcomes (Algoe &

Stanton, 2009), underscoring the value of studying BF and exploring ways in which BF may be promoted (Stanton, Revenson & Tennen, 2007).

Theoretical Background

While the prevalence of BF among trauma survivors has now been well documented (Helgeson, Reynolds, & Tomich, 2006), the mechanisms underlying the development of BF are less clear. Theorists have posited that BF develops as an outcome of an individual's search for meaning following a traumatic experience (Park & Folkman, 1997; Taylor, 1983). In Taylor's (1983) interview study of breast cancer survivors, more than half of women described perceived benefits derived from the experience of breast cancer, including reprioritization, a more positive attitude, and greater self-knowledge. The breast cancer diagnosis appeared to serve as a "catalytic agent" (Taylor, 1983, p.1163) for meaningful restructuring of women's lives. According to cognitive adaptation theory (Taylor, 1983), individuals engage in a meaning-making process in which they seek to understand why the trauma event happened and also evaluate how the event has impacted their lives. In this latter effort to explore the personal impact of the event, individuals often reappraise their lives in a way that leads to the discovery of positive outcomes (Tomich & Helgeson, 2004). BF is, therefore, conceptualized as an outcome of the search for meaning and positive implications during cognitive adaptation to traumatic experiences, such as breast cancer (Taylor, 1983).

Due to the central role of perception in BF theory, BF has been commonly assessed using self-report measures (Tennen & Affleck, 2009), such as the Benefit Finding Scale (BFS; Antoni et al., 2001; Tomich & Helgeson, 2004). Some researchers have questioned whether these self-report measures reflect actual life changes, but others

emphasize the importance of capturing perception and argue that perceived rather than actual experience may better predict behavior (Tennen & Affleck, 2009). Indeed, illness perception has predicted later adjustment within medical populations (Petrie & Corter, 2009). Among breast cancer patients, perceived disease severity predicts long-term adjustment (Stanton, Bower, & Low, 2006) despite the fact that fewer than 50% of women accurately reported their cancer stage (Vothang, Lechner, Tocco, & Glück, 2006).

Both theory and empirical evidence suggest that perceiving benefits in the cancer experience may relate to enhanced sense of mastery among breast cancer patients (Antoni et al., 2001; Antoni et al., 2006a; Taylor, 1983) leading to more positive coping behaviors and emotions (Pascoe & Edvardsson, 2013). BF has been associated with better adjustment to breast cancer (Lechner & Weaver, 2009) as indicated by more approach-oriented active coping (Sears et al., 2003), positive reappraisal (Helgeson et al., 2006), and emotional processing (Antoni et al., 2001). Women's ability to perceive benefits has been shown to predict improvements in psychological outcomes, including improved quality of life (QOL; Carver & Antoni, 2004; Schwarzer, Luszczynska, Boehmer, Taubert, & Knoll, 2006), increased positive affect (Bower et al., 2005b; Carver & Antoni, 2004), and reduced distress (Urcuyo, Boyers, Carver, & Antoni, 2005), depression, and negative affect up to 7 years later (Carver & Antoni, 2004). Additionally, BF can predict improvements in physical functioning (Algoe & Stanton, 2009) and physiological health measures (Pascoe & Edvardsson, 2013).

Psychological Interventions and Benefit Finding

The theoretical role of cognitions in BF and the psychological correlates of BF point to opportunities for psychological interventions to increase BF. One theoretical

model offered by Antoni, Carver, and Lechner (2009) suggests that psychological interventions may promote psychosocial adaptation (including BF) by increasing awareness of unhelpful thinking styles, promoting more positive reappraisals, facilitating emotional processing, enhancing social support, and promoting reduced activation and increased relaxation skills. This theoretical position has been supported, in part, by empirical evidence identifying increased emotional processing and increased relaxation skills as potential mediators of psychosocial intervention effects on BF (Antoni et al., 2006a).

Unfortunately, BF measures have not often been included in studies of psychological interventions for those with medical illness. Spiegel, Bloom, Kraemer, and Gottheil's (1989) Supportive Expressive Therapy (SET), which promotes emotional expression and processing, showed psychological effects (improved mood) for women with breast cancer and appeared to increase survival time by 18 months among women with metastatic breast cancer. SET involves techniques that could likely foster BF (Carver, Lechner, & Antoni, 2009), but BF was not measured in this study, so conclusions about the role of BF in this study must be delicately drawn (Coyne & Tennen, 2010). A 10-week Cognitive-Behavioral Stress Management (CBSM) group intervention has been shown to increase BF in both prostate cancer (Penedo et al., 2006) and breast cancer (Antoni et al., 2001; Antoni et al., 2006a), relative to a half-day education seminar control group. Increases in BF for women with non-metastatic breast cancer were maintained at 3-month and 9-month follow-ups (Antoni et al., 2001).

Notably, increases in BF from pre- to post-CBSM intervention predicted improvements in objective markers of physiological functioning. BF changes after

CBSM predicted increased lymphocyte proliferation (McGregor et al., 2004) at 3-month follow-up, which has been associated with reduced recurrence risk (Antoni, 2012).

Intervention-related changes in BF have also been shown to mediate intervention-related reductions in afternoon serum cortisol levels immediately following CBSM intervention in breast cancer patients (Cruess et al., 2000). In fact, improvements in physiological measures with psychosocial interventions among breast cancer patients have generally not been found if psychological effects, such as increased BF, were not first established (Antoni, 2012; McGregor & Antoni, 2009). Additionally, recent findings suggest that the same CBSM intervention which increased BF among non-metastatic breast cancer patients may confer a survival advantage for women up to 15 years following study enrollment (Stagl et al., 2015), though potential psychological mediators of this survival effect have yet to be tested.

To date most major psychological intervention trials that have shown positive effects in breast cancer patients involve lengthy intervention periods, from 10 weekly sessions (Antoni et al., 2001) to 4 months of weekly sessions plus 8 monthly sessions (Andersen et al., 2004) to 1 year of weekly sessions (Spiegel et al., 1989). These lengthy interventions may not be practical for use in real-world oncology settings where resources and time may be limited (Stanton, Lueken, MacKinnon, & Thompson, 2013). Brief interventions have recently been developed to target distressed cancer subgroups, such as those with advanced cancer (Lo et al., 2014; Ramachandra, Booth, Pieters, Vrotsou, & Huppert, 2009) or those meeting diagnostic criteria for a psychological disorder (Hopko et al., 2011; Kangas, Milross, Taylor, & Bryant, 2013), while others have focused on addressing specific cancer-related symptoms, such as sleep disturbance

(Nakamura, Lipschitz, Kuhn, Kinney, & Donaldson, 2013) or fatigue (Armes, Chalder, Addington-Hall, Richardson, & Hotopf, 2007; Fillion et al., 2008), and even health behaviors like smoking (Thomsen et al., 2010). Several of these brief interventions have involved intervention periods from as short as a one-day (e.g., Jones et al., 2013) up to 3-6 weeks (e.g., Northouse et al., 2013). However, few of these brief interventions involve group psychotherapy techniques designed to promote positive psychological outcomes among non-metastatic breast cancer patients. A review of psychoeducational, social/emotional support, and cognitive-behavioral therapy (CBT) interventions for breast cancer patients showed that CBT-oriented interventions have the greatest effects on positive and negative QOL measures but that the most successful interventions have lasted a minimum of 6-12 weeks (Fors et al., 2011). Another recent review of positive psychological interventions in breast cancer found that the majority of mindfulness-based stress reduction (MBSR) interventions that have been successful in improving a broad-range of positive psychological outcomes have involved 8 weekly sessions (Casellas-Grau, Font, & Vives, 2014). Whether improvements in positive psychological outcomes, such as BF, would be achieved by even shorter interventions is less clear.

To my knowledge, only one study has previously investigated the effect of a shorter group CBSM intervention on BF specifically in women with Stage 0 – IV breast cancer (Groarke, Curtis, & Kerin, 2012). This recent study conducted in Ireland condensed the content from 8 of Antoni's (2003) 10 CBSM sessions (excluding anger management and assertion training sessions) into five 3-hour weekly group sessions. Groarke and colleagues (2012) assessed perceived benefits from the breast cancer experience using the 38-item Silver Lining Questionnaire (SLQ; Sodergren & Hyland,

2000). A group by time interaction was found, demonstrating significantly increased post-intervention BF for the intervention group compared to a standard care control group. However, levels of BF in the control group improved to an equivalent level by 12 months, so BF differences between intervention and control groups were not maintained (Groarke et al., 2012).

The 5-week duration of Groarke and colleagues' (2012) intervention appears to be in line with attendance data from one CBSM intervention (Antoni et al., 2006a) indicating that the improvements in psychological adaptation achieved by women who attended only 5 of the 10 weekly CBSM sessions were not significantly different from those who attended all 10 sessions. Based on these data, recent research at the University of Miami has investigated whether shorter psychological interventions including elements of CBSM, with only 5 weekly sessions rather than 10, may be efficacious (Gudenkauf et al., 2015). Rather than condensing the elements of CBSM, this intervention tested the effects of separate 5-week CBT and relaxation training (RT) interventions for women with non-metastatic breast cancer and found improved measures of overall psychological adaptation immediately following intervention. The present study will investigate whether these briefer psychological interventions are efficacious in increasing reported BF among non-metastatic breast cancer patients up to one-year following study enrollment. This investigation is particularly intriguing given longitudinal research suggesting that BF may increase with increased time since surgery (Manne et al., 2004; Sears et al., 2003) as well as theory suggesting that more time may provide more opportunity to perceive benefits (Taylor, 1983). It will be important to follow up on Groarke and colleagues' (2012) investigation to determine whether an

intervention as brief as 5 weeks can prompt women in the United States to find more benefits earlier in the survivorship trajectory and to determine whether these intervention effects will be maintained over the follow-up period.

Beyond its lengthy intervention period, two other current limitations of CBSM should also be addressed. Prior CBSM studies in breast cancer are limited by lack of an attention-matched control group (Lepore & Kernan, 2009). In order to more closely examine the effects of the skills taught through psychological intervention and control for intervention duration, an attention-matched control group is needed. Finally, the multi-theme nature of CBSM makes identification of critical active ingredients somewhat difficult. Studies have shown that the effects of CBSM on BF may be attributable to specific components of the CBSM intervention, including women's perceived ability to relax and express emotions (Antoni et al., 2006a). The effects of CBSM on reductions in cortisol were also associated with increased confidence in using relaxation and cognitive restructuring skills (Phillips et al., 2011). Thus, a reasonable next step was to dismantle CBSM into its active components with two separate intervention groups – CBT and RT – and compare these to an attention-matched health education (HE) control group to separately analyze intervention effects on BF (Antoni, 2012). Separate, focused CBT and RT interventions have previously been shown to have beneficial effects on distress among non-metastatic breast cancer patients, but the intervention period was fairly extensive, consisting of nine ninety-minute sessions (Cohen & Fried, 2007). More recently, separate 5-week CBT and RT interventions have been shown to improve psychological adaptation and intervention-related skills relative to an attention-matched

HE group (Gudenkauf et al., 2015). Whether improvements in BF can be achieved by such brief CBT and RT groups relative to an HE control group is yet to be determined.

The Role of Distress in Benefit Finding

Another important limitation of current psychological intervention studies in breast cancer patients is that intervention effects on BF have been measured across all levels of initial distress. Women vary greatly in their response to breast cancer diagnosis and treatment (Carver et al., 2009). As previously noted, many women perceive this period as a life crisis (Pascoe & Edvardsson, 2013; Spencer et al., 1999), and up to 20-40% of women report clinically significant distress (Iwatani, Matsuda, Kawabata, Miura, & Matsushima, 2013). However, other women report minimal distress and describe the experience as another “bump in the road” of adverse life events (Carver et al., 2009). This range of distress severity in reaction to breast cancer indicates individual differences in perceptions that may influence women’s ability to find benefits. Cognitive adaptation theory (Taylor, 1983) suggests that BF stems from positive evaluations of events that pose a threat to one’s self-esteem or sense of control (Park, 2009). Some level of perceived threat or crisis may, thus, be necessary to challenge women’s assumptions about the world and foster the meaning-making process that promotes BF (Lechner & Antoni, 2004; Petrie & Corter, 2009; Tartaro et al., 2006; Tedeschi & Calhoun, 2004). This line of thinking would suggest that the greater the perceived threat, the greater the challenge to women’s worldviews and the greater the potential for BF (Cordova, Cunningham, Carlson, & Andrykowski, 2001).

Though the literature on BF and distress has been somewhat mixed, some empirical evidence has supported a positive linear relationship between emotional

distress and BF (e.g., Tomich & Helgeson, 2004; Tartaro et al., 2006). Relative to women low in BF, women who are able to find benefits reported high pre-diagnostic distress (Tartaro et al., 2006). Such studies showing high initial distress scores among women high in BF have suggested that sufficient threat must have been perceived to facilitate later positive reappraisals (Tartaro et al., 2006). However, not all women who experience distress during breast cancer are able to construe benefits (Carver et al., 2009; Tartaro et al., 2006). Extreme distress is likely to overwhelm resources for coping and cause a “cognitive shut down” (Lechner et al., 2003) that would hinder BF (Carver et al., 2009). Support for this hypothesis was provided by one study examining initial adjustment and BF in post-surgical breast cancer patients (Lechner et al., 2006). Quadratic relationships between BF and distress were found such that women with low and high levels of initial distress reported less BF than those women experiencing moderate levels of initial distress (Lechner et al., 2006).

Assessment of Initial Distress

The importance of assessing and addressing distress among newly diagnosed cancer patients is gaining increased recognition in both clinical and research settings (Hammonds, 2012). Historically, psychological distress has been under-recognized by doctors and nurses (Mertz et al., 2012), and women have consequently been at risk for inadequate treatment (Hegel et al., 2006). However, clinic-ready measures of distress, including the National Comprehensive Cancer Center’s Distress Thermometer (DT; Holland & Lewis, 2000), are now being implemented in community and university oncology clinics to increase nurse identification of distress and referrals for support (Hammonds, 2012).

Similarly, researchers recognize the need for early distress assessments in order to target interventions toward those at greatest risk for poor adjustment. In prostate cancer, reviews have identified high-risk groups, including ethnic minorities and patients with greatest symptom distress in the early stages of treatment (Cockle-Hearne & Faithfull, 2010; Dale, Adair, & Humphris, 2010) and have called for interventions targeting these high-risk groups. Studies of breast cancer patients have also identified women with high initial distress as being at risk for later distress and poorer adjustment (Costa-Requena, Rodríguez, & Fernández-Ortega, 2013; Koopman et al., 2002), underscoring the need for early distress assessments. Importantly, distress has previously been found to moderate intervention effects on adjustment among cancer survivors (Groarke et al., 2012; Heron-Speirs, Harvey, & Baken, 2012), such that participants reporting the greatest initial distress achieved the greatest intervention-related improvements (Antoni, Carver, & Lechner, 2009; Dale et al., 2010; Monti et al., 2013). Thus, when distress is assessed and addressed, psychological interventions can have beneficial effects for cancer survivors (Antoni et al., 2009).

Indicators of Distress

Distress among cancer survivors can be broadly conceptualized as having emotional, cognitive, and physiological components (Mertz et al., 2012). The emotional component of distress has been a focus of attention among psychologists for some time (Reich, Lesur, & Perdrizet-Chevallier, 2008). It is now well understood that the stressors associated with the experience of cancer can produce general negative affect among survivors and disrupt emotional well-being (Montazeri, 2008; Reich et al., 2008). Breast cancer researchers have commonly used measures of global emotional distress with items

assessing depressed mood and anxiety (Costa-Requena et al., 2013) and have found that global emotional distress is a powerful predictor of adjustment following cancer diagnosis and surgery (Groarke, Curtis, & Kerin, 2013; Iwatani et al., 2013).

Distress from a breast cancer diagnosis can also manifest as cognitive intrusions related to the cancer experience. Women report unwanted thoughts about their breast cancer diagnosis, treatment-related burdens, and fears about recurrence and death (Tatrow & Montgomery, 2006). These intrusive thoughts about breast cancer predict poorer quality of life in the later phases of breast cancer treatment (Golden-Kreutz et al., 2005). Notably, distress in the form of intrusive, cancer-related thoughts has also predicted greater BF among lung cancer (Thornton et al., 2012) and breast cancer patients (Dunn, Occhipinti, Campbell, Ferguson, & Chambers, 2010).

Many empirical studies have acknowledged the multifaceted nature of distress by assessing both global emotional distress and cancer-specific cognitive distress (e.g., Antoni et al., 2006b; Groarke et al., 2013; Jensen-Johansen et al., 2013; Mehnert & Koch, 2007; Turner, Kelly, Swanson, Allison, & Wetzig, 2005), but few studies have also included physiological measures of distress (e.g., McGregor et al., 2004). It is important to recognize that in addition to the emotional and cognitive components of distress, breast cancer patients also experience distress physiologically. Threat appraisals that elicit psychological distress can initiate a variety of biological processes related to tumor progression among breast cancer patients (McGregor & Antoni, 2009). Some work has focused on biological processes that may suppress cellular immunity via endocrine pathways (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; McGregor & Antoni, 2009). Cortisol, in particular, has been identified as an important biological mediator between

subjective distress and subsequent impairments in cellular immunity (Carlson, Speca, Faris, & Patel, 2007; McGregor & Antoni, 2009; Thornton, Andersen, Crespin, & Carson, 2007). Cortisol is a steroid hormone released from the adrenal cortex following a series of reactions within the Hypothalamic Pituitary Adrenal (HPA) axis (Kirschbaum & Hellhammer, 1994; Sephton & Spiegel, 2003). Beyond its role as a mediator of distress effects on cellular immunity, dysregulated cortisol has been associated with tumor vascularization processes (Moran, Gray, Mikosz, & Conzen, 2000) and even mortality (Sephton, Sapolsky, Kraemer, & Spiegel, 2000).

Assessment of cortisol could provide an objective corroboration of women's self-reported distress levels. Research has shown associations between dysregulated cortisol and self-reported distress. Breast cancer patients reporting psychological distress also exhibit disruptions in rest/activity cycles that have been related to dysregulated diurnal cortisol rhythms (Dedert et al., 2012). CBSM-related decreases in cortisol have also been shown to parallel intervention-related reductions in psychological distress (McGregor & Antoni, 2009). Similarly, MBSR-related decreases in cortisol parallel intervention-related reductions in stress (Carlson et al., 2007). In addition to associations with psychological distress, cortisol has also been related to BF among women with breast cancer (Cruess et al., 2000). Specifically, Cruess et al. (2000) found that reductions in cortisol levels following a 10-week CBSM intervention for breast cancer patients were associated with intervention-related increases in BF. Thus, cortisol serves as a valuable indicator of stress-induced HPA activity (McGregor & Antoni, 2009) that demonstrates important relations with psychological distress, BF, and disease processes in breast cancer.

Cortisol measures in psycho-oncology research have varied greatly (Vedhara, Tuinstra, Miles, Sanderman, & Ranchor, 2006). Though previously measured in blood serum (Cruess et al., 2000; Touitou, Bogdan, Levi, Benavides, & Auzéby, 1996; van der Pompe, Duivenvoorden, Antoni, Visser, & Heijnen, 1997), cortisol is now more commonly measured in salivary samples (Bower et al., 2005a; Carlson et al., 2007; Lang, Berbaum, & Lutgendorf, 2009). As opposed to serum cortisol, which contains unbound and bound fractions of cortisol, salivary cortisol contains only unbound cortisol, reflecting biologically available levels of cortisol (Carlson et al., 2007). Salivary cortisol could be viewed as a more “naturalistic” measure of cortisol that may offer a closer approximation of somatically experienced distress (Tak et al., 2011). Moreover, salivary cortisol collection serves as a quick, portable, and non-invasive method of physiological data collection (Fekedulegn et al., 2007).

Not only has cortisol sampling evolved in recent decades, the time of day of cortisol measurement has also varied in previous studies (e.g., Abercrombie et al., 2004; Cruess et al., 2000; Weinrib et al., 2010). Cortisol levels fluctuate throughout the day, following a diurnal rhythm of increasing levels after waking and then decreasing levels throughout the day (Kirschbaum & Hellhammer, 1989; Sephton et al., 2000). Notably, intervention-related reductions in afternoon/early evening (PM) cortisol levels have been associated with both reduced distress (Carlson et al., 2004) and increased BF among post-surgical breast cancer patients (Cruess et al., 2000), while elevated PM cortisol levels may be part of a diurnal pattern associated with poorer survival outcomes (Sephton et al., 2000). These findings suggest that PM cortisol level may be an important indicator of physiological distress in investigations of intervention effects on BF.

Ethnic Differences

A final limitation of previous psychological intervention studies in women with breast cancer is that most samples have been comprised primarily of non-Hispanic white (NHW) women (Giedzinska, Meyerowitz, Ganz, & Rowland, 2004; Lechner & Weaver, 2009; Yanez, Thompson, & Stanton, 2011). The lack of representation from ethnic minority groups is particularly concerning in BF research because the highest levels of BF are often reported by non-white persons (e.g., Helgeson et al., 2006). More specifically, one recent study found significantly higher levels of BF among Hispanic women relative to NHW women as early as 2-10 weeks following primary surgery for breast cancer (Gudenkauf, 2013). Given that Hispanics represent the fastest-growing minority group in the United States (Lopez-Class, Gomez-Duarte, Graves, & Ashing-Giwa, 2012), the high rates of BF in this population warrant further attention.

When seeking to understand the relationship between ethnicity and BF, it is worthwhile to note that ethnicity is truly “an atheoretical construct that in itself provides little insight into psychological and physical phenomena, but rather may best be understood in the context of sociocultural factors that can inform interventions targeted at improving quality of life for Latinas” (Yanez et al., 2011, p. 204). Thus, ethnicity does not serve as an explanatory construct in its own right. Rather, sociocultural factors must be examined to help explain the relationship between ethnicity and BF. Although Hispanics represent a diverse group of individuals from different nationalities, they share many commonalities in language, world-view, history, and culture as well as in the experience of breast cancer (Sammarco & Konecny, 2008). Hispanic women experience disparities in diagnosis and treatment, such that Hispanic breast cancer patients are

diagnosed with more severe breast cancer stages, may experience delays in treatment and receive more rigorous treatments, and have higher mortality rates compared to NHW women (Segrin & Badger, 2013; Yanez et al., 2011). Hispanic women with breast cancer may disproportionately suffer from problems related to pain symptoms and financial and employment difficulties (Nápoles, Ortíz, O'Brien, Sereno, & Kaplan, 2011). They also report greater concerns surrounding adjuvant therapy, body image and sexuality, and greater fear of recurrence and death (Nápoles-Springer, Ortíz, O'Brien, & Díaz-Méndez, 2009; Yanez et al., 2011). Consequently, Hispanic breast cancer patients are at increased risk for psychological distress relative to NHW women (Moadel, Morgan, & Dutcher, 2007). Hispanic cancer patients report greater distress and worse quality of life (Lockett et al., 2011; Yanez et al., 2011) right after breast cancer surgery (Carver, Lehman, & Antoni, 2003) and throughout the course of the disease (Segrin & Badger, 2013).

High distress severity among Hispanic breast cancer patients may help explain their high levels of BF compared to NHW women. If higher BF is found among women with higher distress (Tartaro et al., 2006) at least to a certain extent (Lechner et al., 2006), then more distressed Hispanic breast cancer patients should report greater BF than NHW women. In line with cognitive adaptation theory (Taylor, 1983), Hispanic women may experience their breast cancer diagnosis as a greater threat to their sense of control and self-esteem and, subsequently, may engage in a more concerted search for meaning from the experience.

Cognitive adaptation theory also acknowledges that social and cultural factors may influence the meaning-making process among Hispanic women and contribute to the discovery of more positive outcomes from the experience (Lepore & Kernan, 2009).

Hispanic cultural values, such as the importance of family, or *familismo* (Segrin & Badger, 2013) may provide Hispanic breast cancer patients with supportive others who can “suggest new and positive perspectives on a traumatic experience, provide information on how to cope, or encourage individuals to accept their situation” (Lepore & Kernan, 2009, p. 146). Such supportive social contexts have been related to BF in previous work (Cordova et al., 2001; Weiss, 2004). Additionally, spiritual values among Hispanic women may prompt distressed individuals to refocus on these spiritual values following a traumatic experience and to perceive personal and spiritual growth from the experience (Nápoles et al., 2011).

Medical and Sociodemographic Correlates of Benefit Finding

Investigation of intervention effects on BF must also consider relevant medical and sociodemographic correlates of BF in order to rule out their potential effect on intervention outcomes. Though the literature has been somewhat mixed, a few medical variables have been theoretically and empirically associated with BF among breast cancer patients (Lechner & Weaver, 2009). In particular, disease severity may have an important influence on BF around the time of diagnosis. Stage of breast cancer serves as an indicator of disease severity and provides information related to prognosis (American Cancer Society, 2014) and, thus, is clearly associated with level of perceived threat (Lechner & Weaver, 2009) for breast cancer patients. Greater perceived threat among women with higher disease stage would theoretically result in greater meaning-making and higher levels of BF according to cognitive adaptation theory (Taylor, 1983), and greater disease severity has been found to relate to greater BF in a review of empirical literature (Helgeson et al., 2006). However, a study examining BF among post-surgical

breast cancer patients found a curvilinear association between disease stage and BF (Lechner et al., 2003). In this study, women with stage II breast cancer found more benefits than did women with stage I or stage IV cancer. It is likely that women with stage IV cancer were so distressed that coping resources were overwhelmed, preventing meaning-making and BF (Lechner et al., 2003). The association between disease severity and BF highlights the need to consider stage of disease when examining BF among breast cancer patients.

In addition to stage of disease, type of surgical procedure has been previously associated with BF. Recent work demonstrated that reported BF was higher among women who underwent a mastectomy compared to those who underwent a lumpectomy (Gudenkauf, 2013). This finding is consistent with previous associations between greater event severity and higher BF (Helgeson et al, 2006) and with cognitive adaptation theory (Taylor, 1983). A more severe surgical procedure likely offers a greater cognitive challenge, prompting higher levels of BF. Thus, surgical procedure should be included in studies of post-surgical BF.

The association between BF and sociodemographic variables has been somewhat inconsistent across previous studies (Lechner & Weaver, 2009). However, studies using the BFS to assess BF in the first year of breast cancer have consistently found an inverse relationship between socioeconomic status (SES) and BF (Carver & Antoni, 2004; Tomich & Helgeson, 2004; Urcuyo et al., 2005), suggesting that women of lower SES are able to find more benefits following breast cancer diagnosis than women of higher SES. Perhaps having limited economic resources makes a breast cancer diagnosis and costly treatment more threatening for low SES women, triggering heightened distress and,

ultimately, greater BF (Lechner & Weaver, 2009). Lower SES has certainly been associated with distress among breast cancer patients (Turner et al., 2005). Alternatively, women with lower SES may have more experience with stressful life events and, therefore, may have more experience with BF following negative life events (Lechner & Weaver, 2009). Notably, SES is also an important consideration of any study investigating ethnic differences. Given that Hispanics tend to have lower SES than NHW women (Yanez et al., 2011), ethnicity and SES are difficult to separate (Lechner & Weaver, 2009).

Age has also been associated with BF. Previous studies have shown that younger women find more benefit than older women (Gudenkauf, 2013; Helgeson et al., 2006). This inverse relationship between age and BF could be attributable to higher levels of stress among younger women (Helgeson et al., 2006), who have fewer challenging life experiences against which to compare their cancer diagnosis (Bellizzi & Blank, 2006) and face an early, unanticipated threat of death (Bower et al., 2005b). Such stress-related facilitation of BF is largely consistent with cognitive adaptation theory (Taylor, 1983), though extreme levels of stress can cause women to feel overwhelmed and impair benefit finding (Lechner & Weaver, 2009).

Current Study Aims and Hypotheses

The current study utilized a sample of 183 women with stages 0 – III breast cancer who were recruited between 2006 and 2012 for a 5-week group psychological intervention trial at the University of Miami. Women were randomized to one of three group conditions – CBT intervention group, RT intervention group, or HE control group – and were asked to attend five 1.5-hour weekly group sessions. The randomized clinical

trial (RCT) included four assessment time-points: a baseline assessment of psychological and physiological measures within 2-10 weeks after surgery (T1); a post-intervention assessment of psychological measures at approximately 2 months post-baseline (T2); and two long-term follow-up assessments of both psychological and physiological measures, one at 6 months post-baseline (T3), and one at 12 months post-baseline (T4).

The present study specifically examined measures of BF at T1, T2, T3, and T4 as well as measures of distress at T1 and addressed two major aims. The first aim was to determine whether brief CBT and RT group interventions increase BF over the first year of breast cancer treatment relative to an attention-matched HE control group. The second aim was to investigate whether intervention effects on BF may be moderated by distress measures and ethnicity. For aim 2a, I examined the potential moderating role of initial distress level, and for aim 2b, I sought to determine whether intervention effects on BF differed between Hispanic and NHW ethnic groups.

Aim 1: Intervention effects on benefit finding. Both 10-week (Antoni et al., 2001) and 5-week (Groarke et al., 2012) CBSM interventions have increased BF in breast cancer patients, but no study has tested whether 5-week interventions separately utilizing the active ingredients of CBSM (i.e., CBT and RT) increase BF relative to an attention-matched, active control group. Because the BFS has been found to be a unitary measure of BF in the present post-surgical breast cancer sample (Gudenkauf, 2013), I investigated whether a 5-week intervention focused on CBT or RT increases the 17-item Benefit Finding Scale (Antoni et al., 2001; Tomich & Helgeson, 2004) mean score (BF-17) relative to an attention-matched HE control group. Based on previous findings that intervention effects on BF are attributable to both women's emotional expression and

perceived ability to relax (Antoni et al., 2006a), I hypothesized that both CBT and RT interventions would independently increase BF relative to HE control.

Aim 2: Distress and ethnicity as moderators of intervention effects on benefit finding.

Aim 2a. The literature suggests that some level of baseline distress is necessary to prompt women to find benefits following a traumatic event (Lechner & Weaver, 2009). Thus, baseline distress was examined as a potential moderator of intervention effects on BF in the present study. I examined both self-reported psychological measures of distress, including the Affects Balance Scale (ABS; Derogatis, 1975) and Impact of Event Scale – Revised (IES-R; Weiss, 2007), as well as a more objective, physiological measure of distress (PM salivary cortisol level). The main analyses tested whether intervention effects on BF are significantly greater with increasing levels of baseline emotional, cognitive, and physiological distress. Given that cancer patients reporting the highest levels of initial distress have exhibited the greatest intervention-related improvements on psychological outcomes in previous studies (Antoni et al., 2009; Dale et al., 2010; Groarke et al., 2012; Monti et al., 2013), I hypothesized that intervention effects on BF would be greatest among women with highest initial distress.

Aim 2b. Previous work has shown that Hispanic women report greater psychological distress than NHW women after surgery for non-metastatic breast cancer (Carver et al., 2003), and one study examining baseline differences in levels of BF found that Hispanic women report higher levels of BF than NHW women immediately after surgery (Gudenkauf, 2013). Notably, the present sample has strong representation of ethnic/racial minority groups and is nearly evenly split between Hispanic women (44.8%) and NHW women (41.5%). Thus, ethnicity was examined as a potential two-group

moderator (Hispanic vs. NHW) of intervention effects on BF. The main analysis tested whether intervention effects on BF were significantly greater among Hispanic women than NHW women.

Chapter 2: Method

Information on the method of the present study, including participants, procedures, and intervention conditions is also described in Gudenkauf et al. (2015).

Participants

Female patients age 21 or older with newly diagnosed stage 0 – III breast cancer were recruited within 2-10 weeks following surgery (i.e., lumpectomy or mastectomy). Surgical oncologists at Miami cancer centers and community clinics referred women who provided written consent to be contacted by the study team. Potential participants were mailed information pamphlets and contacted via phone for screening. Study personnel approached 739 women and enrolled a total of 183 women (25%) between 2006 and 2013. Exclusion criteria included a history of neo-adjuvant treatment or prior cancer, severe mental illness, chronic or acute co-morbid medical conditions, and not being fluent in English. These criteria were used to create a more homogenous sample and to ensure that women could fully participate in the trial.

Procedures

The current University of Miami efficacy trial was approved by the Institutional Review Board (National Institutes of Health Clinical Trial NCT02103387) and was conducted as a single-blind, parallel-assignment, randomized trial within the Psychology Department.

Women who met study inclusion criteria and consented to participate completed a baseline (T1) assessment, which included a questionnaire packet with demographic, medical, and psychological measures (e.g., BFS and distress measures) in addition to salivary cortisol samples and a peripheral venous blood sample. Salivary cortisol

collection procedures are also described in Gudenkauf (2013). Participants were asked to collect saliva samples at home over two consecutive days. Women were specifically instructed to collect a saliva sample at four timepoints each day – upon waking, 30 minutes after wakening, at 4 pm, and at 9 pm - providing a total of eight samples. This collection schedule was established to increase measurement reliability (Weinrib et al., 2010) by averaging values from each timepoint across the two days. To assist with saliva collection, women were provided with Salivette® tubes, verbal instructions, a DVD with step-by-step demonstrations, a timer to remind participants of collection times, and detailed written instructions (see appendix) which outlined activities to avoid on collection days (e.g., brushing teeth, eating large meals, drinking alcohol, and vigorous exercise). Following each sample collection, participants placed the cotton swab in the double-layer Salivette® tube and stored the sample in a freezer until all eight samples could be returned to the laboratory. To reduce participant burden, freezer packs and insulated lunch bags were provided so that women could collect samples while away from home while also preserving saliva integrity until the sample could be frozen. After saliva collection was complete, peripheral venous blood samples were collected by a licensed phlebotomist at the University of Miami. Participants were compensated \$50 for the completion of the T1 assessment.

After baseline, women were randomized into one of three study conditions: CBT intervention ($N = 55$), RT intervention ($N = 70$), or HE control ($N = 58$). The random allocation sequence was pre-determined by a drawing and generated by a project coordinator who was not involved in facilitating the group interventions. Following the group interventions, approximately 2 months after their baseline T1 assessment,

participants again completed the psychological questionnaire packet as their T2 assessment and were compensated \$25. Women were later assessed 6 months post-baseline (T3) and 12 months post-baseline (T4). At both T3 and T4 assessments, participants completed the psychological questionnaire packet, salivary cortisol collection, and peripheral venous blood collection. Similar to the T1 assessment, women were compensated \$50 for each T3 and T4 assessment. This efficacy trial was deemed complete when we reached the study end date and grant funding terminated.

Intervention Conditions

Groups of 3-7 women met at the University of Miami once weekly for 1.5-hour sessions. Based on evidence suggesting that women who attended 5 of 10 CBSM group sessions achieved outcomes comparable to those who attended 8-10 sessions (Antoni et al., 2006a), women in all three conditions of the present study were asked to meet for a total of 5 weeks. Women were paid \$10 per session for transportation and parking costs. Women who missed a group session were contacted by the group facilitator to review the missed session and were provided with the session materials. Groups were facilitated by female Master's level clinical psychology students at the University of Miami. A total of six interventionists facilitated groups over the study period. All interventionists were trained in the protocol for each of the three conditions, and group sessions were videotaped for review by two licensed psychologists to ensure treatment fidelity. Supervisors provided feedback on protocol adherence and interventionist competence through weekly supervisions. No adverse events related to the present study were reported.

Cognitive-behavioral training. The CBT intervention condition was adapted from a manualized 10-week CBSM group intervention for breast cancer survivors (Antoni, 2003). The CBT intervention in the present study condensed the cognitive-behavioral components from this 10-week structured intervention into a 5-session protocol teaching coping skills and social support utilization for the management of daily stressors related to breast cancer and its treatment. Over the course of five weeks, women received specific training to increase awareness of personal stressors, restructure maladaptive cognitions (Beck & Emery, 1985), match coping strategies to controllable and uncontrollable aspects of stressors (Folkman & Greer, 2000), better utilize available social support resources, manage anger and resolve interpersonal conflicts, and communicate assertively (Fensterheim & Baer, 1975). These skills were selected to promote emotional expression and support-seeking for improved adaptation to breast cancer and its treatment. Women had the opportunity to practice CBT skills with in-session demonstration exercises as well as at-home practice exercises (e.g., cognitive restructuring).

Relaxation training. The RT intervention condition was also adapted from Antoni's (2003) 10-week CBSM intervention for breast cancer survivors. The particular relaxation components selected for inclusion in the present RT intervention were chosen based on participant feedback following the CBSM trial (Antoni et al., 2006a). In study evaluations, women reported which relaxation techniques they had practiced most often as well as techniques that they found more difficult to implement. Those relaxation techniques which women practiced most often during the 10-week CBSM trial were chosen for the present five-session RT group, including abdominal breathing, guided

imagery, progressive muscle relaxation, and meditation. The overall goal of teaching these relaxation techniques was to reduce anxiety via muscle relaxation and imagery (Bernstein & Borkovec, 1973). Similar to the CBT intervention, women in the RT condition had the opportunity to practice RT skills with in-session demonstration exercises as well as daily at-home practice exercises (e.g., deep breathing) with relaxation audio recordings.

Health education. The HE group provided an attention and time-matched control against which to compare the CBT and RT intervention conditions. The HE condition represents a particularly stringent control condition because it was conducted in a group format, creating opportunities for social support among members. Over the course of five sessions, women in the HE group were provided with educational content related to breast cancer diagnosis, treatment, management of side-effects, recurrence, healthy lifestyle behaviors, QOL, and available resources. Educational content was obtained from the American Cancer Society (2006), the National Cancer Institute (2006), Dr. Susan Love Research Foundation (2006), Susan G. Komen (2006), and the Livestrong Foundation (2006), and was provided to give attention and support equivalent to that which women in the CBT and RT groups received. This type of control group may also reduce the risk of drop-out, which is common to control groups. Women in the HE group were not exposed to active intervention ingredients (e.g., coping strategies or relaxation techniques), allowing for comparisons against the intervention-specific content of the CBT and RT groups while holding attention and support constant across the three conditions.

Measures

Benefit finding. The 17-item Benefit Finding Scale (BFS; Antoni et al., 2001; Tomich & Helgeson, 2004) was used as a measure of women's ability to find benefits in the experience of breast cancer (see appendix). The BFS was originally based on Behr's Positive Contributions Scale (Behr, Murphy, & Summers, 1992), which assessed parents' ability to find benefits in caring for children with disabilities. The BFS was adapted for use with breast cancer patients and has been shown to be valid and reliable in this population (Antoni et al., 2001; Tomich & Helgeson, 2004). For each of the 17 items of the scale, participants are asked to rate the degree to which they have found benefit within various life domains, such as family and social relations and personal growth in relation to the experience of breast cancer. For example, "Having had breast cancer has brought my family closer together." Scale ratings range from *Not at all* (1) to *Extremely* (5). Women are also provided with an additional response option of 9 (*does not apply to me*) to prevent participants from skipping items they deemed not applicable. However, due to the broad applicability of the items, study investigators predetermined that items coded as a 9 (*does not apply to me*) would be recoded to 1 (*not at all*). The BFS shows high reliability ($\alpha = .95$) in the current sample.

General affective distress. The negative subscale of the 40-item Affects Balance Scale (ABS; Derogatis, 1975) was used to assess women's general emotional distress in the present study. The ABS has been previously validated in breast cancer samples (e.g., Antoni et al., 2006b) and includes items measuring both negative (depressive affect, hostility, guilt, and anxiety) and positive (affection, contentment, vigor, and joy) affective states using a list of 40 adjectives. Respondents are asked to recall their experience

during the past week and rate the degree to which they felt each emotion, from *Never* (1) to *Always* (5). An ABS-negative score was calculated as the average of the 20 negative items. The ABS-negative subscale shows high reliability ($\alpha = .93$) in the current sample.

Cancer-specific cognitive distress. The intrusion subscale of the Impact of Event Scale-Revised (IES-R; Weiss, 2007) was used to assess cancer-specific distress in the present study. The IES-R has been previously used to measure distress among breast cancer patients (Antoni et al., 2006b), and results of 10-week CBSM intervention showed reductions in cancer-related distress. The intrusion subscale of the IES-R specifically measures participants' unwanted, intrusive thoughts related to their cancer experience. Respondents are asked to consider the degree to which intrusive cancer-related thoughts may have bothered them over the past week, from *Not at all distressing* (0) to *Extremely distressing* (4). For example, participants are asked to rate the extent to which they are distressed by "thinking about (breast cancer) when they didn't mean to." An IES-I score was calculated as the average of 7 such items. The IES-I shows high reliability ($\alpha = .92$) in the current sample.

Physiological distress. Given the bioavailability of salivary cortisol (Carson et al., 2007) which may better represent physiological distress compared to serum cortisol (Tak et al, 2011), previously demonstrated intervention effects on PM cortisol (e.g., Cruess et al., 2000), and associations between PM cortisol level and adjustment and survival outcomes (Sephton et al., 2000), 4 pm salivary cortisol level (in $\mu\text{g/dl}$) was used as the physiological measure of women's distress in the present study. An Immuno-Biological Laboratories, Inc. (USA) high sensitivity salivary cortisol ELISA kit was used to measure salivary cortisol levels in the laboratory. Saliva samples were first processed

in the laboratory, then vortexed and centrifuged at 1500 RPM for 10 minutes. Samples were stored in a -20°C freezer until competitive immunoassay could be conducted with ELISA kits. The eight collection samples from each participant were processed on the same assay plate.

Ethnicity. Self-report questionnaires were used to collect demographic data at the time of study entry. Participants provided self-identified race/ethnicity according to the following categories: Puerto Rican, Cuban-American, Colombian, Venezuelan, Argentine, Hispanic/other, non-Hispanic White, Black/Caribbean, African-American, mixed ethnicity, or other. In order to simplify these categories for the present study, racial/ethnic groups were re-categorized into Hispanic (i.e., Puerto Rican, Cuban-American, Colombian, Venezuelan, Argentine, Hispanic/other), non-Hispanic White, Black (i.e., Black/Caribbean and African-American), and other. Aim 2b focused on comparisons between Hispanic and non-Hispanic White women, who represented a combined total of 86.3% of the study sample.

Covariates. Women self-reported their age, annual household income (in thousands of dollars), and their years of education completed (e.g., attaining a Bachelor's degree equates to 16 years of education) at the time of study entry. Additionally, women's disease stage (coded as Stage 0, I, II, or III) and surgical procedure (lumpectomy vs. mastectomy) were obtained through medical chart review at surgical oncologist offices. If medical charts of individual participants were not available for review or if desired medical information was not provided in participants' medical charts, self-reported medical data was utilized. Approximately 84.6% of disease stage data and

88.0% of surgical procedure data was determined from chart review and the remaining data was determined through participants' self-report.

Analytic Approach

Data screening procedures included winsorization (Wilcox, 1993) for outliers falling outside three standard deviations from the mean. Winsorization was used to address outliers for self-reported income. Additionally, natural log-transformation was used to address skewness and kurtosis for salivary cortisol data. Data was intended to be analyzed on an intent-to-treat basis, with all 183 enrolled participants included in longitudinal analyses. However, two women did not provide BF data at any timepoint, reducing the study sample size to 181. Another woman provided BF data at T2 but not at T1, reducing the maximum T1 sample size for the present study to 180. Finally, scores for women with missing data on more than five (or greater than 30%) of the 17 BFS items at a given timepoint were counted as missing for that timepoint. This criterion led to the exclusion of T1 data for two women for whom greater than 30% of the 17 BFS items were missing at T1, reducing the effective T1 sample size to 178. No other timepoints were affected by this missing data criterion.

Aim 1: Intervention effects on benefit finding. Intervention effects on BF were analyzed using latent growth modeling (LGM) using Mplus-Version 7 (Muthén & Muthén, 2012) with a full-information maximum likelihood (FIML) procedure for missing data. LGM is a form of structural equation modeling that computes a trajectory of change over repeated measures and allows for the inclusion of group condition as a predictor of this change trajectory. LGMs were conducted for the 17-item average BFS score. Group condition was dummy coded into two variables, using HE as the

comparison group (i.e., “CBTdummy” variable = CBT (1), RT (0), HE (0) and “RTdummy” variable = CBT (0), RT (1) HE (0)). This dummy coding allowed for separate comparisons of CBT vs. HE effects on BF and RT vs. HE effects on BF. In LGM, the intercept (the starting value of the trajectory), the linear slope of change, and the quadratic term capturing the change in slopes over repeated measures are represented as latent variables capturing data from the timepoints of interest. Slope loadings represented the time associated with each assessment timepoint: T1 baseline at 0 months, T2 at approximately 2 months post-baseline, T3 at 6 months post-baseline, T4 at 12 months post-baseline. The path from group condition to BF linear slope reflects the change over time in BF that can be attributed to group condition, so a significant effect would demonstrate a difference in linear trajectories between groups. The path from group condition to BF quadratic slope reflects the change in the slope that can be attributed to group condition, so a significant effect would demonstrate a difference in the quadratic trajectories between groups.

Aim 2: Distress and ethnicity as moderators of intervention effects on benefit finding.

Aim 2a. Distress was included as a potential moderator of intervention effects on BF in latent growth modeling (LGM) using Mplus-Version 7 with FIML. LGMs were conducted for the 17-item average BFS score. Again, group condition was dummy coded to allow for separate comparisons of CBT vs. HE effects on BF and RT vs. HE effects on BF. Proposed slope loadings represented the time associated with each assessment timepoint: T1 baseline at 0 months, T2 at approximately 2 months post-baseline, T3 at approximately 6 months post-baseline, T4 at approximately 12 months post-baseline.

Aim 2b. Aim 2b was to test differential intervention effects on BF between Hispanic and NHW women. The same LGM analytic approach used for distress measures was applied to test whether ethnicity (coded as NHW vs. Hispanic) moderated dummy-coded intervention effects on BF-17 average scores across the 12-month study period. Again, proposed slope loadings represented the time associated with each assessment timepoint: T1 baseline at 0 months, T2 at approximately 2 months post-baseline, T3 at approximately 6 months post-baseline, T4 at approximately 12 months post-baseline.

Covariates

Of the theoretically derived covariates (SES, disease stage, surgical procedure, and age), surgical procedure and age were significantly correlated ($r = -0.15, p = .049$). Women who underwent a lumpectomy were older (*Mean age* = 55.78, *SD* = 10.46) than those who underwent a mastectomy (*Mean age* = 52.86, *SD* = 9.51). Thus, based on multicollinearity, the temporal proximity of the baseline assessment to surgical procedure, and the theoretical importance of surgical procedure as a component of the cancer “trauma” (Taylor, 1983), surgical procedure was selected over age as a covariate in this study. No other theoretical covariates were significantly related. All analyses were first run without control variables and then repeated with relevant covariates, including SES, disease stage, and surgical procedure. Various combinations of income and education measures have been used to assess SES in previous studies (Lechner & Weaver, 2009). Given that the current sample exhibits baseline group differences in income, the present study used income level as the proxy for SES.

Chapter 3: Results

The CONSolidated Standards Of Reporting Trials (CONSORT) diagram of study enrollment and retention is provided in Figure 1. Information on study enrollment and retention from T1 to T2 is also described in Gudenkauf et al. (2015). Between 2006 and 2013, 739 women were screened for study participation, but 556 women were excluded or withdrew prior to randomization. Of these, 5 women were excluded due to severe psychiatric conditions (3 due to Bipolar Disorder, 1 due to severe Depression, and 1 due to an unspecified psychiatric condition). A total of 183 women gave informed consent, completed their baseline assessment, and were randomized to CBT (55 women), RT (70 women), or HE (58 women). Of those randomized, 138 women (75.4%) completed the T2 post-intervention assessment, 130 (71.0%) completed the T3 assessment, and 136 (74.3%) completed the T4 assessment.

Sample Demographics

Table 1 provides a summary of demographic and medical characteristics of the present sample ($N = 183$) categorized by group condition. In the overall sample, the average age of participants was 54.28 ($SD = 10.06$) with a range from 28 – 80 years old. The sample included women diagnosed with ductal carcinoma in-situ (DCIS; 19.1%), stage I (51.4%), stage II (24.0%), and stage III (4.9%). Medical chart review revealed that most women had positive estrogen-receptor status (77.0%) and progesterone-receptor status (66.7%), while a minority of the sample (20.2%) had positive lymph nodes. Approximately half of the sample underwent a lumpectomy (48.6%) and about half underwent a mastectomy (51.4%). The average time between surgery and study enrollment was 37.42 days ($SD = 22.30$). The sample had nearly equal representation of

women who self-identified as Hispanic (44.8%) and NHW (41.5%), and the remainder of the sample included women who self-identified as Black/African-American (8.7%) or other racial/ethnic categories (4.4%). The majority of participants were partnered (63.9%). The average education level was 15.49 years ($SD = 3.00$), and the average household income was \$100,610 per year ($SD = 67.89$). The vast majority of participants (80.9%) received some form of adjuvant treatment (chemotherapy, radiation therapy, anti-hormonal therapy, or Herceptin) during the 12-month study period. Self-reported medication use during the 12-month study period was as follows, 15.3% reported use of anti-depressants at some point during the study period, 25.1% reported use of anxiolytic medication, 27.3% reported use of sleep medication, and 32.2% reported use of pain medication.

Table 1 provides results of chi-square and one-way ANOVA tests of group differences on demographic and medical characteristics. The three groups were equivalent on all demographic and medical variables except annual income. Women in the HE group reported significantly higher annual household income than those in either CBT or RT intervention groups. Women randomized to each of the three study conditions did not significantly differ on number of sessions attended ($p > .05$). Women in CBT attended an average of 3.98 sessions ($SD = 1.47$), women in RT attended an average of 3.61 sessions ($SD = 1.58$), and women in HE attended an average of 4.29 sessions ($SD = 1.08$). Session attendance was not significantly associated with BF scores at any timepoint (T1-T4; all p 's $> .05$) or with changes in BF score across any combination of timepoints (i.e., T1-T2, T1-T3, T1-T4, T2-T3, T2-T4, or T3-T4). Retention rates did not significantly differ between study groups at T2 assessment ($\chi^2(2) = 3.89, p = .143$) or at

T3 assessment ($\chi^2(2) = 5.40, p = .067$). However, retention rates at T4 assessment significantly differed between groups ($\chi^2(2) = 7.81, p = .020$), with the lowest retention observed for women in the RT group (62.9%) compared to women in CBT (81.8%) and HE (81.0%).

Aim 1: Intervention Effects on Benefit Finding

84.83% of women in the current sample reported finding at least some benefits at the baseline assessment. Overall observed sample means and standard deviations for BF-17 average scores at each timepoint were as follows: BF-17 at T1 ($M = 3.13, SD = 1.04$), BF-17 at T2 ($M = 3.47, SD = 0.97$), BF-17 at T3 ($M = 3.40, SD = 0.99$), and BF-17 at T4 ($M = 3.42, SD = 0.92$). Figure 2 provides mean plots of observed BF-17 average scores at each timepoint split by group condition, and Table 2 provides means and standard deviations of observed BF-17 average scores at each timepoint split by group condition. Notably, there were no group differences in BF-17 average score at the baseline assessment ($F(2,175) = 0.37, p = .691$).

Intervention effects on BF from T1 to T4 were first modeled using linear and quadratic LGMs (see Figure 3). However, the linear model did not fit the data ($\chi^2(5) = 36.63, p < .001$; CFI = 0.93; RMSEA = 0.19; SRMR = 0.12). Model fit was not improved by constraining residual variances, freely estimating timepoints, specifying correlations between timepoints, specifying a relationship between slope and intercept, or using auxiliary variables. The quadratic model resulted in a non-positive definite, requiring that the variance of the BF linear slope be fixed at zero. Even with this model modification, the quadratic model did not fit the data ($\chi^2(5) = 30.21, p < .001$; CFI = 0.94; RMSEA = 0.17; SRMR = 0.07). The shape of the observed BF data (see Figure 2) suggests a

possible cubic trajectory (with two bends in the trajectory). However, a cubic LGM could not be performed because a cubic model requires a minimum of five timepoints.

Similarly, a piecewise LGM (modeling different periods of the growth trajectory with separate LGMs) could not be performed because it also requires a minimum of five timepoints. Multiple group LGMs for T1 to T4 were conducted to determine whether allowing slopes to freely vary between groups (CBT, RT, and HE) would help improve model fit. The multiple group LGM with freely varying slopes did not fit the data ($\chi^2(18) = 49.30, p < .001$; CFI = 0.93; RMSEA = 0.17; SRMR = 0.19).

Given the observed trajectory of increasing BF scores across all groups from T1 to T2 followed by the suggestion of differential maintenance of BF effects for the three groups from T2 to T4 (see Figure 2), these time periods were examined separately. Cross-sectional analyses revealed no differences in BF scores between study conditions at T1 or at T2 (all p 's > .05). There were also no between-group differences in T1-T2 change in BF in uncontrolled or controlled analyses (all p 's > .05). In uncontrolled analyses, BF scores within all three groups significantly increased from T1 to T2 (CBT standardized $\beta = 0.59, t(39) = 3.75, p = .001$; RT standardized $\beta = 0.43, t(47) = 2.97, p = .005$; HE standardized $\beta = 0.48, t(48) = 3.28, p = .002$). However, within-condition effects from T1 to T2 remained significant only for the CBT group when controlling for income, disease stage, and surgical procedure (CBT $t(36) = 2.76, p = .004$).

A linear LGM modeling maintenance of BF from T2 to T4 was run with T1 BF included as a predictor of both intercept and slope and dummy coded group included as a predictor of slope (see Figure 4). Given that there were no between-group differences in BF at T2, the paths from dummy coded group variables to intercept were not included in

the model. Slope loadings were fixed at T2 = 0 months, T3 = 4 months, and T4 = 10 months. This T2 to T4 model fit the data ($\chi^2(7) = 14.16, p = .05$; CFI = 0.99; RMSEA = 0.08; SRMR = 0.05) after the residual variance of T4 BF was fixed at zero. LGM results showed a significant difference between CBT and HE groups in BF change over the 10-month period from T2 to T4 (standardized $\beta = 0.22, p = .042, d = 0.49$). There was no difference between RT and HE groups in BF change over the 10-month period from T2 to T4 (standardized $\beta = 0.04, p = .717$). When covariates (i.e., income, stage, and procedure) were included in the model, the model fit the data ($\chi^2(10) = 15.95, p = .10$; CFI = 0.99; RMSEA = 0.06; SRMR = 0.04), and the significant difference in slopes between CBT and HE groups held (standardized $\beta = 0.24, p = .028, d = 0.54$). The relationship between RT and HE remained non-significant with covariates (standardized $\beta = 0.10, p = .359$). Although LGM split by group condition ($\chi^2(9) = 15.20, p = .086$; CFI = 0.99; RMSEA = 0.12; SRMR = 0.10) did not indicate significant within-condition changes in BF for women in CBT or women in HE from T2 to T4, follow-up cross-sectional analyses at T4 demonstrated a tendency toward higher BF scores for women in CBT compared to women in HE by the end of the study period ($t(134) = 1.78, p = .071$). Change in BF from T2 to T4 did not significantly differ between RT and HE groups in uncontrolled (standardized $\beta = 0.04, p = .717, d = 0.09$) or controlled LGM analyses (standardized $\beta = 0.10, p = .359, d = 0.22$). Change in BF from T2 to T4 also did not differ between RT and CBT groups in uncontrolled (standardized $\beta = 0.18, p = .109, d = 0.40$) or controlled LGM analyses (standardized $\beta = 0.10, p = .380, d = 0.38$).

Aim 2: Distress and Ethnicity as Moderators of Intervention Effects on Benefit Finding

Aim 2a. Overall sample means and standard deviations for baseline distress variables were as follows: ABS-negative affect ($M = 2.01$, $SD = 0.57$), IES-I ($M = 1.31$, $SD = 0.86$), and salivary cortisol ($M = 1.75$, $SD = 0.62$). Group differences on psychological and physiological distress predictor variables were compared at T1 (see Table 1). There were no group differences on baseline ABS-negative affect or salivary cortisol levels. As reported in Gudenkauf et al. (2015), significant baseline differences were found for IES-I, such that women in the CBT group reported significantly higher baseline IES-I scores than did women in either the RT ($p = .023$) or HE groups ($p = .006$). Correlations were also computed to determine associations between distress measures at baseline. ABS-negative affect and IES-I were significantly correlated ($r = 0.62$, $p < .001$), but PM salivary cortisol levels were not significantly correlated with either ABS-negative affect ($r = 0.03$, $p = .732$) or IES-I ($r = 0.15$, $p = .065$). Baseline distress measures were largely unrelated to BF-17 average scores across the study period. Only baseline IES-I score was associated with BF-17 average scores at T1 ($r = 0.20$, $p = .006$) and at T4 ($r = 0.18$, $p = .043$).

Distress variables were tested as potential moderators of intervention effects on BF changes from T1 to T2. In three separate regression analyses, the three distress indicators (ABS-negative affect, IES-I, and salivary cortisol) and their respective distress predictor x group condition interaction terms were included as predictors of T1 to T2 changes in BF. Neither baseline ABS-negative nor its interaction terms (ABS-negative affect x CBTdummy; ABS-negative x RTdummy) predicted T1 to T2 change in BF in uncontrolled or controlled analyses (all p 's $> .05$), suggesting that baseline ABS-negative

score does not moderate intervention-related changes in BF from T1 to T2. Similarly, neither baseline IES-I nor its interaction terms (IES-I x CBTdummy; IES-I x RTdummy) predicted BF T1 to T2 change in BF in uncontrolled or controlled analyses (all p 's > .05), suggesting that baseline IES-I score does not moderate intervention-related changes in BF from T1 to T2. Finally, neither baseline salivary cortisol nor its interaction terms (salivary cortisol x CBTdummy; salivary cortisol x RTdummy) predicted BF T1 to T2 change in BF in uncontrolled or controlled analyses (all p 's > .05), suggesting that baseline salivary cortisol level does not moderate intervention-related changes in BF from T1 to T2.

Distress variables were included as potential moderators of intervention effects on BF in separate LGM analyses of the T2 to T4 study period, with slope loadings fixed at T2 = 0 months, T3 = 4 months, and T4 = 10 months. For all moderator analyses, T1 BF was included as a predictor of both intercept and slope, dummy coded group variables were included as predictors of slope, and the residual variance of T4 BF was fixed at zero. In three separate LGM analyses, the three distress indicators (ABS-negative affect, IES-I, and salivary cortisol) and their respective distress predictor x group condition interaction terms were included as predictors of the T2-T4 LGM model. First, baseline ABS-negative affect score and ABS-negative x dummy-coded group interaction terms were included as predictors of the T2-T4 LGM model (see Figure 5). This model fit the data ($\chi^2(13) = 20.68, p = .080; CFI = 0.98; RMSEA = 0.06; SRMR = 0.04$) after the residual variance of T4 BF was fixed at zero. Neither baseline ABS-negative affect nor the interaction terms predicted BF slope in uncontrolled or controlled analyses (all p 's > .05), suggesting that the baseline ABS-negative affect score does not moderate intervention-

related changes in BF from T2 to T4. Second, baseline IES-I score and IES-I x dummy-coded group interaction terms were included as predictors of the T2-T4 LGM model (see Figure 6). This model fit the data ($\chi^2(10) = 16.27, p = .092$; CFI = 0.99; RMSEA = 0.06; SRMR = 0.04) after the residual variance of T4 BF was fixed at zero. Neither baseline IES-I nor the interaction terms predicted BF slope in uncontrolled or controlled analyses (all p 's > .05), suggesting that baseline IES-I score does not moderate intervention-related changes in BF from T2 to T4. Third, baseline level of salivary cortisol and salivary cortisol x dummy-coded group interaction terms were included as predictors of the T2-T4 LGM model (see Figure 7). This model fit the data ($\chi^2(10) = 16.56, p = .085$; CFI = 0.98; RMSEA = 0.07; SRMR = 0.04) after the residual variance of T4 BF was fixed at zero. Neither baseline salivary cortisol nor the interaction terms predicted BF slope in uncontrolled or controlled analyses (all p 's > .05), suggesting that baseline level of salivary cortisol does not moderate intervention-related changes in BF from T2 to T4.

Aim 2b. The final aim of this study was to determine whether NHW and Hispanic women differ in reported levels of BF. Table 3 provides a summary of demographic and medical characteristics for NHW and Hispanic women. Chi-square and one-way ANOVAs revealed significant differences in age, education, stage, and presence of positive lymph nodes. Results suggest that Hispanic women were significantly younger than NHW women, had fewer years of education, represented a marginally greater proportion of stage I women ($\chi^2(1) = 3.61, p = .058$) and a significantly smaller proportion of stage II women ($\chi^2(1) = 3.83, p = .050$), and were more likely to have positive lymph nodes than NHW women.

Attendance and retention analyses revealed that Hispanic women had significantly lower session attendance ($M = 3.79$, $SD = 1.50$) than NHW women ($M = 4.41$, $SD = 1.10$; $F(1,119) = 6.76$, $p = .011$). Hispanic women also had lower retention rates at all follow-up timepoints (T2: $\chi^2(1) = 5.75$, $p = .016$; T3: $\chi^2(1) = 6.48$, $p = .011$; T4: $\chi^2(1) = 8.60$, $p = .003$). Retention rates were 85.5% for NHW women vs. 69.5% for Hispanic women at T2, 81.6% for NHW women vs. 63.4% for Hispanic women at T3, and 86.8% for NHW women vs. 67.1% Hispanic women at T4. Ethnic group differences on psychological and physiological distress predictor variables were also compared at T1 (see Table 3). There were no differences between NHW and Hispanic women on any baseline distress measure (i.e., ABS-negative affect, IES-I, or salivary cortisol level).

Figure 8 provides mean plots of observed BF-17 average scores at each timepoint split by NHW vs. Hispanic group, and Table 4 provides means and standard deviations of observed BF-17 average scores at each timepoint split by NHW vs. Hispanic group. Cross-sectional analyses showed that Hispanic women reported significantly greater BF than NHW women at each timepoint (T1 $t(153) = 4.35$, $p < .001$; T2 $t(120) = 4.77$, $p = .001$; T3 $t(112) = 3.72$, $p < .001$; T4 $t(119) = 2.53$, $p = .009$). These between-group BF differences at each timepoint remained significant even when controlling for income, stage, and procedure (all p 's $< .05$) and when controlling for session attendance (all p 's $< .05$). An additional controlled analysis was conducted with baseline variables for which Hispanic and NHW women differed (i.e., age, education, stage, positive lymph nodes) included as covariates, and between-group BF differences remained significant. There were no differences between Hispanic and NHW women in T1-T2 change in BF (standardized $\beta = 0.12$, $t(118) = 1.37$, $p = .168$), T2-T3 change in BF (standardized $\beta = -$

0.10, $t(105) = -0.99, p = .322$), or T3-T4 change in BF (standardized $\beta = -0.15, t(100) = -1.53, p = .122$). In uncontrolled regression analyses, within-ethnic group BF scores significantly increased from T1 to T2 for NHW women (NHW standardized $\beta = 0.43, t(62) = 3.45, p = .001$) and for Hispanic women (Hispanic standardized $\beta = 0.57, t(56) = 4.32, p < .001$). However, neither of these within-ethnic group effects from T1 to T2 were significant after controlling for income, stage, and procedure (all p 's $> .10$).

Ethnicity (coded as NHW vs. Hispanic) was included as a potential moderator of intervention effects on BF changes from T1 to T2. Neither ethnicity nor the interaction terms (ethnicity x CBTdummy; ethnicity x RTdummy) predicted T1 to T2 change in BF in uncontrolled or controlled analyses (all p 's $> .05$), suggesting that ethnicity does not moderate intervention-related changes in BF from T1 to T2. Finally, ethnicity (coded as NHW vs. Hispanic) was included as potential moderator in LGM analyses testing BF changes from T2 to T4, with slope loadings fixed at T2 = 0 months, T3 = 4 months, and T4 = 10 months (see Figure 9). This model fit the data ($\chi^2(10) = 15.38, p = .120$; CFI = 0.99; RMSEA = 0.06; SRMR = 0.04) after the residual variance of T4 BF was fixed at zero. Neither ethnicity nor the interaction terms predicted BF slope in uncontrolled or controlled analyses (all p 's $> .05$), suggesting that ethnicity does not moderate changes in BF from T2 to T4.

Chapter 4: Discussion

The current study followed women from the weeks post-surgery out one year into survivorship. This study period encompassed a stressful period with a number of significant stressors, including recovery from surgery, treatment decision-making, adjuvant therapy, and transitioning into survivorship (Carlson et al., 2004). During the active study period, women were dealing with acute effects of medical treatment, and throughout the study follow-up period women continued to face psychological and physical challenges of survivorship. By the end of the current study, women may have been dealing with long-term or late treatment effects and were challenged to develop a new sense of normalcy in their lives (Singh-Carlson, Wong, Martin, & Nguyen, 2013). In the midst of all these stressors, women in the present sample reported finding benefits in the experience of breast cancer. Approximately 85% of women reported finding some benefit at the baseline assessment, which is comparable to the 83% of women who found benefits in Sears et al. (2003) and the 84% of people who found benefits in Collins, Taylor, and Skokan (1990). Our overall sample mean indicates that “moderate” levels of benefit were found as early as 2-10 weeks following primary surgery.

Women have previously reported finding benefits in the experience of breast cancer (e.g., Sears et al., 2003), and comprehensive CBSM interventions have been shown to increase BF compared to a minimal attention control group (Antoni et al., 2001). Even CBSM interventions as brief as 5-weeks have increased BF relative to a standard care control condition (Groarke et al., 2012). However, less is known about the potential impact of brief 5-week interventions focused on the active components of CBSM (CBT or RT) on BF among breast cancer patients. The current study sought to examine

potential differential changes in BF for women in three 5-week group conditions (CBT, RT, and HE) over a 12-month period. The current study also examined potential moderating effects of initial distress levels and of ethnicity on changes in BF over time.

Intervention Effects on Benefit Finding

The first aim of the present study was to examine intervention effects on BF over the first year of treatment for breast cancer. The proposed T1 to T4 LGM models did not fit the data, likely due to the shape of the BF change trajectory, which indicated sample-wide increases in BF from T1 to T2 and differential BF changes from T2 to T4. Indeed, uncontrolled results showed that women in the current study reported increases in BF from T1 to T2, regardless of their study condition. Interestingly, when sociodemographic and medical sample characteristics were taken into account, only women in the CBT group demonstrated significant increases from baseline to post-intervention. This result offers some suggestion that a focused CBT intervention as brief as 5-weeks may help promote BF immediately following intervention; however, the lack of group by time interaction limits comparative conclusions. Although within-condition increases in BF were achieved, there were no between-group differences for women in CBT compared to HE from T1 to T2. The attention-matched HE control group may have provided many non-specific group effects, including facilitator attention and social support, which made it a stringent comparison group. A limitation of the present study is that there was no treatment-as-usual (TAU) comparison group with which to compare women who were involved in one of the three group conditions, so the potential impact of the non-specific benefits of the group environment cannot be ruled out. General comparisons with reported BF means in a similar sample of non-metastatic breast cancer patients who

participated in a separate trial (Antoni et al., 2001) offers an opportunity to compare the magnitude of the BF effect achieved by the present 5-week interventions and a previously studied 10-week CBSM intervention. This comparison also offers an opportunity to compare the current 5-week interventions to a half-day education control group used in the prior trial (Antoni et al., 2001) that was not equivalent on attention time. Comparing the present and the prior trial, women demonstrated comparable levels of initial BF prior to intervention, which was not surprising given that they were all recruited at the same point in their treatment (in the weeks after surgery but prior to starting adjuvant treatment). Interestingly, post-intervention BF levels for women in all three 5-week group conditions of the present study appear more similar to post-intervention BF levels for women in the 10-week CBSM condition than women in the half-day education seminar control group. This coarse qualitative comparison of BF means in these two samples suggests that the 5-week group conditions may have had comparable effects on post-intervention BF as a 10-week CBSM intervention. Future research could provide statistical comparisons to further explore the differential effects of 5-week CBT, RT, and HE compared to 10-week CBSM and a half-day education control condition.

Women in the three groups of the present trial demonstrated differential maintenance of BF from T2 to T4. Specifically, BF changes from T2 to T4 significantly differed between women in CBT and women in the HE control group, with a medium effect size. By the end of the 12-month follow-up period, women in CBT reported a tendency toward greater levels of BF than those in the HE control condition. Perhaps the skills learned in CBT provide longer lasting effects on BF compared to the HE control condition. By the 12-month follow-up period, specific training in stress awareness,

cognitive restructuring, coping skills training, and social support utilization appears to have a greater effect on BF levels than education regarding breast cancer, as one might expect. Interestingly, differential BF levels between 5-week CBT and 5-week HE groups contrasts with findings from Groarke et al. (2012) in which BF among women in the control group caught up to levels reported by women in the 5-week CBSM group by the 12-month follow-up assessment. It is possible that the very specific emphasis on CBT skills offered in the CBT group of the present study allowed women to focus on cognitive reappraisals fostering BF compared to the Groarke and colleagues' (2012) 5-week CBSM intervention in which CBT was one of many intervention components taught.

It is important to note that the content of the present 5-week group interventions did not explicitly promote BF, as clinical interventions directly targeting BF remain controversial (Tedeschi & Calhoun, 2009). Rather, previous studies have demonstrated that CBSM intervention-related increases in BF may be attributable to enhanced emotional processing skills (Antoni et al., 2006a) and intervention-related improvements in affect (Gudenkauf et al., 2013), which likely facilitate BF.

Changes in BF over time did not differ between women in RT and women in HE. One possible reason for this finding is that women in RT may not have continued to practice RT skills from post-intervention to the 12-month follow-up. A limitation of the present study is that there were no measures of skills practice at follow-up assessments, so the degree to which women continued to practice the skills they had learned as well as the potential influence of practice on reported levels of BF cannot be determined. Given that the long-term benefits of relaxation skills may be highly reliant on regular practice (e.g., Borkovec & Costello, 1993) beyond the brief intervention period and that

intervention effects on BF may be mediated by confidence in relaxation skills (Antoni et al., 2006a), potential lack of practice and/or lack of confidence in relaxation skills could have influenced women's reported levels of BF in the follow-up period. Future studies could benefit from inclusion of practice measures at follow-up assessments to determine the extent to which women continue to practice relaxation skills after completing the group intervention. Of note, group differences in retention were found at T4, such that women in RT demonstrated the lowest retention rates at the 12-month follow-up assessment. Lower retention rates for women in RT may also have contributed to the observed lack of difference in reported BF between women in RT and women in the HE control group.

Distress and Ethnicity as Moderators of Intervention Effects on Benefit Finding

One of the aims of this study was to examine baseline distress indicators as potential moderators of intervention effects on BF. Distress has been conceptualized as a possible precursor of BF (Cordova et al., 2001), and previous work investigating moderator effects demonstrated greater intervention effects for women with higher initial distress (Groarke et al., 2012). However, none of the three distress indicators (i.e., ABS-negative affect, IES-I, or salivary cortisol) were found to moderate intervention effects on BF in the present study. These findings may be due to the fact that overall self-reported distress levels were low in the current sample, with little variance. The overall sample average for ABS-negative indicates that women "rarely" experienced negative emotions during the week prior to their baseline assessment, and the average for IES-I indicates that women were only "a little bit" distressed by intrusive thoughts about cancer during the week prior to baseline. These low average self-reported distress levels with small

distress variances likely limited the ability to detect any distress moderator effects. Low self-reported distress levels have often been found among studies of non-metastatic breast cancer patients utilizing similar measures of distress (e.g., Antoni et al., 2001; Antoni et al., 2006b). The apparent limited ability to detect distress during a presumably stressful time and the discrepancy between the present results and the moderation effects found with more global measures of distress, such as the Perceived Stress Scale used in Groarke et al. (2012), suggest possible methodological limitations of the self-report distress measures utilized in the present study (Antoni et al., 2001).

Self-reported distress levels, as measured by ABS-negative affect and IES-I subscales, also did not correlate with the more objective salivary cortisol distress measure in the current sample. Despite this lack of association, the moderation results of the self-report and physiological distress measures were similar. Intervention-related changes in BF did not vary based on initial levels of salivary cortisol. Interestingly, the average PM salivary cortisol level in the present sample is comparable to that of participants whose PM salivary cortisol levels were considered low in Sephton and colleagues' (2000) survival study. This could suggest that the low PM salivary cortisol levels observed in the present sample demonstrate a tendency toward a steeper, healthier diurnal cortisol slope and lower physiological distress levels. However, it is important to keep in mind that low levels of PM salivary cortisol may not necessarily indicate a steeper diurnal slope from peak morning levels to lower PM levels. If the expected morning rise in cortisol does not occur, low levels of PM salivary cortisol may merely demonstrate an overall flatter slope over the course of the day (Sephton et al., 2000), which has been associated with poorer physiological functioning (McEwen, 1998). One limitation of a cross-sectional

examination of salivary cortisol level is that conclusions regarding diurnal cortisol patterns are limited. Thus, the low salivary cortisol levels in the present sample may indicate lower levels of physiological distress, but this conclusion requires further investigation into women's overall diurnal cortisol patterns. Again, if levels of physiological distress could be considered low in the present sample, this would have limited the ability to detect distress moderator effects in this study.

Distress measures were not generally associated with BF in the current sample, with the exception of associations between IES-I and BF at T1 and at T4. The general lack of association between self-reported distress measures and BF has been previously documented (Antoni et al., 2001) but is inconsistent with cognitive adaptation theory (Taylor, 1983), which conceptualizes BF as an outcome of the search for meaning following a traumatic, distressing event. Perhaps the present measures of self-reported distress do not fully capture the perceived level of trauma associated with a breast cancer diagnosis. Another possibility is that the timing of the baseline assessment (at 2-10 weeks post-surgery) is too far removed from the initial diagnosis to detect initial distress due to cancer diagnosis. Previous studies demonstrating an association between initial distress and later BF have examined pre-diagnostic distress (e.g., Tartaro et al., 2006). It is possible that women in the current sample experienced higher levels of subjective distress around the time of diagnosis but the months following diagnosis and surgery provided sufficient time for distress levels to decrease and for women to find benefits in their circumstances. The fact that women reported moderate levels of BF suggests that they initially perceived breast cancer as a significant enough crisis to find positive meaning in the experience.

The final aim of the study examined ethnicity as potential moderator of intervention effects on BF. Changes in BF among the two ethnic groups with the largest representation in the current sample (NHW women and Hispanic women) were compared, and ethnicity did not moderate intervention effects on BF. BF change trajectories over the study period showed comparable trajectories between NHW and Hispanic women, suggesting that the intervention groups did not have differential effects on BF for NHW and Hispanic women. Although a significant interaction was not found, there was a significant main effect of ethnicity on levels of BF. Hispanic women reported significantly higher BF at all timepoints, which is consistent with the literature (e.g., Gudenkauf, 2013; Helgeson et al, 2006). Importantly, Hispanic women were also younger, reported lower education levels, and had more positive lymph nodes than NHW women. These demographic and medical characteristics are consistent with BF literature suggesting that younger age, lower education level, and more positive lymph nodes—suggesting more advanced disease—are associated with higher levels of BF (e.g., Helgeson et al., 2006; Lechner et al., 2006). However, differences in BF between NHW and Hispanic women in the present study were robust, and findings held even after relevant controlling for demographic and medical covariates. Hispanic women also had lower session attendance, and differences in BF held after controlling for attendance. Therefore, independent of the younger age, lower education level, higher prevalence of positive lymph nodes, and poorer session attendance, Hispanic women were able to find more benefits at baseline compared to NHW women and maintained higher levels of BF across the study period.

Finally, contrary to expectations, Hispanic women reported higher levels of BF despite the fact that initial distress levels were equivalent to those of NHW women. This finding contradicts previous literature demonstrating greater distress among Hispanic women (Carver et al., 2003; Luckett et al., 2011; Yanez et al., 2011). In the current sample, differences in BF between Hispanic and NHW women are not attributable to differences in initial distress. Instead, social and cultural factors outlined within cognitive adaptation theory (Lepore & Kernan, 2009) may better account for the observed differences in BF. As previously described, it is likely that Hispanic cultural values, such as *familismo*, provide a supportive social context that fosters meaning making and BF (Cordova et al., 2001; Weiss, 2004) and/or spiritual values may prompt Hispanic women to perceive spiritual and personal growth from the experience of breast cancer (Nápoles et al., 2011). Measures of Hispanic cultural values and spirituality were not included in the present study, but future work should explore the potential factors contributing to greater levels of BF among Hispanic breast cancer patients.

Strengths and Limitations

Strengths. The current study represents a unique examination of intervention effects on BF over a year-long assessment period. This RCT involved four assessment timepoints, allowing for latent growth modeling of BF change over time. The study adds to the intervention literature in breast cancer by examining effects of more brief and focused 5-week CBT and RT interventions compared to a stringent, attention-matched health education control group. Even with this stringent control group, women in CBT showed greater increases in BF out to 12-month follow-up, suggesting beneficial effects of cognitive-behavioral skills in maintaining BF among breast cancer patients above and

beyond the benefits of facilitator attention and group social support. This study also adds to the BF literature by investigating the impact of initial subjective and objective distress levels on intervention-related changes in BF. Hispanic women were well represented, comprising the largest ethnic group in the study sample, followed closely by NHW women. Approximately equivalent representation of Hispanic and NHW women permitted a unique examination of differences in BF between these two ethnic groups and enables greater generalizability of results beyond the traditional NHW sample.

Limitations. Several study limitations relate to the study design of the overall RCT and are described in Gudenkauf et al. (2015). These include sampling limitations inherent to most psychosocial interventions, such as self-selection. Women who agreed to participate in the current study were motivated to join a stress management program, were not deterred by the weekly time commitment, and were able to travel to the group meetings. Highly motivated participants may not represent breast cancer patients in real-world clinical oncology settings. Only non-metastatic breast cancer patients were enrolled in this study, limiting our ability to generalize to metastatic breast cancer populations. The resultant sample reported low levels of initial distress, which may have limited the ability to detect stress management effects and distress moderator effects. Women who participated were also fluent in English. This inclusion criterion restricted the sample to a subset of English-speaking women, limiting generalizability of findings to non-English speaking women. Despite strong representation of Hispanic women in the current study, other ethnic minority groups were less well represented. Future work should seek to include an even more diverse sample of breast cancer patients in order to investigate ethnic differences in BF among a broader range of ethnic minorities.

The present sample reported fairly high income and education levels, reducing our ability to generalize to lower SES groups. This study is also limited by a failure of random assignment. Women in the HE group reported higher household income while women in the CBT group reported the highest initial self-reported distress as measured by IES thought intrusions subscale. In order to account for income differences, income was included as a socioeconomic covariate in study analyses. Another study limitation is the lack of a more inert TAU control group. Without a TAU group, it is difficult to determine whether changes in BF observed in each study condition in the present study are attributable to the study conditions or merely to natural change over time. The present analyses were also limited by the number of assessment timepoints, the sample size, and the three-group comparisons, which strained LGM models and made model fit and hypothesis-testing difficult. Finally, the present study was limited by issues related to study measures, particularly the BFS and salivary cortisol measures. These measurement issues are elaborated in Gudenkauf (2013) and include the retrospective self-report nature of the BFS (Tennen & Affleck, 2009), difficulties related to BFS scoring (Carver et al. 2009), and participant burden and lack of adherence measures for salivary cortisol collection.

Future Directions

Future studies should focus on improving on the aforementioned study limitations by seeking to include a more diverse and representative study sample and increasing generalizability. Questionnaires and group materials could be translated to Spanish to enable non-English speaking women to participate. Future study measures should include measures assessing cultural factors that may be contributing to higher reported BF among

Hispanic women. Furthermore, the study follow-up period could be extended beyond the year following primary surgery. Additional assessment timepoints would provide BF change trajectories over a longer assessment period and would allow for more complex latent-growth modeling to better characterize changes in BF over time. Since differences in BF between women in CBT and HE emerged by the final assessment timepoint, a longer follow-up period would also help determine whether BF differences between CBT and HE groups continue to increase, are maintained, or decrease over time.

Future research could offer additional insight into the intervention content and intervention timing most likely to promote positive adaptation. Given that the present 5-week CBT intervention and Groarke and colleagues' (2012) 5-week CBSM showed similar short-term effects on BF but different long-term effects, it would be interesting to directly compare these interventions to better determine the intervention components most responsible for subsequent BF. It appears that a focused CBT intervention may be sufficient for promoting BF and even superior in the long-term, but this comparison should be directly tested. Future research should also test whether implementing the 5-week intervention at different points in the cancer survivorship trajectory influences intervention effects on positive adaptation. The brief nature of the intervention offers an opportunity to intervene in the period between diagnosis and surgery, when distress may be particularly heightened (Cimprich, 1999) and interventions may be especially helpful. Women may also benefit from psychosocial intervention during other stressful periods, like during adjuvant treatment (Knobf, 1986) and following treatment completion (Lindley, Vasa, Sawyer, & Winer, 1998).

The ability of a 5-week intervention to help women make meaning of their breast cancer experience and promote positive adaptation is clinically relevant. BF, and positive psychosocial adjustment overall, could not only enhance women's QOL during and after treatment (e.g., Lechner & Weaver, 2009) but can impact physical functioning (Algoe & Stanton, 2009) and physiological health (Pascoe & Edvardson, 2013). Future studies should further investigate whether intervention-related BF changes in the year following primary surgery predict later psychological or physiological functioning, comorbidities, or even recurrence and survival. 10-week CBSM interventions that have promoted BF among cancer patients have demonstrated associations with more favorable psychosocial and health outcomes (e.g., Penedo et al., 2006; Stagl et al., 2015), but the ability of 5-week psychosocial interventions to predict later psychological and health outcomes 5 to 10 years into survivorship remains to be tested. In general, it has been suggested that "adjuvant treatment" in the clinical oncology setting should include psychological therapy (Cunningham, 2000), and the current study, along with other work (e.g., Gudenkauf et al., 2015), suggests that a 5-week psychosocial intervention could be of help.

Tables

Table 1

Means (Standard Deviations) and Frequencies for Baseline (T1) Demographic, Medical, and Distress Variables by Group Condition

Variable	CBT (n = 55)	RT (n = 70)	HE (n = 58)	Statistic	p
Age (yrs), 28-80	54.62 (9.2)	53.69 (11.5)	54.67 (9.1)	$F(2,180) = 0.20$	.823
Race/Ethnicity				$\chi^2(6) = 4.21$	.648
<i>NHW</i>	25 (45.5%)	24 (34.3%)	27 (46.6%)		
<i>Hispanic</i>	22 (40.0%)	36 (51.4%)	24 (41.4%)		
<i>AA</i>	4 (7.3%)	6 (8.6%)	6 (10.3%)		
<i>Other</i>	3 (5.5%)	4 (5.7%)	1 (1.7%)		
Income (thousands)	99.85 (63.6)	86.60 (57.9)	118.25 (79.2)	$F(2,180) = 3.55$	.031
Education (yrs)	16.11 (2.6)	14.90 (3.1)	15.60 (3.2)	$F(2,176) = 2.59$	.078
Partnered	39 (70.9%)	40 (57.1%)	38 (65.5%)	$\chi^2(2) = 2.39$	.303
Stage				$\chi^2(6) = 2.36$	.883
0	11 (20.0%)	12 (17.1%)	12 (20.7%)		
I	31 (56.4%)	34 (48.6%)	29 (50.0%)		
II	11 (20.0%)	20 (28.6%)	13 (22.4%)		
III	2 (3.6%)	3 (4.3%)	4 (6.9%)		
Positive Nodes	6 (10.9%)	16 (22.9%)	15 (25.9%)	$\chi^2(2) = 4.23$	.120
Hormone Status					
<i>ER Positive</i>	44 (80.0%)	56 (80.0%)	41 (70.7%)	$\chi^2(2) = 3.33$	.189
<i>PR Positive</i>	36 (65.5%)	49 (70.0%)	37 (63.8%)	$\chi^2(2) = 0.31$	.858
Procedure				$\chi^2(2) = 0.82$	.662
<i>Lumpectomy</i>	24 (43.6%)	35 (50.0%)	30 (51.7%)		
<i>Mastectomy</i>	31 (56.4%)	35 (50.0%)	28 (48.3%)		
Days Since Sx	36.73 (25.0)	39.36 (22.8)	35.72 (18.9)	$F(2,180) = 0.46$	.635
Treatment					
<i>Chemotherapy</i>	16 (29.1%)	26 (37.1%)	20 (34.5%)	$\chi^2(2) = 1.23$	.540
<i>Radiation</i>	23 (41.8%)	26 (37.1%)	34 (58.6%)	$\chi^2(2) = 4.23$	.120
<i>Anti-hormonal</i>	43 (78.2%)	47 (67.1%)	42 (72.4%)	$\chi^2(2) = 1.65$	.439
<i>Any Adjuvant</i>	44 (80.0%)	56 (80.0%)	48 (82.8%)	$\chi^2(2) = 0.90$	.637
Medication					
<i>Antidepressant</i>	12 (21.8%)	9 (12.9%)	7 (12.1%)	$\chi^2(2) = 2.47$	.291
<i>Anti-anxiety</i>	16 (29.1%)	17 (24.3%)	13 (22.4%)	$\chi^2(2) = 0.67$	.714
<i>Sleep</i>	15 (27.3%)	18 (25.7%)	17 (29.3%)	$\chi^2(2) = 1.03$	.950
<i>Pain</i>	21 (38.2%)	21 (30.0%)	17 (29.3%)	$\chi^2(2) = 1.16$	.561
Distress					
<i>ABS-negative</i>	2.09 (0.6)	2.06 (2.0)	1.88 (0.6)	$F(2,175) = 2.40$	.094

<i>IES-intrusions</i>	1.60 (0.8)	1.24 (0.8)	1.14 (0.9)	$F(2,176) = 4.35$	.014
<i>Cortisol</i>	1.70 (0.6)	1.69 (0.5)	1.86 (0.7)	$F(2,161) = 1.39$	.253

Note: CBT = Cognitive-Behavioral Training; RT = Relaxation Training; HE = Health Education; Yrs = Years; NHW = Non-Hispanic White; AA = African-American; ER = Estrogen Receptor; PR = Progesterone Receptor; Days Since Sx = Days Since Surgery (the number of days from surgery to baseline assessment); ABS-negative = ABS-negative affect

Mean (SD) or Frequency (%)

Table 2

Means (Standard Deviations) for BF-17 Average Scores at Each Assessment Timepoint (T1 – T4) by Group Condition

Variable	CBT (n = 55)	RT (n = 70)	HE (n = 58)
BF-17 at T1	3.23 (0.96)	3.09 (1.07)	3.08 (1.09)
BF-17 at T2	3.56 (0.81)	3.46 (0.97)	3.41 (1.09)
BF-17 at T3	3.46 (0.92)	3.55 (0.88)	3.20 (1.13)
BF-17 at T4	3.62 (0.81)	3.36 (0.86)	3.28 (1.06)

Note: CBT = Cognitive-Behavioral Training; RT = Relaxation Training; HE = Health Education

Table 3

Means (Standard Deviations) and Frequencies for Baseline (T1) Demographic, Medical, and Distress Variables by Ethnic Group

Variable	NHW (n = 76)	Hispanic (n = 82)	Statistic	p
Age (yrs), 28-80	57.89 (10.0)	51.99 (9.4)	$F(1,156) = 14.7$	<.001
Income (thousands)	114.29 (71.9)	95.21 (63.9)	$F(1,156) = 3.11$	.079
Education (yrs)	16.04 (3.0)	15.06 (3.0)	$F(1,154) = 4.15$	.043
Partnered	51 (67.1%)	54 (65.9%)	$\chi^2(1) < 0.01$	.958
Stage			$\chi^2(3) = 8.80$	.032
0	18 (23.7%)	12 (14.6%)		
I	33 (43.4%)	48 (58.5%)		
II	23 (30.3%)	14 (17.1%)		
III	2 (2.6%)	7 (8.5%)		
Positive Nodes	9 (11.8%)	21 (25.6%)	$\chi^2(1) = 4.69$	.030
Hormone Status				
<i>ER Positive</i>	58 (76.3%)	65 (79.3%)	$\chi^2(1) = 0.72$	.397
<i>PR Positive</i>	49 (64.5%)	58 (70.7%)	$\chi^2(1) = 1.82$	.178
Procedure			$\chi^2(1) = 2.07$	.150
<i>Lumpectomy</i>	43 (56.6%)	37 (45.1%)		
<i>Mastectomy</i>	33 (43.4%)	45 (54.9%)		
Days Since Sx	37.24 (21.8)	35.68 (22.4)	$F(1,156) = 0.20$	.660
Treatment				
<i>Chemotherapy</i>	23 (30.3%)	29 (35.4%)	$\chi^2(1) = 0.83$	.363
<i>Radiation</i>	43 (56.6%)	34 (41.5%)	$\chi^2(1) = 1.93$	.164
<i>Anti-hormonal</i>	54 (71.1%)	62 (75.6%)	$\chi^2(1) = 1.25$	.264
<i>Any Adjuvant</i>	64 (84.2%)	69 (84.1%)	$\chi^2(1) = 0.69$	.406
Medication				
<i>Antidepressant</i>	11 (14.5%)	15 (18.3%)	$\chi^2(1) = 0.51$	.474
<i>Anti-anxiety</i>	17 (22.4%)	26 (31.7%)	$\chi^2(1) = 2.00$	.157
<i>Sleep</i>	23 (30.3%)	19 (23.2%)	$\chi^2(1) = 0.76$	.384
<i>Pain</i>	24 (31.6%)	25 (30.5%)	$\chi^2(1) < 0.01$	.965
Distress				
<i>ABS-negative</i>	1.94 (0.5)	2.08 (0.6)	$F(1,152) = 2.37$	.126
<i>IES-intrusions</i>	1.19 (0.8)	1.39 (0.9)	$F(1,153) = 2.11$	.148
<i>Cortisol</i>	1.84 (0.7)	1.72 (0.5)	$F(1,144) = 1.26$	.264

Note: NHW = Non-Hispanic White; Yrs = Years; ER = Estrogen Receptor; PR = Progesterone Receptor; Days Since Sx = Days Since Surgery (the number of days from surgery to baseline assessment); ABS –negative = ABS-negative affect

Mean (SD) or Frequency (%)

Table 4

Means (Standard Deviations) for BF-17 Average Scores at Each Assessment Timepoint (T1 – T4) by Ethnic Group

Variable	NHW (<i>n</i> = 76)	Hispanic (<i>n</i> = 82)
BF-17 at T1	2.73 (1.03)	3.41 (0.95)
BF-17 at T2	3.09 (0.97)	3.84 (0.78)
BF-17 at T3	3.05 (0.98)	3.69 (0.83)
BF-17 at T4	3.19 (0.91)	3.59 (0.82)

Note: NHW = Non-Hispanic White

Figures

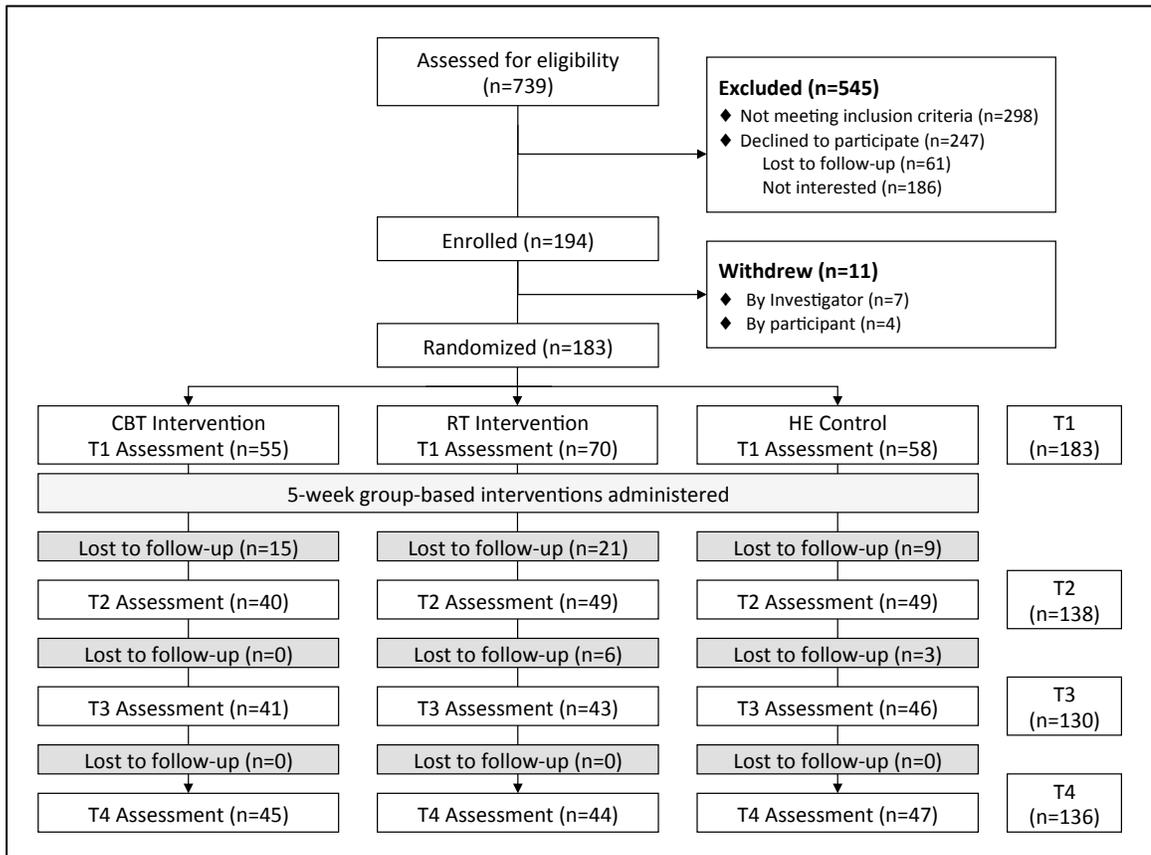


Figure 1. CONSolidated Standards Of Reporting Trials (CONSORT) flow diagram of study enrollment and retention.

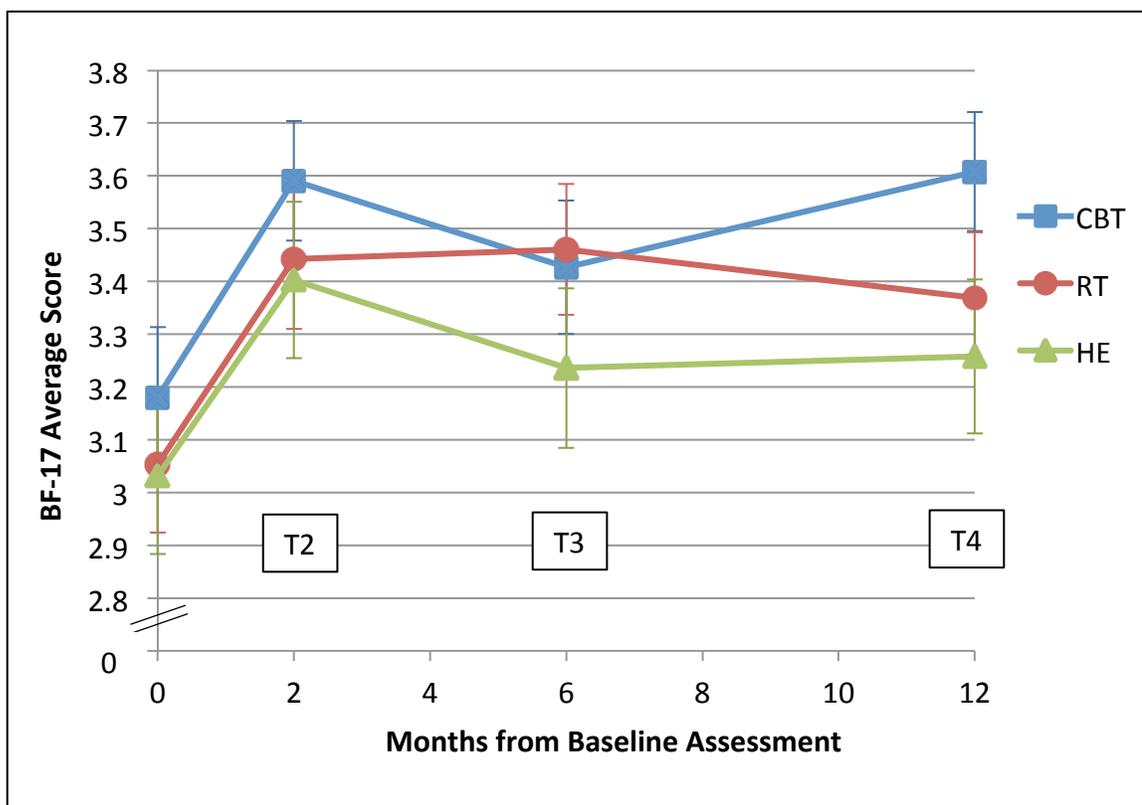


Figure 2. Estimated means plot for BF-17 average scores of each group condition (CBT, RT, and HE) at each assessment timepoint (T1 = 0 months, T2 = 2 months, T3 = 6 months, T4 = 12 months). Error bars reflect standard error of the mean value for each group at each timepoint.

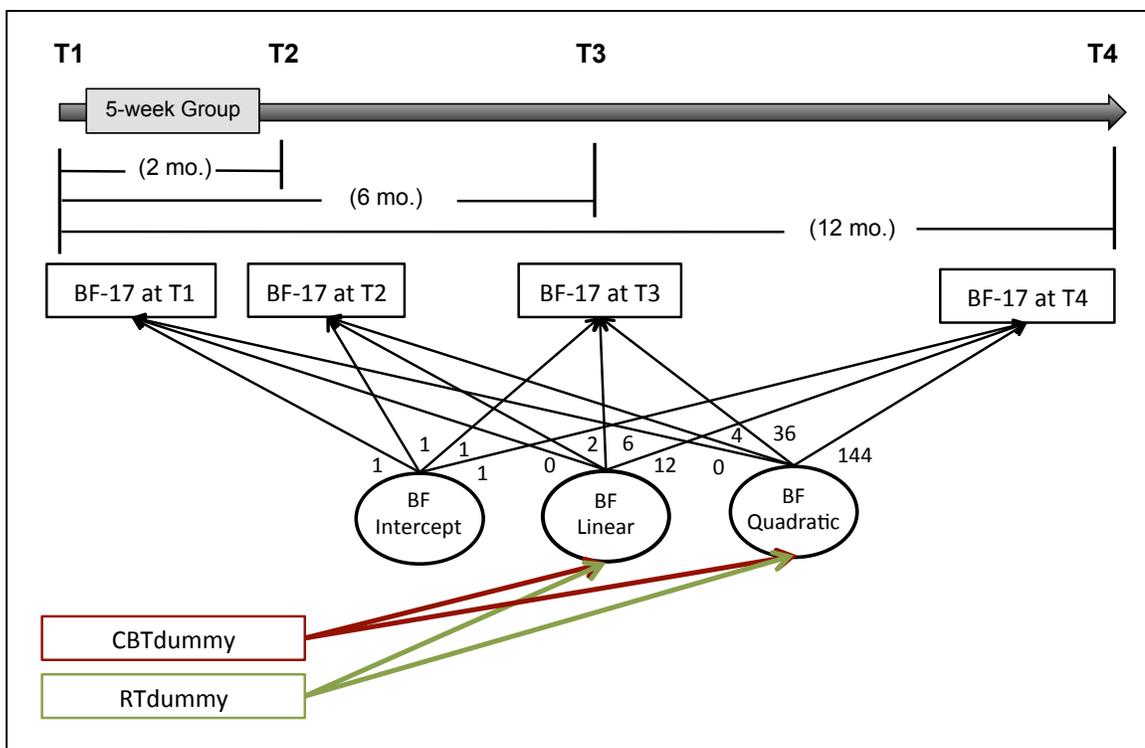


Figure 3. Aim 1 latent growth model of intervention effects on changes in benefit finding (BF) from T1 to T4. BF is measured using 3 latent variables (intercept, linear slope, and quadratic term) with loadings on four timepoints (T1 – T4) over a 12-month (mo.) interval. The slope for BF is set at T1 = 0. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of BF linear and quadratic terms.

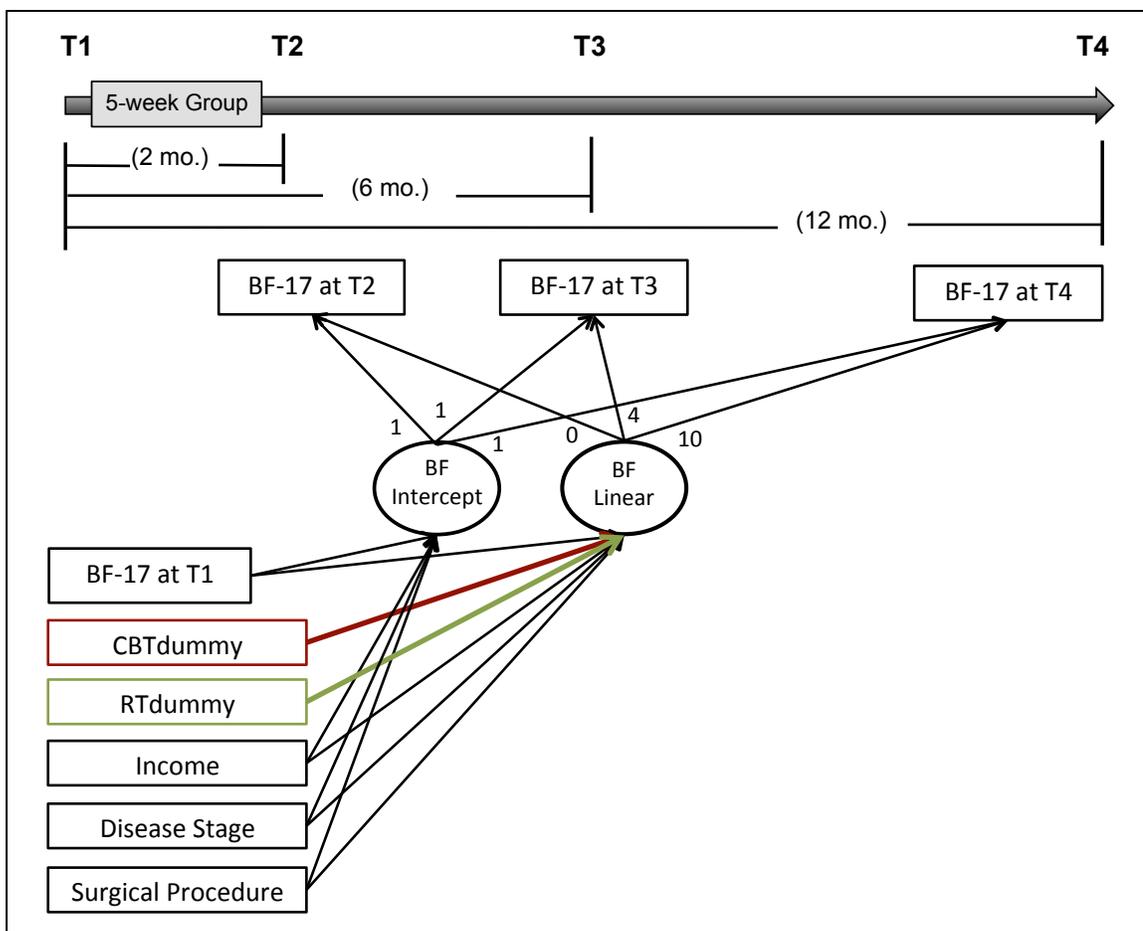


Figure 4. Aim 1 latent growth model of intervention effects on changes in benefit finding (BF) from T2 to T4. BF is measured using 2 latent variables (intercept and linear slope) with loadings on three timepoints (T2 – T4) over a 10-month (mo.) interval. The slope for BF is set at T2 = 0. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of the BF linear slope term. T1 BF-17 average score and the three covariates (i.e., income, disease stage, and surgical procedure) are also included as predictors of both the BF intercept and BF linear slope terms.

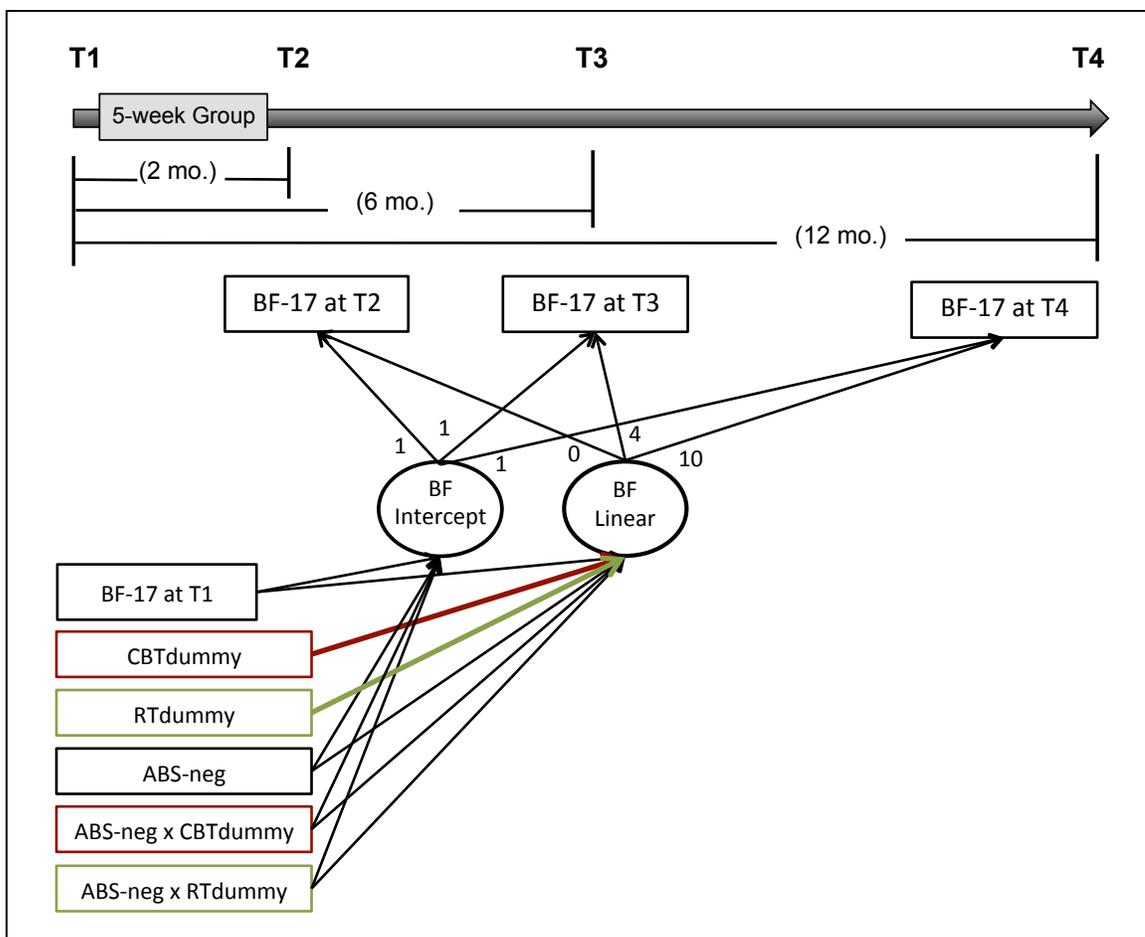


Figure 5. Aim 2a latent growth model of baseline ABS-negative affect (ABS-neg) moderating intervention effects on changes in benefit finding (BF) from T2 to T4. BF is measured using 2 latent variables (intercept and linear slope) with loadings on three timepoints (T2 – T4) over a 10-month (mo.) interval. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of the BF linear slope term. T1 BF-17 average score is included as a predictor of BF intercept and BF linear slope. Baseline ABS-negative affect and the interaction of negative affect by dummy coded condition variables are also included as predictors of BF intercept and BF linear slope in order to test general affective distress as a potential moderator.

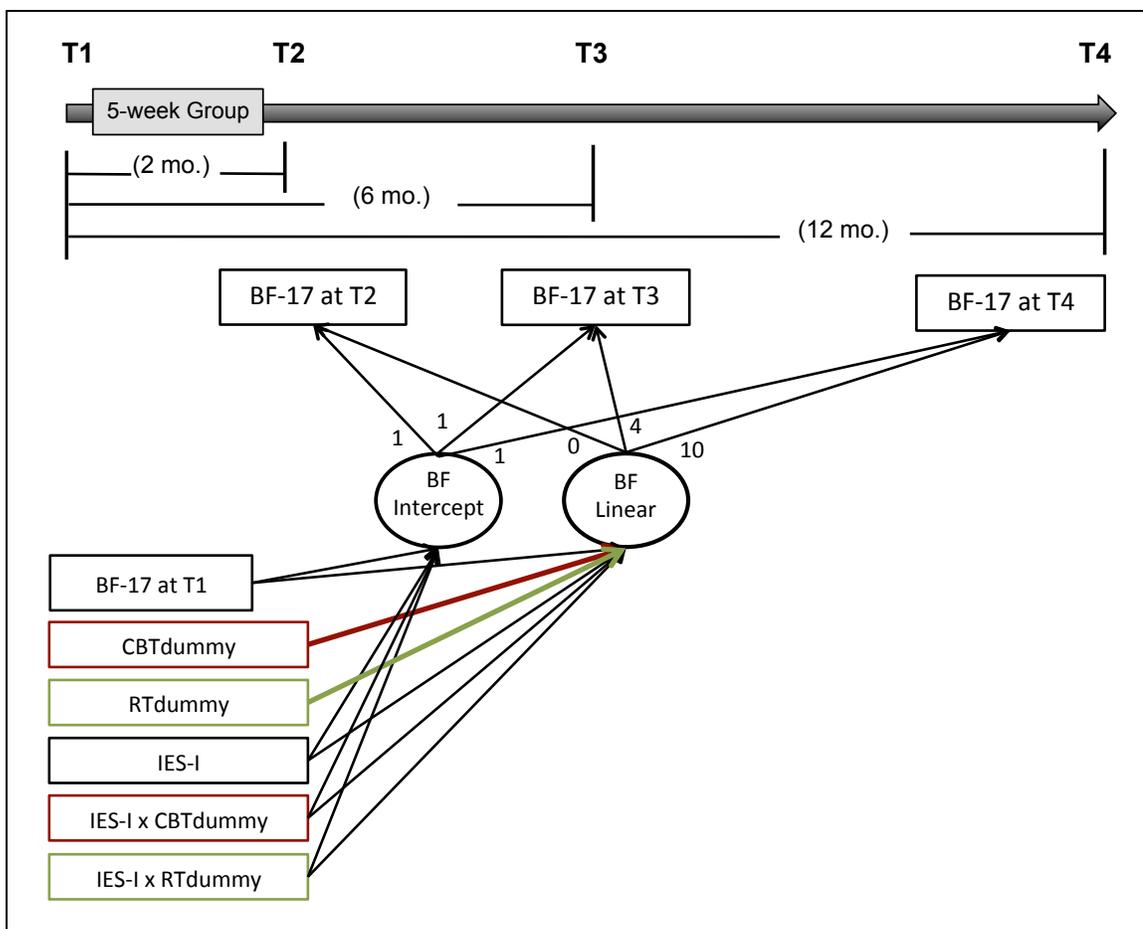


Figure 6. Aim 2a latent growth model of baseline IES-I moderating intervention effects on changes in benefit finding (BF) from T2 to T4. BF is measured using 2 latent variables (intercept and linear slope) with loadings on three timepoints (T2 – T4) over a 10-month (mo.) interval. The slope for BF is set at T2 = 0. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of the BF linear slope term. T1 BF-17 average score is included as a predictor of BF intercept and BF linear slope. Baseline IES-I distress and the interaction of IES-I distress by dummy coded condition variables are also included as predictors of BF intercept and BF linear slope in order to test cancer-specific cognitive distress as a potential moderator.

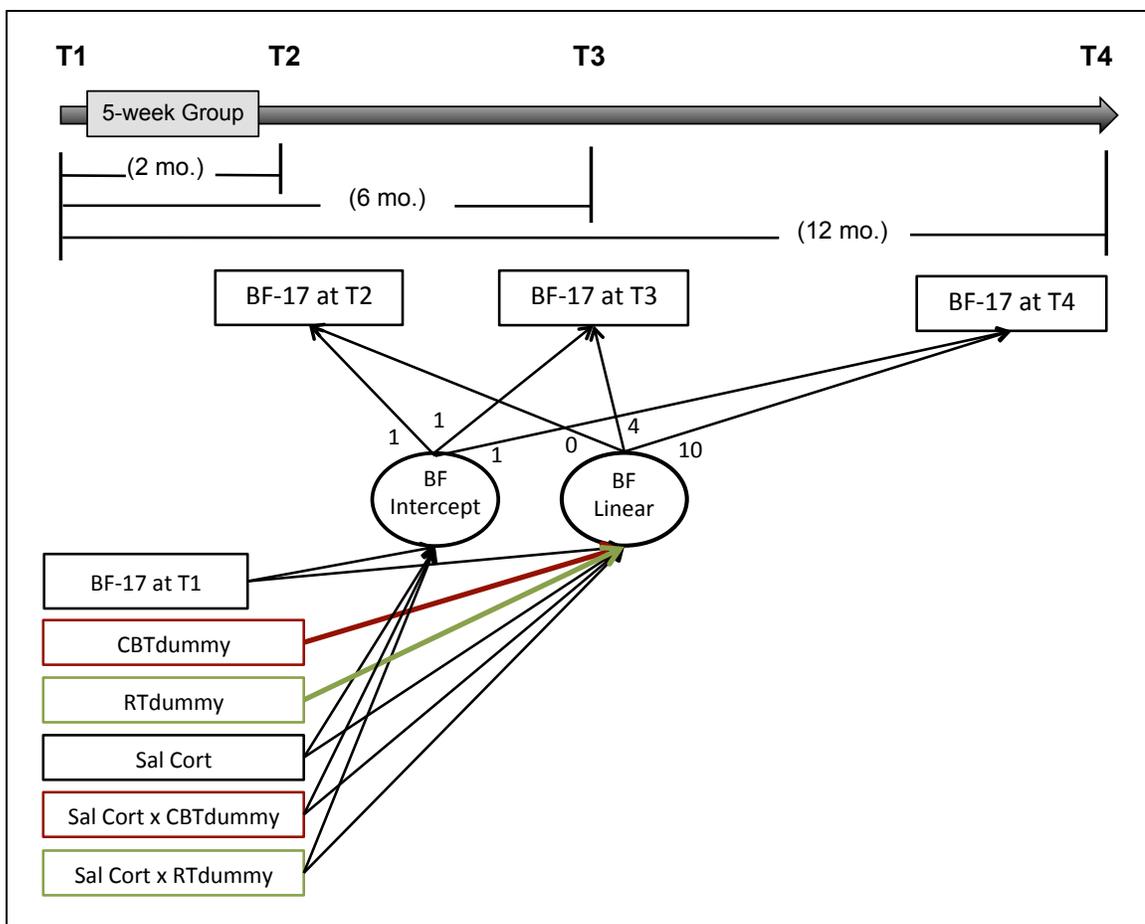


Figure 7. Aim 2a latent growth model of baseline mean evening salivary cortisol level (Sal Cort) moderating intervention effects on changes in benefit finding (BF) from T2 to T4. BF is measured using 2 latent variables (intercept and linear slope) with loadings on three timepoints (T2 – T4) over a 10-month (mo.) interval. The slope for BF is set at T2 = 0. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of the BF linear slope term. T1 BF-17 average score is included as a predictor of BF intercept and BF linear slope. Baseline salivary cortisol and the interaction of cortisol by dummy coded condition variables are also included as predictors of BF intercept and BF linear slope in order to test physiological distress as a potential moderator.

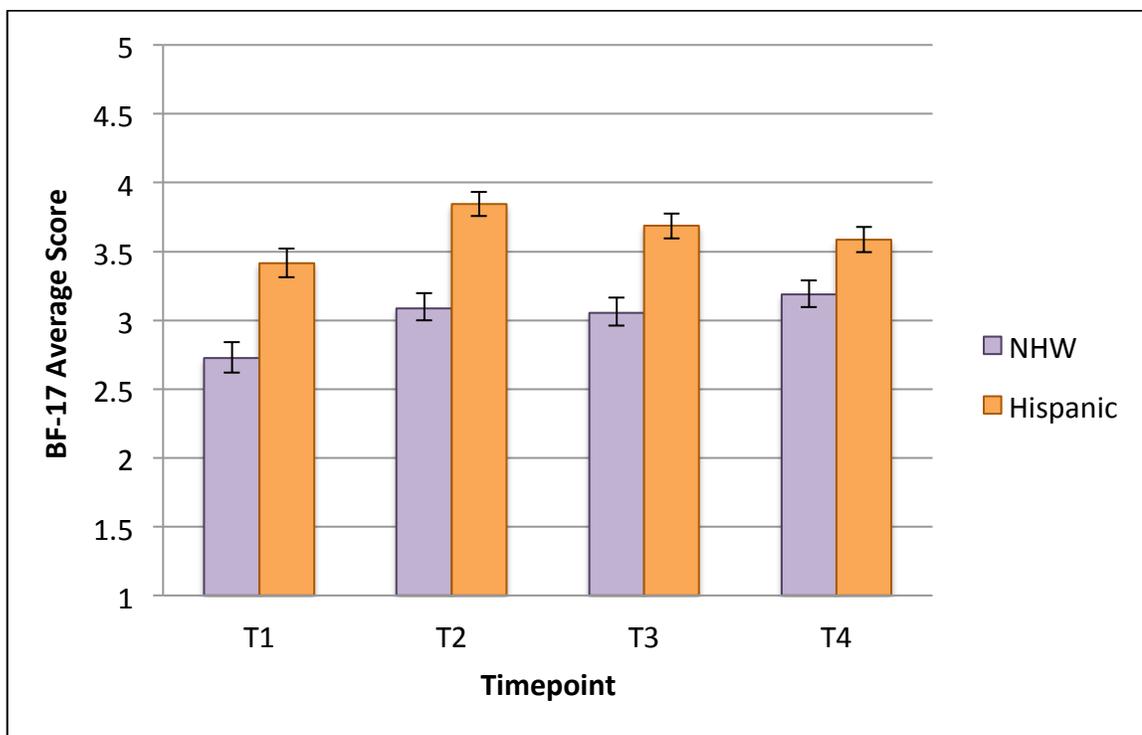


Figure 8. Observed means histogram for BF-17 average scores at each assessment timepoint (T1 – T4) for Non-Hispanic White (NHW) and Hispanic women. Error bars reflect standard error of the mean value for each ethnic group at each timepoint.

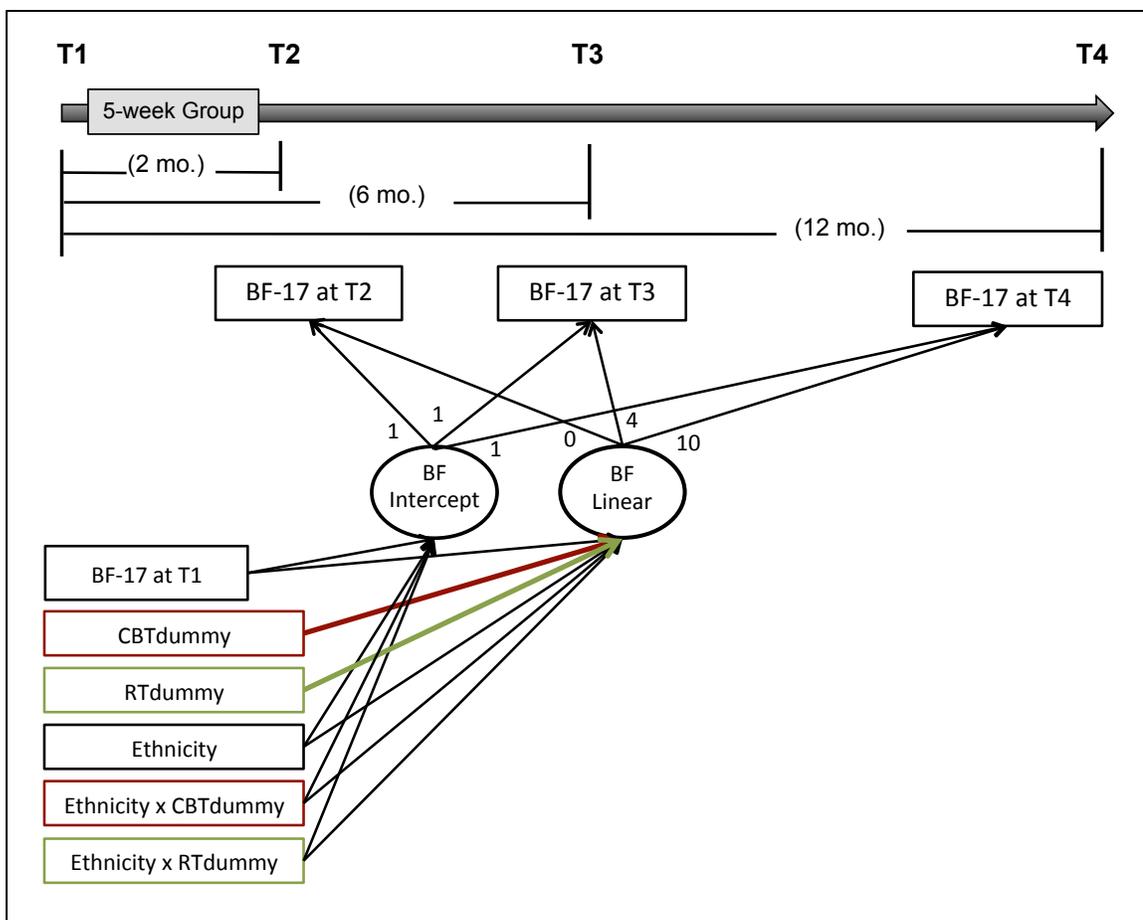


Figure 9. Aim 2b latent growth model of ethnicity moderating intervention effects on changes in benefit finding (BF) from T2 to T4. BF is measured using 2 latent variables (intercept and linear slope) with loadings on three timepoints (T2 – T4) over a 10-month (mo.) interval. The slope for BF is set at T2 = 0. Group condition dummy coded vectors (CBTdummy and RTdummy) are included as predictors of the BF linear slope term. T1 BF-17 average score is included as a predictor of BF intercept and BF linear slope. A dichotomous (Hispanic vs. Non-Hispanic White) ethnicity variable and the interaction of ethnicity by dummy coded condition variables are also included as predictors of BF intercept and BF linear slope in order to test ethnicity as a potential moderator.

References

- Abercrombie, H. C., Giese-Davis, J., Sephton, S., Epel, E. S., Turner-Cobb, J. M., & Spiegel, D. (2004). Flattened cortisol rhythms in metastatic breast cancer patients. *Psychoneuroendocrinology*, *29*(8), 1082-1092. doi:10.1016/j.psyneuen.2003.11.003
- Algoe, S. B. & Stanton, A. L. (2009). Is benefit finding good for individuals with chronic disease? In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 173-193). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- American Cancer Society. (2006). *Learn about breast cancer*. Retrieved from <http://www.cancer.org/cancer/breastcancer/>
- American Cancer Society. (2014). *Key statistics about breast cancer*. Retrieved from <http://www.cancer.org/cancer/breastcancer/detailedguide/breast-cancer-key-statistics>
- Andersen, B. L., Farrar, W. B., Golden-Kreutz, D. M., Glaser, R., Emery, C. F., Crespin, T. R., . . . Carson, W. E., III. (2004). Psychological, behavioral, and immune changes after a psychological intervention: A clinical trial. *Journal of Clinical Oncology*, *22*(17), 3570-3580. doi:10.1200/JCO.2004.06.030
- Antoni, M. H. (2003). *Stress Management intervention for women with breast cancer*. Washington, DC: American Psychological Association. doi:10.1037/10488-000
- Antoni, M. H. (2012). Stress management, PNI, and disease. In Segerstrom, S.C. (Ed.), *The Oxford Handbook of Psychoneuroimmunology*. (pp. 385-420). New York, NY: Oxford University Press. doi:10.1093/oxfordhb/9780195394399.013.0021
- Antoni, M. H., Carver, C. S., & Lechner, S. C. (2009). Enhancing positive adaptation: Example intervention during treatment for breast cancer. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 197-214). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Antoni, M. H., Lechner, S. C., Kazi, A., Wimberly, S. R., Sifre, T., Urcuyo, K. R., . . . Carver, C. S. (2006a). How stress management improves quality of life after treatment for breast cancer. *Journal of Consulting and Clinical Psychology*, *74*(6), 1143-1152. doi:10.1037/0022-006X.74.6.1143

- Antoni, M. H., Lehman, J. M., Kilbourn, K. M., Boyers, A. E., Culver, J. L., Alferi, S. M., . . . Carver, C. S. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. *Health Psychology, 20*(1), 20-32. doi:10.1037/0278-6133.20.1.20
- Antoni, M. H., Wimberly, S. R., Lechner, S. C., Kazi, A., Sifre, T., Urcuyo, K. R., . . . Carver, C. S. (2006b). Reduction of cancer-specific thought intrusions and anxiety symptoms with a stress management intervention among women undergoing treatment for breast cancer. *The American Journal of Psychiatry, 163*(10), 1791-1797. doi:10.1176/appi.ajp.163.10.1791
- Armes, J., Chalder, T., Addington-Hall, J., Richardson, A., & Hotopf, M. (2007). A randomized controlled trial to evaluate the effectiveness of a brief, behaviorally oriented intervention for cancer-related fatigue. *Cancer, 110*(6), 1385-1395. doi:10.1002/cncr.22923
- Beck, A. T., & Emery, G. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books. doi:http://dx.doi.org/10.1017/S0021932000016369
- Behr, S. K., Murphy, D. L., & Summers, J. A. (1992). *User's manual: Kansas Inventory of Parental Perceptions (KIPP)*. Beach Center on Families and Disabilities. University of Kansas.
- Bellizzi, K.M., & Blank, T.O. (2006). Predicting posttraumatic growth in breast cancer survivors. *Health Psychology, 25*(1), 47-56. doi:10.1037/0278-6133.25.1.47
- Bernstein, B., & Borkovec, T. (1973). *Progressive muscle relaxation training: A manual for the helping professions*. Champaign, IL: Research Press.
- Borkovec, T. D., & Costello, E. (1993). Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology, 61*(4), 611-619. doi:10.1037/0022-006x.61.4.611
- Bower, J. E., Ganz, P. A., Dickerson, S. S., Petersen, L., Aziz, N., & Fahey, J. L. (2005a). Diurnal cortisol rhythm and fatigue in breast cancer survivors. *Psychoneuroendocrinology, 30*(1), 92-100. doi:10.1016/j.psyneuen.2004.06.003
- Bower, J. E., Meyerowitz, B. E., Desmond, K. A., Bernaards, C. A., Rowland, J. H., & Ganz, P. A. (2005b). Perceptions of positive meaning and vulnerability following breast cancer: Predictors and outcomes among long-term breast cancer survivors. *Annals of Behavioral Medicine, 29*(3), 236-245. doi:10.1207/s15324796abm2903_10

- Carlson, L., Angen, M., Cullum, J., Goodey, E., Koopmans, J., Lamont, L., . . . Bultz, B. (2004). High levels of untreated distress and fatigue in cancer patients. *British Journal of Cancer*, *90*(12), 2297-2304. doi:10.1038/sj.bjc.6601887
- Carlson, L. E., Speca, M., Farris, P., & Patel, K. D. (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain, Behavior, & Immunity*, *21*(8), 1038-1049. doi:10.1016/j.bbi.2007.04.002
- Carver, C. S., & Antoni, M. H. (2004). Finding benefit in breast cancer during the year after diagnosis predicts better adjustment 5 to 8 years after diagnosis. *Health Psychology*, *23*(6), 595-598. doi:10.1037/0278-6133.23.6.595
- Carver, C. S., Lechner, S. C., & Antoni, M. H. (2009). Challenges in studying positive change after adversity: Illustrations from research on breast cancer. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 51-62). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Carver, C. S., Lehman, J. M., & Antoni, M. H. (2003). Dispositional pessimism predicts illness-related disruption of social and recreational activities among breast cancer patients. *Journal of Personality and Social Psychology*, *84*(4), 813-821. doi:10.1037/0022-3514.84.4.813
- Casellas-Grau, A., Font, A., & Vives, J. (2014). Positive psychology interventions in breast cancer. A systematic review. *Psycho-Oncology*, *23*(1), 9-19. doi:10.1002/pon.3353
- Christensen, S., Zachariae, R., Jensen, A. B., Væth, M., Møller, S., Ravnsbæk, J., & von der Maase, H. (2009). Prevalence and risk of depressive symptoms 3–4 months post-surgery in a nationwide cohort study of Danish women treated for early stage breast-cancer. *Breast Cancer Research and Treatment*, *113*(2), 339-355. doi:10.1007/s10549-008-9920-9
- Cimprich, B. (1999). Pretreatment symptom distress in women newly diagnosed with breast cancer. *Cancer Nursing*, *22*(3), 185-194. doi:10.1097/00002820-199906000-00001
- Cockle-Hearne, J., & Faithfull, S. (2010). Self-management for men surviving prostate cancer: A review of behavioural and psychosocial interventions to understand what strategies can work, for whom and in what circumstances. *Psycho-Oncology*, *19*(9), 909-922. doi:10.1002/pon.1657

- Cohen, M., & Fried, G. (2007). Comparing relaxation training and cognitive-behavioral group therapy for women with breast cancer. *Research on Social Work Practice, 17*(3), 313-323. doi:10.1177/1049731506293741
- Collins, R. L., Taylor, S. E., & Skokan, L. A. (1990). A better world or a shattered vision? Changes in life perspective following victimization. *Social Cognition, 8*(3), 263-285. doi: 10.1521/soco.1990.8.3.263
- Cordova, M. J., Cunningham, L. L., Carlson, C. R., & Andrykowski, M. A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology, 20*(3), 176. doi:10.1037/0278-6133.20.3.176
- Costa-Requena, G., Rodríguez, A., & Fernández-Ortega, P. (2013). Longitudinal assessment of distress and quality of life in the early stages of breast cancer treatment. *Scandinavian Journal of Caring Sciences, 27*(1), 77-83. doi:10.1111/j.1471-6712.2012.01003.x
- Coyne, J. C., & Tennen, H. (2010). Positive psychology in cancer care: Bad science, exaggerated claims, and unproven medicine. *Annals of Behavioral Medicine, 39*(1), 16-26. doi:10.1007/s12160-009-9154-z
- Cruess, D. G., Antoni, M. H., McGregor, B. A., Kilbourn, K. M., Boyers, A. E., Alferi, S. M., . . . Kumar, M. (2000). Cognitive-behavioral stress management reduces serum cortisol by enhancing benefit finding among women being treated for early stage breast cancer. *Psychosomatic Medicine, 62*(3), 304-308. doi:10.1097/00006842-200005000-00002
- Cunningham, A. (2000). Adjuvant psychological therapy for cancer patients: Putting it on the same footing as adjunctive medical therapies. *Psycho-Oncology, 9*(5), 367-371. doi: 10.1002/1099-1611(200009/10)9:5<367::AID-PON473>3.0.CO;2-I
- Dale, H.L., Adair, P.M., & Humphris, G.M. (2010). Systematic review of post-treatment psychosocial and behaviour change interventions for men with cancer. *Psycho-Oncology, 19*(3), 227-237. doi:10.1002/pon.1598
- Dedert, E., Lush, E., Chagpar, A., Dhabhar, F. S., Segerstrom, S. C., Spiegel, D., ... Sephton, S. E. (2012). Stress, coping, and circadian disruption among women awaiting breast cancer surgery. *Annals of Behavioral Medicine, 44*(1), 10-20. doi:10.1007/s12160-012-9352-y
- Derogatis, L. R. (1975). *The Affects Balance Scale*. Baltimore: Clinical Psychometric Research.
- Dr. Susan Love Research Foundation. (2006). *Breast Cancer*. Retrieved from <http://www.dslrf.org/breastcancer/>

- Dunn, J., Occhipinti, S., Campbell, A., Ferguson, M., & Chambers, S. K. (2010). Benefit finding after cancer: The role of optimism, intrusive thinking and social environment. *Journal of Health Psychology, 16*(1), 169-177. doi:10.1177/1359105310371555
- Fekedulegn, D. B., Andrew, M. E., Burchfiel, C. M., Violanti, J. M., Hartley, T. A., Charles, L. E., & Miller, D. B. (2007). Area under the curve and other summary indicators of repeated waking cortisol measurements. *Psychosomatic Medicine, 69*(7), 651-659. doi:10.1097/PSY.0b013e31814c405c
- Fensterheim, H. & Baer, J. (1975). *Don't say yes when you want to say no*. New York: David McKay.
- Fillion, L., Gagnon, P., Leblond, F., G elinas, C., Savard, J., Dupuis, R., ... Larochelle, M. (2008). A brief intervention for fatigue management in breast cancer survivors. *Cancer Nursing, 31*(2), 145-159. doi:10.1097/01.NCC.0000305698.97625.95
- Folkman, S., & Greer, S. (2000). Promoting psychological well-being in the face of serious illness: When theory, research and practice inform each other. *Psycho-Oncology, 9*(1), 11-19. doi:10.1002/(SICI)1099-1611(200001/02)9:1<11::AID-PON424>3.0.CO;2-Z
- Fors, E. A., Bertheussen, G. F., Thune, I., Juvet, L. K., Elvsaas, I. K.  ., Oldervoll, L., ... Leivseth, G. (2011). Psychosocial interventions as part of breast cancer rehabilitation programs? Results from a systematic review. *Psycho-Oncology, 20*(9), 909-918. doi:10.1002/pon.1844
- Ganz, P. A. (2008). Psychological and social aspects of breast cancer. *Oncology, 22*(6), 642-646.
- Giedzinska, A. S., Meyerowitz, B. E., Ganz, P. A., & Rowland, J. H. (2004). Health-related quality of life in a multiethnic sample of breast cancer survivors. *Annals of Behavioral Medicine, 28*(1), 39-51. doi:10.1207/s15324796abm2801_6
- Golden-Kreutz, D. M., Thornton, L. M., Wells-Di Gregorio, S., Frierson, G. M., Jim, H. S., Carpenter, K. M., . . . Andersen, B. L. (2005). Traumatic stress, perceived global stress, and life events: Prospectively predicting quality of life in breast cancer patients. *Health Psychology, 24*(3), 288-296. doi:10.1037/0278-6133.24.3.288
- Groarke, A., Curtis, R., & Kerin, M. (2012). Cognitive-behavioural stress management enhances adjustment in women with breast cancer. *British Journal of Health Psychology, 18*(3), 623-641. doi:10.1111/bjhp.12009
- Groarke, A., Curtis, R., & Kerin, M. (2013). Global stress predicts both positive and negative emotional adjustment at diagnosis and post-surgery in women with breast cancer. *Psycho-Oncology, 22*(1), 177-185. doi:10.1002/pon.2071

- Gudenkauf, L.M. (2013). *Benefit finding in women with breast cancer: Assessment and relations with cortisol* (Unpublished master's thesis). University of Miami, Miami, Florida.
- Gudenkauf, L. M., Antoni, M. H., Stagl, J. M., Lechner, S. C., Jutagir, D. R., Bouchard, L. C., ... Carver, C. S. (2015). Brief cognitive-behavioral and relaxation training interventions for breast cancer: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 83*(4), 677-688. doi:10.1037/ccp0000020
- Gudenkauf, L.M., Jutagir, D.R., Stagl, J.M., Lechner, S., Blomberg, B., Glück, S., ... Antoni, M.H. (March 2013). *Brief psychological intervention after surgery for breast cancer improves affect and increases benefit finding*. Paper presented at the 71st Annual Meeting and Scientific Sessions of the American Psychosomatic Society, Miami, Florida.
- Hammonds, L. S. (2012). Implementing a distress screening instrument in a university breast cancer clinic. *Clinical Journal of Oncology Nursing, 16*(5), 491-494. doi:10.1188/12.CJON.491-494
- Hegel, M. T., Moore, C. P., Collins, E. D., Kearing, S., Gillock, K. L., Riggs, R. L., ... Ahles, T. A. (2006). Distress, psychiatric syndromes, and impairment of function in women with newly diagnosed breast cancer. *Cancer, 107*(12), 2924-2931. doi:10.1002/cncr.22335
- Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology, 74*(5), 797-816. doi:10.1037/0022-006X.74.5.797
- Heron-Speirs, H. A., Harvey, S. T., & Baken, D. M. (2012). Moderators of psycho-oncology therapy effectiveness: Addressing design variable confounds in meta-analysis. *Clinical Psychology: Science and Practice, 19*(1), 49-71. doi:10.1111/j.1468-2850.2012.01274.x
- Herschbach, P., Keller, M., Knight, L., Brandl, T., Huber, B., Henrich, G., & Marten-Mittag, B. (2004). Psychological problems of cancer patients: A cancer distress screening with a cancer-specific questionnaire. *British Journal of Cancer, 91*(3), 504-511. doi:10.1038/sj.bjc.6601986
- Holland, J.C. & Lewis, S. (2000). *The human side of cancer: Living with hope, coping with uncertainty*. New York: HarperCollins.
- Hopko, D. R., Armento, M. E., Robertson, S., Ryba, M. M., Carvalho, J. P., Colman, L. K., ... Lejuez, C. W. (2011). Brief behavioral activation and problem-solving therapy for depressed breast cancer patients: Randomized trial. *Journal of Consulting and Clinical Psychology, 79*(6), 834-849. doi:10.1037/a0025450

- Iwatani, T., Matsuda, A., Kawabata, H., Miura, D., & Matsushima, E. (2013). Predictive factors for psychological distress related to diagnosis of breast cancer. *Psycho-Oncology*, 22(3), 523-529. doi:10.1002/pon.3023
- Jensen-Johansen, M. B., Christensen, S., Valdimarsdottir, H., Zakowski, S., Jensen, A. B., Bovbjerg, D. H., & Zachariae, R. (2013). Effects of an expressive writing intervention on cancer-related distress in Danish breast cancer survivors - Results from a nationwide randomized clinical trial. *Psycho-Oncology*, 22(7), 1492-1500. doi:10.1002/pon.3193
- Jones, J. M., Cheng, T., Jackman, M., Walton, T., Haines, S., Rodin, G., & Catton, P. (2013). Getting back on track: Evaluation of a brief group psychoeducation intervention for women completing primary treatment for breast cancer. *Psycho-Oncology*, 22(1), 117-124. doi:10.1002/pon.2060
- Kangas, M., Milross, C., Taylor, A., & Bryant, R. A. (2013). A pilot randomized controlled trial of a brief early intervention for reducing posttraumatic stress disorder, anxiety and depressive symptoms in newly diagnosed head and neck cancer patients. *Psycho-Oncology*, 22(7), 1665-1673. doi:10.1002/pon.3208
- Kiecolt-Glaser, J. K., McGuire, L., Robles, T. F., & Glaser, R. (2002). Psychoneuroimmunology: Psychological influences on immune function and health. *Journal of Consulting and Clinical Psychology*, 70(3), 537. doi:10.1037//0022-006X.70.3.537
- Kirschbaum, C., & Hellhammer, D. H. (1989). Salivary cortisol in psychobiological research: An overview. *Neuropsychobiology*, 22(3), 150-169. doi:10.1159/000118611
- Kirschbaum, C., & Hellhammer, D. H. (1994). Salivary cortisol in psychoneuroendocrine research: Recent developments and applications. *Psychoneuroendocrinology*, 19(4), 313-333. doi:10.1016/0306-4530(94)90013-2
- Knobf, M. T. (1986). Physical and psychologic distress associated with adjuvant chemotherapy in women with breast cancer. *Journal of Clinical Oncology*, 4(5), 678-684.
- Koopman, C., Butler, L. D., Classen, C., Giese-Davis, J., Morrow, G. R., Westendorf, J., ... Spiegel, D. (2002). Traumatic stress symptoms among women with recently diagnosed primary breast cancer. *Journal of Traumatic Stress*, 15(4), 277-287. doi:10.1023/A:1016295610660
- Lang, E. V., Berbaum, K. S., & Lutgendorf, S. K. (2009). Large-core breast biopsy: Abnormal salivary cortisol profiles associated with uncertainty of diagnosis. *Radiology*, 250(3), 631-637. doi:10.1148/radiol.2503081087

- Lechner, S. C., & Antoni, M. H. (2004). Posttraumatic growth and group-based interventions for persons dealing with cancer: What have we learned so far? *Psychological Inquiry, 15*, 35–40.
- Lechner, S. C., Carver, C. S., Antoni, M. H., Weaver, K. E., & Phillips, K. M. (2006). Curvilinear associations between benefit finding and psychosocial adjustment to breast cancer. *Journal of Consulting and Clinical Psychology, 74*(5), 828-840. doi:10.1037/0022-006X.74.5.828
- Lechner, S. C., Park, C. L., Stanton, A. L., & Antoni, M. H. (2009). Introduction. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 3-7). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Lechner, S. C., & Weaver, K. E. (2009). Lessons learned about benefit finding among individuals with cancer or HIV/AIDS. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 107-124). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Lechner, S. C., Zakowski, S. G., Antoni, M. H., Greenhawt, M., Block, K., & Block, P. (2003). Do sociodemographic and disease-related variables influence benefit-finding in cancer patients? *Psycho-Oncology, 12*(5), 491-499. doi:10.1002/pon.671
- Lepore, S. J. & Kernan, W. D. (2009). Positive life change and the social context of illness: An expanded social-cognitive processing model. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 139-152). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Lindley, C., Vasa, S., Sawyer, W. T., & Winer, E. P. (1998). Quality of life and preferences for treatment following systemic adjuvant therapy for early-stage breast cancer. *Journal of Clinical Oncology, 16*(4), 1380-1387.
- Livestrong Foundation. (2006). *Breast cancer*. Retrieved from <http://www.livestrong.com/article/14202-breast-cancer/>
- Lo, C., Hales, S., Jung, J., Chiu, A., Panday, T., Rydall, A., ... Rodin, G. (2014). Managing Cancer And Living Meaningfully (CALM): Phase 2 trial of a brief individual psychotherapy for patients with advanced cancer. *Palliative Medicine, 28*(3), 234–242. doi:10.1177/0269216313507757
- Lopez-Class, M., Gomez-Duarte, J., Graves, K., & Ashing-Giwa, K. (2012). A contextual approach to understanding breast cancer survivorship among Latinas. *Psycho-Oncology, 21*(2), 115-124. doi:10.1002/pon.1998

- Luckett, T., Goldstein, D., Butow, P. N., Gebiski, V., Aldridge, L. J., McGrane, J., ... King, M. T. (2011). Psychological morbidity and quality of life of ethnic minority patients with cancer: A systematic review and meta-analysis. *The Lancet Oncology*, *12*(13), 1240-1248. doi:10.1016/S1470-2045(11)70212-1
- Manne, S., Ostroff, J., Winkel, G., Goldstein, L., Fox, K., & Grana, G. (2004). Posttraumatic growth after breast cancer: Patient, partner, and couple perspectives. *Psychosomatic Medicine*, *66*(3), 442-454. doi:10.1097/00006842-200405000-00025
- McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, *338*(3), 171-179. doi:10.1056/NEJM199801153380307
- McGregor, B. A., & Antoni, M. H. (2009). Psychological intervention and health outcomes among women treated for breast cancer: A review of stress pathways and biological mediators. *Brain, Behavior, and Immunity*, *23*(2), 159-166. doi:10.1016/j.bbi.2008.08.002
- McGregor, B. A., Antoni, M. H., Boyers, A., Alferi, S. M., Blomberg, B. B., & Carver, C. S. (2004). Cognitive-behavioral stress management increases benefit finding and immune function among women with early-stage breast cancer. *Journal of Psychosomatic Research*, *56*(1), 1-8. doi:10.1016/S0022-3999(03)00036-9
- Mehnert, A., & Koch, U. (2007). Prevalence of acute and post-traumatic stress disorder and comorbid mental disorders in breast cancer patients during primary cancer care: A prospective study. *Psycho-Oncology*, *16*(3), 181-188. doi:10.1002/pon.1057
- Mertz, B. G., Bistrup, P. E., Johansen, C., Dalton, S. O., Deltour, I., Kehlet, H., & Kroman, N. (2012). Psychological distress among women with newly diagnosed breast cancer. *European Journal of Oncology Nursing*, *16*(4), 439-443. doi:10.1016/j.ejon.2011.10.001
- Moadel, A. B., Morgan, C., & Dutcher, J. (2007). Psychosocial needs assessment among an underserved, ethnically diverse cancer patient population. *Cancer*, *109*(S2), 446-454. doi:10.1002/cncr.22357
- Montazeri, A. (2008). Health-related quality of life in breast cancer patients: A bibliographic review of the literature from 1974 to 2007. *Journal of Experimental & Clinical Cancer Research*, *27*(1), 32. doi:10.1186/1756-9966-27-32
- Monti, D. A., Kash, K. M., Kunkel, E. J., Moss, A., Mathews, M., Brainard, G., ... Newberg, A. B. (2013). Psychosocial benefits of a novel mindfulness intervention versus standard support in distressed women with breast cancer. *Psycho-Oncology*, *22*(11), 2565-2575. doi:10.1002/pon.3320

- Moran, T.J., Gray, S., Mikosz, C.A., Conzen, S.D. (2000). The glucocorticoid receptor mediates a survival signal in human mammary epithelial cells. *Cancer Research*, 60(4), 867–872.
- Muthén, L.K., & Muthén, B.O. (1998-2012). Mplus User's Guide. Seventh Edition. Los Angeles, CA: Muthén & Muthén.
- Nakamura, Y., Lipschitz, D. L., Kuhn, R., Kinney, A. Y., & Donaldson, G. W. (2013). Investigating efficacy of two brief mind–body intervention programs for managing sleep disturbance in cancer survivors: A pilot randomized controlled trial. *Journal of Cancer Survivorship*, 7(2), 165-182. doi:10.1007/s11764-012-0252-8
- Nápoles, A. M., Ortíz, C., O'Brien, H., Sereno, A. B., & Kaplan, C. P. (2011). Coping resources and self-rated health among Latina breast cancer survivors. *Oncology Nursing Forum*, 38(5), 523-531. doi:10.1188/11.ONF.523-531
- Nápoles-Springer, A. M., Ortíz, C., O'Brien, H., & Díaz-Méndez, M. (2009). Developing a culturally competent peer support intervention for Spanish-speaking Latinas with breast cancer. *Journal of Immigrant and Minority Health*, 11(4), 268-280. doi:10.1007/s10903-008-9128-4
- National Cancer Institute at the National Institutes of Health. (2006). *Breast Cancer*. Retrieved from <http://www.cancer.gov/cancertopics/types/breast>
- Northouse, L. L., Mood, D. W., Schafenacker, A., Kalemkerian, G., Zalupski, M., LoRusso, P., ... Kershaw, T. (2013). Randomized clinical trial of a brief and extensive dyadic intervention for advanced cancer patients and their family caregivers. *Psycho-Oncology*, 22(3), 555-563. doi:10.1002/pon.3036
- Park, C. L. (2009). Overview of theoretical perspectives. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 11-30). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Park, C.L. & Folkman, S. (1997). Meaning in the context of stress and coping. *Review of General Psychology*, 1(2), 115-144. doi:10.1037//1089-2680.1.2.115
- Pascoe, L., & Edvardsson, D. (2013). Benefit finding in cancer: A review of influencing factors and health outcomes. *European Journal of Oncology Nursing*, 17(6), 760-766. doi:10.1016/j.ejon.2013.03.005
- Penedo, F. J., Molton, I., Dahn, J. R., Shen, B. J., Kinsinger, D., Traeger, L., . . . Antoni, M. (2006). A randomized clinical trial of group-based cognitive-behavioral stress management in localized prostate cancer: Development of stress management skills improves quality of life and benefit finding. *Annals of Behavioral Medicine*, 31(3), 261-270. doi:10.1207/s15324796abm3103_8

- Petrie, K. J. & Corter, A. (2009). Illness perceptions and benefit finding among individuals with breast cancer, acoustic neuroma, or heart disease. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 125-137). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Phillips, K. M., Antoni, M. H., Carver, C. S., Lechner, S. C., Penedo, F. J., McCullough, M. E., . . . , Blomberg, B. B. (2011). Stress management skills and reductions in serum cortisol across the year after surgery for non-metastatic breast cancer. *Cognitive Therapy and Research, 35*, 595-600. doi:10.1007/s10608-011-9398-3
- Ramachandra, P., Booth, S., Pieters, T., Vrotsou, K., & Huppert, F. A. (2009). A brief self-administered psychological intervention to improve well-being in patients with cancer: Results from a feasibility study. *Psycho-Oncology, 18*(12), 1323-1326. doi:10.1002/pon.1516
- Reich, M., Lesur, A., & Perdrizet-Chevallier, C. (2008). Depression, quality of life and breast cancer: A review of the literature. *Breast Cancer Research and Treatment, 110*(1), 9-17. doi:10.1007/s10549-007-9706-5
- Sammarco, A., & Konecny, L. M. (2008). Quality of life, social support, and uncertainty among Latina breast cancer survivors. *Oncology Nursing Forum, 35*(5), 844-849. doi:10.1188/08.ONF.844-849
- Schwarzer, R., Luszczynska, A., Boehmer, S., Taubert, S., & Knoll, N. (2006). Changes in finding benefit after cancer surgery and the prediction of well-being one year later. *Social Science and Medicine, 63*(6), 1614-1624. doi:10.1016/j.socscimed.2006.04.004
- Sears, S. R., Stanton, A. L., & Danoff-Burg, S. (2003). The yellow brick road and the emerald city: Benefit finding, positive reappraisal coping and posttraumatic growth in women with early-stage breast cancer. *Health Psychology, 22*(5), 487-497. doi:10.1037/0278-6133.22.5.487
- Segrin, C., & Badger, T. A. (2013). Interdependent psychological distress between Latinas with breast cancer and their supportive partners. *Journal of Latina/o Psychology, 1*(1), 21-34. doi:10.1037/a0030345
- Sephton, S. E., Sapolsky, R. M., Kraemer, H. C., & Spiegel, D. (2000). Diurnal cortisol rhythm as a predictor of breast cancer survival. *Journal of the National Cancer Institute, 92*(12), 994-1000. doi:10.1093/jnci/92.12.994
- Sephton, S., & Spiegel, D. (2003). Circadian disruption in cancer: A neuroendocrine-immune pathway from stress to disease? *Brain, Behavior, and Immunity, 17*(5), 321-328. doi:10.1016/S0889-1591(03)00078-3

- Singh–Carlson, S., Wong, F., Martin, L., & Nguyen, S. K. A. (2013). Breast cancer survivorship and South Asian women: Understanding about the follow-up care plan and perspectives and preferences for information post treatment. *Current Oncology*, *20*(2), e63–e79. doi:10.3747/co.20.1066
- Sodergren, S., & Hyland, M. (2000). What are the positive consequences of illness? *Psychology & Health*, *15*, 85–97. doi:10.1080/08870440008400290.
- Spencer, S. M., Lehman, J. M., Wynings, C., Arena, P., Carver, C. S., Antoni, M. H., . . . Love, N. (1999). Concerns about breast cancer and relations to psychosocial well-being in a multiethnic sample of early-stage patients. *Health Psychology*, *18*(2), 159–168. doi:10.1037//0278-6133.18.2.159
- Spiegel, D., Bloom, J. R., Kraemer, H. C., & Gottheil, E. (1989). Effect of psychosocial treatment on survival of patients with metastatic breast cancer. *Lancet*, *2*(8668), 888–891. doi:10.1016/S0140-6736(89)91551-1
- Stagl, J. M., Lechner, S. C., Carver, C. S., Bouchard, L. C., Gudenkauf, L. M., Jutagir, D. R., ... Antoni, M.H. (2015). A randomized controlled trial of cognitive-behavioral stress management in breast cancer: Survival and recurrence at 11-year follow-up. *Breast Cancer Research and Treatment*, *154*(2), 319–328. doi:10.1007/s10549-015-3626-6
- Stanton, A. L., Bower, J. E., & Low, C. A. (2006). Posttraumatic growth after cancer. In L.G. Calhoun & R.G. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 138–175). Mahwah, NJ: Erlbaum.
- Stanton, A. L., Luecken, L. J., MacKinnon, D. P., & Thompson, E. H. (2013). Mechanisms in psychosocial interventions for adults living with cancer: Opportunity for integration of theory, research, and practice. *Journal of Consulting and Clinical Psychology*, *81*(2), 318–335. doi:10.1037/a0028833
- Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annual Review of Psychology*, *58*, 565–592. doi:10.1146/annurev.psych.58.110405.085615
- Susan G. Komen. (2006). *Understanding breast cancer*. Retrieved from <http://ww5.komen.org>
- Tak, L. M., Cleare, A. J., Ormel, J., Manoharan, A., Kok, I. C., Wessely, S., & Rosmalen, J. G. (2011). Meta-analysis and meta-regression of hypothalamic-pituitary-adrenal axis activity in functional somatic disorders. *Biological Psychology*, *87*(2), 183–194. doi:10.1016/j.biopsycho.2011.02.002
- Tartaro, J., Roberts, J., Nosarti, C., Crayford, T., Luecken, L., & David, A. (2006). Who benefits? Distress, adjustment and benefit-finding among breast cancer survivors. *Journal of Psychosocial Oncology*, *23*(2-3), 45–64. doi:10.1300/J077v23n02_04

- Tatrow, K., & Montgomery, G. H. (2006). Cognitive behavioral therapy techniques for distress and pain in breast cancer patients: A meta-analysis. *Journal of Behavioral Medicine, 29*(1), 17-27. doi:10.1007/s10865-005-9036-1
- Taylor, S.E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist, 38*, 1161-1173. doi:10.1037//0003-066X.38.11.1161
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1), 1-18. doi:10.1207/s15327965pli1501_01
- Tennen, H., & Affleck, G. (2009). Assessing positive life change: In search of meticulous methods. In C. L. Park, S. C. Lechner, M. H. Antoni & A. L. Stanton (Eds.), *Medical illness and positive life change: Can crisis lead to personal transformation?* (pp. 31-49). Washington, DC: American Psychological Association. doi:10.1037/11854-000
- Thomsen, T., Tønnesen, H., Okholm, M., Kroman, N., Maibom, A., Sauerberg, M. L., & Møller, A. M. (2010). Brief smoking cessation intervention in relation to breast cancer surgery: A randomized controlled trial. *Nicotine & Tobacco Research, 12*(11), 1118-1124. doi:10.1093/ntr/ntq158
- Thornton, L. M., Andersen, B. L., Crespin, T. R., & Carson, W. E. (2007). Individual trajectories in stress covary with immunity during recovery from cancer diagnosis and treatments. *Brain, Behavior, and Immunity, 21*(2), 185-194. doi:10.1016/j.bbi.2006.06.007
- Thornton, A. A., Owen, J. E., Kernstine, K., Koczywas, M., Grannis, F., Cristea, M., ... Stanton, A. L. (2012). Predictors of finding benefit after lung cancer diagnosis. *Psycho-Oncology, 21*(4), 365-373. doi:10.1002/pon.1904
- Tomich, P. L., & Helgeson, V. S. (2004). Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychology, 23*(1), 16-23. doi:10.1037/0278-6133.23.1.16
- Touitou, Y., Bogdan, A., Levi, F., Benavides, M., & Auzéby, A. (1996). Disruption of the circadian patterns of serum cortisol in breast and ovarian cancer patients: Relationships with tumour marker antigens. *British Journal of Cancer, 74*(8), 1248-1252. doi:10.1038/bjc.1996.524
- Turner, J., Kelly, B., Swanson, C., Allison, R., & Wetzig, N. (2005). Psychosocial impact of newly diagnosed advanced breast cancer. *Psycho-Oncology, 14*(5), 396-407. doi:10.1002/pon.856
- Urcuyo, K.R., Boyers, A.E., Carver, C.S., & Antoni, M.H. (2005). Finding benefit in breast cancer: Relations with personality, coping, and concurrent well-being. *Psychology and Health, 20*(2), 175-192. doi:10.1080/08870440512331317634

- van der Pompe, G., Duivenvoorden, H. J., Antoni, M. H., Visser, A., & Heijnen, C. J. (1997). Effectiveness of a short-term group psychotherapy program on endocrine and immune function in breast cancer patients: An exploratory study. *Journal of Psychosomatic Research*, *42*(5), 453-466. doi:10.1016/S0022-3999(96)00393-5
- Vedhara, K., Tuinstra, J., Miles, J. N. V., Sanderman, R., & Ranchor, A.V. (2006). Psychosocial factors associated with indices of cortisol production in women with cancer and controls. *Psychoneuroendocrinology*, *31*, 299-311. doi:10.1016/j.psyneuen.2005.08.006
- Vothang, T., Lechner, S., Tocco, J., & Glück, M. (March 2006). *Beware of self-report medical data: Lessons learned at a cancer center*. Poster presented at the annual meeting of the Society of Behavioral Medicine, San Francisco.
- Weinrib, A. Z., Sephton, S. E., Degeest, K., Penedo, F., Bender, D., Zimmerman, B., . . . Lutgendorf, S. K. (2010). Diurnal cortisol dysregulation, functional disability, and depression in women with ovarian cancer. *Cancer*, *116*(18), 4410-4419. doi:10.1002/cncr.25299
- Weiss, D. S. (2004). Correlates of posttraumatic growth in married breast cancer survivors. *Journal of Social and Clinical Psychology*, *23*, 733-746. doi:10.1521/jscp.23.5.733.50750
- Weiss, D. S. (2007). The impact of event scale: Revised. In *Cross-cultural assessment of psychological trauma and PTSD* (pp. 219-238). Springer US. doi:10.1007/978-0-387-70990-1_10
- Wilcox, R. R. (1993). Some results on a winsorized correlation-coefficient. *British Journal of Mathematical & Statistical Psychology*, *46*, 339-349. doi:10.1111/j.2044-8317.1993.tb01020.x
- Yanez, B., Thompson, E. H., & Stanton, A. L. (2011). Quality of life among Latina breast cancer patients: A systematic review of the literature. *Journal of Cancer Survivorship*, *5*(2), 191-207. doi:10.1007/s11764-011-0171-0

Appendix of Measures

Benefit Finding Scale (Antoni et al., 2001; Tomich & Helgeson, 2004)

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

- 1 = Not at all
- 2 = A little
- 3 = Moderately
- 4 = Quite a bit
- 5 = Extremely
- 9 = Does not apply to me

Having 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 taught me that everyone has a purpose in life.
- _____ 7 has shown me that all people need to be loved.
- _____ 8 has made me realize the importance of planning for my family's future.
- _____ 9 has made me more aware and concerned for the future of all human beings.
- _____ 10 has taught me to be patient.
- _____ 11 has led me to deal better with stress and problems.
- _____ 12 has led me to meet people who have become some of my best friends.
- _____ 13 has contributed to my overall emotional and spiritual growth.
- _____ 14 has helped me become more aware of the love and support available from other people.
- _____ 15 has helped me realize who my true friends are.
- _____ 16 has helped me become more focused on priorities, with a deeper sense of purpose in life.
- _____ 17 has helped me become a stronger person, more able to cope effectively with future life challenges.

Saliva Collection Instructions

As part of the Coping and Recovery Project, you are requested to collect eight samples of your saliva over the course of two days. This will happen three times during the study - at your entry into the study, at the 6-month follow-up, and at the 12-month follow-up. We will be using your saliva in order to measure your cortisol levels, which are related to stress. Cortisol levels naturally change over the course of the day, so you will be asked to take four samples on each collection day so that we can look at how your cortisol levels change with time. It is very important that you read these instructions carefully and follow them exactly.

You have been provided with a **nylon carrying bag** which contains **nine labeled tubes** and a **timer**. This timer is already set to go off four times a day when you are required to collect your saliva. Your first saliva collection will be at the wake-up time you indicated during the phone screen (), the second is 30 minutes after wake-up, the third is at 4pm and the last is at 9pm. You will also find an **instructional DVD** in the bag, which will show you step-by-step instructions of how to collect your saliva. One of the tubes is labeled “TEST” – you can use this tube to practice collecting your saliva while you watch the DVD. The other eight tubes will be used to collect saliva at the pre-determined times listed above. Lastly, the carrying bag also contains a **freezer pack**. Please put this pack in your freezer to chill it the night before your first saliva collection. On collection days, keep the frozen pack at the bottom of the nylon carrying bag in order to keep your saliva samples cool.

Sample-Day Instructions

On the days that you are taking saliva samples, please follow these guidelines:

- Do not brush your teeth before you take a sample
- Do not exercise vigorously on a collection day (it can affect your cortisol levels)
- Do not eat a large meal for at least 1 hour before you take a sample
 - Do not eat anything during the 30 min. between your 1st and 2nd samples
- Do not have any alcohol for at least 12 hours before you take a sample

Step-by-Step Instructions

1. When the timer we give you starts to beep, take out the pointed tube that matches the day and sample number. (FOR EXAMPLE: If it is your first day of collecting saliva, and it is the first collection of the day, take out the tube labeled “Day 1, Sample 1.”)
 - To turn off the alarm, push the “ALM” button (the top button).
 - Note: You do not need to re-set the alarm. It will still go off the next day automatically.
2. Remove the smaller tube from inside the pointed tube, and take out the piece of cotton.
3. Put the cotton piece in your mouth. Do not swallow the cotton, and DO NOT CHEW ON THE COTTON. Some people place the cotton under their tongue, but please do whatever feels the most comfortable for you.
4. Keep the cotton in your mouth until is it very wet (at least 2 minutes). Some people think about lemons in order to make their mouths water more.
5. Once the cotton is completely wet, put it back into the smaller tube and put on the cap. Then put the small tube into the larger pointed tube so that it looks the same as when you started. Put the tube back into the bag with the **freezer pack**.
 - After your fourth collection of the day (9pm), put the freezer pack and the used collection tubes in the freezer overnight (in the nylon bag).
 - DO NOT put the timer in the freezer – please keep the timer and the tube labeled “Day 2, Sample 1” near your bed so that you do not miss your wake-up collection time on Day 2.
6. You will repeat these steps four times a day over two consecutive days, for a total of eight collections.
7. PLEASE REMEMBER to bring your **bag** with all the **samples**, the **timer**, the **DVD** and the **freezer pack** to your appointment with Coping and Recovery the day after Collection Day 2.