PSYCHO-ONCOLOGY
Psycho-Oncology **15**: 1038–1054 (2006)
Published online 29 September 2006 in Wiley InterScience (www.interscience.wiley.com). **DOI**: 10.1002/pon.999

MEASUREMENT OF COPING AND STRESS RESPONSES IN WOMEN WITH BREAST CANCER

BRUCE E. COMPAS[a,*], ELLEN BECKJORD[b], BEDE AGOCHA[c], MARNE L. SHERMAN[d], ADELA LANGROCK[e], CYNTHIA I. GROSSMAN[f], BARBARA DAUSCH[f], JUDITH GLINDER[f], CHERYL KAISER[f], CAY ANDERSON-HANLEY[g] and LINDA LUECKEN[h]
[a] *Department of Psychology & Human Development, Vanderbilt University, Peabody 512, 230 Appleton Place, Nashville, TN 37203, USA*
[b] *Cancer Prevention Fellowship Program, Division of Cancer Prevention, National Cancer Institute, National Institutes of Health, USA*
[c] *University of Connecticut, USA*
[d] *University of Missouri, Kansas City, USA*
[e] *Middlebury College, USA*
[f] *University of Vermont, USA*
[g] *Cancer Center Research Office, Glen Falls Hospital, Glen Falls, NY, USA*
[h] *Arizona State University, USA*

SUMMARY

The development of the Responses to Stress Questionnaire-cancer version (RSQ-CV) to assess coping with and responses to the stress of breast cancer is described. The RSQ-CV was completed by 232 women with breast cancer near the time of their diagnosis. Confirmatory factor analyses verified a model that includes three voluntary coping factors (primary control engagement coping, secondary control engagement coping, disengagement coping) and two involuntary stress response factors (involuntary engagement, involuntary disengagement). Internal consistency reliability, and stability over 12 weeks for the five factors were adequate to excellent. Convergent and discriminant validity was examined through correlations with measures of intrusive thoughts, avoidance, and dimensions of perceived control. Significant correlations with symptoms of anxiety and depression are also reported. Applications of the RSQ-CV for research with breast cancer patients are discussed. Copyright © 2006 John Wiley & Sons, Ltd.

KEY WORDS: coping; breast cancer; measurement; cancer; oncology

INTRODUCTION

Adaptation to the stressful aspects of breast cancer involves two fundamental processes. The first includes involuntary, automatic responses to the stress of the diagnosis and treatment of breast cancer, exemplified by unwanted, uncontrollable intrusive thoughts or heightened physiological reactivity. The second process involves controlled, voluntary responses that are represented by goal-directed efforts to cope with the stress of cancer. In spite of the importance of these dual processes in adjustment to breast cancer, comprehensive measurement of both automatic and controlled responses to the stress of breast cancer has been problematic; in fact, there is no current measure of responses to the stress of breast cancer that assesses both involuntary stress responses and voluntary coping responses, despite the fact that behaviors in both of these categories have been shown to be related to emotional distress. The present research was designed to examine the reliability and validity of a new measure of automatic and controlled responses to the diagnosis and treatment of breast cancer, and to provide a further test of a dual-process model of controlled and automatic processes of psychological adaptation to breast cancer.

*Correspondence to: Department of Psychology & Human Development, Vanderbilt University, Peabody 512, 230 Appleton Place, Nashville, TN 37203, USA.
E-mail: bruce.compas@vanderbilt.edu

Received 4 December 2004
Accepted 15 August 2005

Numerous studies have separately examined the association of voluntary coping and automatic stress responses with psychological distress and adjustment in breast cancer patients (Compas and Luecken, 2002; Leucken and Compas, 2002). For example, coping is directly associated with psychological adjustment and also mediates the association of dispositional optimism in relation to adjustment and distress (e.g. Carver *et al*., 1993; Epping-Jordan *et al*., 1999). In addition to coping responses, automatic responses to stress such as intrusive thoughts are related to increased emotional distress and poorer adjustment in breast cancer patients (e.g. Andrykowski *et al*., 1998). Furthermore, controlled coping efforts to avoid or suppress involuntary intrusive thoughts interact with automatic, intrusive thoughts in predicting indices of psychological distress such as symptoms of anxiety and depression (Primo *et al*., 2000). The interplay of intrusive thoughts and avoidance coping in predicting adjustment is one example of the potential importance of measuring both automatic and controlled processes in response to the stress of breast cancer.

Several measures of coping have been used in breast cancer research, including the COPE (Carver *et al*., 1989), the Ways of Coping Checklist (WCC; Folkman and Lazarus, 1980, 1985), and the Coping Strategies Inventory (CSI; Tobin *et al*., 1989). All three of these measures were originally designed as general measures of coping but have been used in studies of coping with the diagnosis and treatment of breast cancer (e.g. Carver *et al*., 1993; Dunkel-Schetter *et al*., 1992; Epping-Jordan *et al*., 1999). Other measures have been used to assess specific components of the coping process. For example, Stanton *et al*. (2000) reported on a measure of emotional approach coping (active attempts to acknowledge, understand, and express emotions) in breast cancer patients. Nelson *et al*. (1989) used the Fighting Spirit and Denial Scale to assess three aspects of coping: fighting spirit (belief in the ability to fight back and recover from cancer), information-seeking behavior, and denial. The Courtauld Emotional Control Scale has been used to measure emotional expression and the mental adjustment to cancer has been used to measure fighting spirit, denial, and fatalism (Classen *et al*., 1996). In contrast to the large number of measures that have been used to examine coping with breast cancer, assessment of automatic stress responses has been limited to the use of the Impact of Events Scale (IES; Horowitz *et al*., 1979) to assess intrusive thoughts (e.g. Epping-Jordan *et al*., 1999; Primo *et al*., 2000).

Several findings have emerged from studies using these measures of coping. First, coping responses that involve avoidance or escape from sources of stress or from negative thoughts and emotions related to breast cancer are associated with greater emotional distress and poorer psychological adjustment (e.g. Carver *et al*., 1993; Epping-Jordan *et al*., 1999; McCaul *et al*., 1999; Stanton *et al*., 2000). Second, only limited evidence has been found for an association between active forms of coping that involve problem solving and better psychological adjustment (Carver *et al*., 1993; Nezu *et al*., 1999). Third, findings have been mixed regarding coping that involves a focus on emotions. Some forms of coping that are included in the general category of emotion-focused coping have been related to *more* emotional distress and *poorer* adjustment (e.g. Carver *et al*., 1993; Compas *et al*., 1999; Epping-Jordan *et al*., 1999). However, Stanton *et al*. (2000) have shown that this pattern of findings is due in part to problematic items that are often used to assess emotion-focused coping. For example, emotion-focused coping scales often include items that reflect avoidance, the unregulated expression of negative emotions, and coping responses that are to some degree confounded with symptoms of emotional distress. Using scales not confounded by items that reflect these three types of problems, Stanton *et al*. found that emotional approach coping is related to *lower* distress.

In spite of progress in understanding of the process of psychological adjustment to breast cancer, the measurement of coping has been limited in several ways. First, research in this area has not been informed or guided by a conceptual framework that includes both automatic and controlled responses to stress. The fundamental importance of the distinction between voluntary (controlled) and involuntary (automatic) responses is reflected in its central place in a number of areas of psychology relevant to understanding stress responses, including cognitive science (e.g. Shiffrin, 1997; Shiffrin and Schneider, 1977), affective neuroscience (e.g. Davidson *et al*., 2000), and memory (see Barrett *et al*. 2004, for a review of dual-process models of automatic and controlled processes in psychology). The distinction between and measurement of automatic and controlled responses to stress is important for a comprehensive understanding of the process of responding to

the stress of breast cancer. As a consequence of a failure to attend to this distinction at the conceptual level, none of the previous measures have assessed involuntary responses to stress. Therefore, a full assessment of responses to the stress of breast cancer will benefit from the measurement of automatic as well as controlled processes.

A second problem is the lack of consistency of the factor structure, and therefore the subtypes or categories of coping, for specific measures across different studies. For example, several different factor structures of the WCC have been identified using exploratory factor analysis (EFA) with breast cancer patients (e.g. Dunkel-Schetter *et al*., 1992; Mishel and Sorenson, 1993; Rosberger *et al*., 2002) and using rationally derived categories (e.g. Cohen, 2002). Some of these inconsistencies have been the result of the use of EFA to test the factor structure of most of these scales rather than confirmatory factor analysis (CFA) to test conceptual models of coping. Skinner *et al.* (2003) have argued that identification of the structure of coping requires the use CFA (rather than EFA) to test theoretically based models of coping. CFA has several advantages over EFA in that CFA allows researchers to test the degree to which theory-based models of coping are reflected in coping measures. The few instances in which CFA has been used in model testing have used non-cancer samples (e.g. Tobin *et al*., 1989).

Third, several of the coping factors that have been identified have been problematic. Much of the research on coping with breast cancer has examined the distinction between problem-focused and emotion-focused coping (Folkman and Lazarus, 1980). These two categories have been criticized as being overly broad and failing to distinguish among meaningful subtypes of coping efforts aimed at emotion regulation (Skinner *et al*., 2003). Furthermore, as noted above, the measurement of coping aimed at the regulation of emotion has been problematic, as these scales have been confounded by items that measure emotional distress, resulting in the common misperception that methods of coping that are intended to manage or regulate emotions lead to increased distress (Stanton *et al*., 2000).

The present study was designed to address several of the limitations in previous measures of coping and stress responses in breast cancer and offered the opportunity to further test a theoretical model that includes both voluntary coping and involuntary stress responses in a hierarchical framework (e.g. Compas *et al*., 1997, 2001) so as to provide a comprehensive assessment of responses to the stress of breast cancer. Both voluntary and involuntary responses to stress are distinguished on the basis of engagement with or disengagement from the source of stress and one's emotional reactions to stress. Engagement responses are those that are oriented toward the source of stress or one's reaction to the stressor, and disengagement responses are oriented away from the stressor and one's reactions. Voluntary coping responses are further distinguished based on control-related processes into three types of coping: primary control engagement coping (efforts to achieve control by directly changing the source of stress or one's emotional responses to it), secondary control engagement coping (efforts to achieve control indirectly by adapting to the source of stress), and disengagement coping (efforts to avoid or suppress the source of stress and emotional responses through relinquished control; Compas *et al*., 2001; McCarty *et al*., 1999; Weisz *et al*., 1994). In this way, voluntary coping with a focus on emotions is distinguished based on potentially adaptive emotion-focused responses (i.e. secondary control coping) versus potentially maladaptive responses (i.e. disengagement coping). None of the existing measures of coping include a sample of items broad enough to test this model.

A measure of coping and stress responses based on the model described above, the responses to stress questionnaire (RSQ; Connor-Smith *et al*., 2000), was adapted to focus specifically on the stress of breast cancer. The RSQ was designed to capture both controlled and automatic responses to stress and can be adapted to specific stressors or domains of stress (in this case breast cancer). Prior studies using CFA have confirmed a three-factor model of coping (primary control engagement, secondary control engagement, disengagement) and a two-factor model of involuntary stress responses (involuntary engagement and disengagement) in Euro-American adolescents (Connor-Smith *et al*., 2000), Bosnian adolescents coping with war-related trauma (Benson *et al*., 2004), Navajo adolescents coping with social stress (Wadsworth *et al*., 2004), and in samples of college students in the US and Spain (Connor-Smith and Calvete, 2004). In the present study, CFA was used to test the hypothesized factor structure, and therefore to establish construct validity of the

RSQ-Cancer Version (RSQ-CV)[1] in response to breast cancer stress. The internal consistency reliability and short-term stability (12 weeks) of the scales of the RSQ-CV were examined, and convergent and discriminant validities of the RSQ-CV were tested using correlations with the IES scales of intrusion and avoidance. The association of coping and stress responses with dimensions of perceived control over cancer was tested using a multi-dimensional measure of patients' perceptions of control over physical symptoms and control over one's emotions, as these two aspects of perceived control reflect control over the physical and psychological aspects of breast cancer. The use of primary and secondary control engagement coping was expected to be higher in response to stress that is perceived as controllable and disengagement coping was expected to be higher in response to uncontrollable stressors. Finally, correlations of the RSQ-CV scales with symptoms of anxiety and depression were examined as a preliminary index of the utility of the measure to predict emotional distress. In summary, the reliability and validity of the RSQ-CV and the applicability of a dual-process model of controlled and automatic responses to stress were tested in a sample of women with newly diagnosed breast cancer.

METHOD

Participants

The sample for the present study ($n = 232$) was drawn from a larger randomized controlled clinical trial comparing the efficacy of supportive expressive and cognitive behavioral group interventions in a waiting list design. The present sample includes patients who agreed to participate in this clinical trial ($n = 199$) as well as a sample of women who agreed to complete questionnaires but did not volunteer for the intervention trial ($n = 33$). Thus, the sample included women seeking psychological support for coping with breast cancer within the framework of a randomized trial and women with breast cancer who were not seeking psychological support or who were unwilling to participate in a randomized study.

Women with newly diagnosed non-metastatic breast cancer (Stage 0 through Stage III) were recruited at the Breast Care Center of Fletcher Allen Health Care in Burlington, Vermont and the Glens Falls Cancer Center in Glens Falls, New York. Patients with Stage IV diagnoses, recurrence of breast cancer, previous diagnoses of other treated cancers, psychotic disorders, and/or cognitive impairments were excluded from this study. On average, 35% of eligible patients approached agreed to participate in the intervention trial. The primary reason that patients declined participation in the intervention trial was because they lived in a rural area and travel to the cancer center to attend groups was problematic because of the distance they had to drive, scheduling of the sessions at night, and inclement weather in the winter.

Participants had a mean age of 52.3 years (S.D. = 9.7) and a mean of 14.8 years of education (S.D. = 2.5). Representative of Vermont and northern New York State, the sample was predominantly Euro-American (97.6%) with the remaining 2.4% reporting 'mixed' ethnicity. Seventy-three percent were married or living with a partner and 93.2% had children. Participants were within several weeks of initial breast cancer diagnosis at the time of completion of the self-report questionnaires ($M = 14.8$ weeks, S.D. = 6.9 weeks).

Breast cancer diagnoses included invasive ductal carcinoma (65.8%), ductal carcinoma *in situ* (18.2%), invasive lobular carcinoma (9.3%), tubular carcinoma (3.1%), mucinous carcinoma (0.9%), and the remainder included non-specified types of breast cancer (2.2%). Fifteen percent of the sample had Stage 0 cancer, 48% had Stage I breast cancer, 30% had Stage II breast cancer, and 5% had Stage III breast cancer. This staging distribution is similar to that reported in other recent studies of women with newly diagnosed breast cancer (e.g. Bradley *et al.*, 2002). Regarding surgery, 72.4% received a partial mastectomy and 26.7% received a total mastectomy. Regarding adjuvant therapy, 76% received radiation therapy, 44.2% received chemotherapy, and 71.1% received hormonal therapy.

The 199 women who agreed to participate in the clinical trial and the 33 women who only completed questionnaires were compared on medical, demographic, and psychological variables. The two groups did not differ in education or stage of cancer, but there was a trend for women who volunteered for the clinical trial (mean age of 52 years) to be younger than those who completed questionnaires only (mean age of 56 years), $t = 1.90$, $p = 0.067$. The two groups did not differ

on the intrusion or avoidance scales of the IES or anxiety symptoms; however, those who agreed to participate in the clinical trial were higher in depressive symptoms (as measured by the BDI-II; $M = 11.2$) than those who did not ($M = 7.8$), $t = 2.1$, $p = 0.04$. Finally, the two groups did not differ on 4 of the 5 scales on the RSQ (secondary control engagement coping, disengagement coping, involuntary engagement, involuntary disengagement), but the women who participated in the trial reported using more primary control engagement coping ($M = 1.83$) than those who declined ($M = 1.35$), $t = 2.02$, $p = 0.05$. Because the differences between the two groups were relatively minor, both samples were included in the CFA.

Procedure

Women were recruited to participate in a randomized clinical trial comparing two types of group psychosocial interventions; data reported here were collected prior to participation in the intervention. The RSQ-CV and several other questionnaires (see Measures) were mailed to women. All measures reported here were completed prior to patients' participation in the intervention phase of this study.

Measures

Responses to Stress Questionnaire-Cancer Version (RSQ-CV). The Responses to Stress Questionnaire (RSQ) (Connor-Smith *et al*., 2000) was adapted for use in this study; i.e. items were worded to reference the ways that patients respond to stressors related to their breast cancer diagnosis. The RSQ measures two dimensions of stress responses—those that involve voluntary coping responses and those that involve involuntary responses to stress. Each of these two dimensions is further divided into engagement and disengagement responses, with the voluntary (coping) engagement responses further divided into primary and secondary control coping. CFA was used to validate the hypothesized five-factor model of the RSQ with samples of adolescents reporting on their coping with several different types of stressors (Connor-Smith *et al*.). Convergent and discriminant validity were established by examining correlations with subscales from the COPE and a laboratory measure of stress reactivity. Internal consistency and test-retest reliability were found to be adequate to excellent (Connor-Smith *et al*.).

The first section of the RSQ-CV includes a set of stressors related to the diagnosis and treatment of breast cancer: (a) Effects of my diagnosis on the people I care about; (b) Concerns about my treatments and their side effects.; (c) Uncertainty regarding the cancer (e.g. was treatment successful; possible recurrence); (d) Concerns about household responsibilities (e.g. can I continue to meet them; am I letting things slide); (e) Concerns about death (e.g. fear of dying, confronting death); (f) Concerns about my job (e.g. can I continue to do well; will I be laid off); (g) Feelings of guilt (e.g. did I cause the cancer; am I disrupting everyone's life); (h) Financial concerns; (i) My physical attractiveness and concerns about sexuality. Participants endorse items that have been stressful for them since their diagnosis and rate the degree to which these problems have been stressful for them. This is followed by 57 items that reflect voluntary (coping) and involuntary stress responses and respondents indicate the degree (1 = not at all, to 4 = a lot) to which they have done or felt these things in response to the stressors that they endorsed in the first section of the measure.

The RSQ-CV reflects a five-factor model of coping in which each hypothesized factor is comprised of subtypes of coping, each of which is measured by parcels of 3 items each (Connor-Smith *et al*., 2000). In the proposed model of coping and stress responses, *primary control engagement coping* consists of coping responses aimed at problem solving (e.g. I try to think of different ways to deal with problems related to breast cancer), emotional expression (e.g. I let someone know how I feel), and emotional modulation (e.g. I keep my feelings under control when I have to, then let them out when they won't make things worse). *Secondary control engagement coping* involves cognitive restructuring (e.g. I tell myself that things could be worse), positive thinking (e.g. I tell myself that everything will be alright), acceptance (e.g. I just take things the way they are, I go with the flow), and distraction (e.g. I think about happy things to take my mind off the problems related to breast cancer or how I'm feeling.). Similar to Stanton *et al*. (2000), items were generated that were not confounded with symptoms of emotional distress

(see Connor-Smith *et al.*). *Disengagement coping* involves avoidance (e.g. I try not to think about it, to forget all about it), denial (e.g. I try to believe it never happened), and wishful thinking (e.g. I wish that I were stronger, or better able to cope so that things would be different). *Involuntary engagement* stress responses involve rumination (e.g. I can't stop thinking about how I am feeling), intrusive thoughts (e.g. Thoughts about breast cancer just pop into my head), emotional arousal (e.g. I get upset by things that don't usually bother me), physiological arousal (e.g. I feel sick to my stomach or get headaches), and impulsive action (e.g. I can't control what I do or say). *Involuntary disengagement* stress responses are composed of emotional numbing (e.g. I really don't know what I feel), cognitive interference (e.g. My mind just goes blank, I can't think at all), escape (e.g. I just have to get away, I can't stop myself), and inaction (e.g. I just end up lying around or sleeping a lot).

Scores on each factor of the RSQ-CV are recalculated to create proportion scores reflecting the relative amount that participants' reported using each type of coping and stress response compared to the total of all types of coping and stress responses they reported making. This method of proportion scoring provides an index of the *relative* amount of each coping response used, thereby controlling for the total number of responses of each individual and a response tendency to endorse a large number of items or 'yea saying' (Connor-Smith *et al.*, 2000; Forsythe and Compas, 1987; Osowiecki and Compas, 1998; Vitaliano *et al.*, 1990).

Intrusive thoughts and avoidance. The Impact of Events Scale (IES; Horowitz *et al.*, 1979) was used to assess levels of intrusive thoughts and avoidance related to cancer. The internal consistency for the current sample was 0.82 for intrusive thoughts and 0.77 for avoidance. The correlation between the intrusion and avoidance scales was $r = 0.43$, a magnitude similar to that found in previous studies with breast cancer patients (e.g. Epping-Jordan *et al.*, 1999; Primo *et al.*, 2000) and suggesting that women who experienced intrusive thoughts also tried to avoid those thoughts.

Emotional distress. The Beck Anxiety Inventory (Beck and Steer, 1990) and the Beck Depression Inventory-II (Beck *et al.*, 1996) were used to assess symptoms of anxiety and depression, respectively. In the current sample, the alpha for the BAI was 0.86 and for the BDI-II was 0.91.

Perceived control over breast cancer. Perceptions of control over breast cancer were assessed using the Breast Cancer Perceived Control Scale (BCPCS; Glinder *et al.*, 2003). The BCPCS is a multi-dimensional measure of patients' perceptions of control over several aspects of breast cancer and its treatment, including perceptions of control over physical symptoms, medical procedures, their emotions, relationships with others, and disease outcomes. The present analyses focused on two salient aspects of the experience of breast cancer patients, their perceptions of control over their physical symptoms ($\alpha = 0.79$) and control over their emotions ($\alpha = 0.87$).

RESULTS

Raw scores for the RSQ-CV were calculated by summing the scores on the specific items within each 3-item parcel or factor and dividing by the number of items, correcting for missing items, to yield the mean score per item (missing data were estimated based on mean responses for completed items on the same scale). For the proportion scores, scores for each factor were divided by the sum of all the items on the RSQ-CV. Raw RSQ-CV scores were used for factor analyses and reliability analyses, whereas both raw and proportion scores were used in the analyses of correlations with other measures. Means and standard deviations for RSQ-CV raw and proportion scores and for measures of emotional distress are presented in Table 1.

Sources of stress

Participants endorsed the breast-cancer-related stressors to varying degrees, ranging from a high percentage of the sample who indicated that uncertainty about the future (82%), treatment (81%), and receiving their diagnosis (76%) were sources of stress, to smaller but still substantial portions of the sample who endorsed stress related to financial strains (37%), disruption in their jobs (31%), and feelings of guilt (27%). Participants endorsed a mean of 4.53 of the 9 stressors

Table 1. Means and standard deviations for RSQ factors and measures of emotional distress

	Mean	Standard deviation
Primary control engagement		
Raw score	2.79	0.59
Proportion score	0.32	0.10
Secondary control engagement		
Raw score	2.88	0.52
Proportion score	0.34	0.12
Disengagement		
Raw score	1.86	0.53
Proportion score	0.14	0.07
Involuntary engagement		
Raw score	1.76	0.59
Proportion score	0.12	0.08
Involuntary disengagement		
Raw score	1.53	0.48
Proportion score	0.08	0.06
BAI	9.21	7.69
BDI-II	10.74	8.39
IES: intrusion	13.00	8.45
IES: avoidance	13.12	8.22
Perceived control		
Physical symptoms	14.19	4.75
Emotions	17.19	5.70

Mean raw scores reflect the mean score per item on 1–4 scale.

(S.D. = 2.25), with a mode of 3 stressors endorsed by 17% of the sample (range 1–9 stressors endorsed).

Confirmatory factor analyses: construct validity

CFA was conducted using EQS (see, Bentler, 1995) to cross-validate the models for voluntary (coping) and involuntary responses to stress. These models were estimated using maximum likelihood estimation, and a variance–covariance input matrix was derived from the sample data. In all specified models, individual 3-item parcels were allowed to load on only one factor, consistent with Anderson and Gerbing's (1988) argument that unidimensional models are more useful for the interpretation of latent constructs. Based on convention, we report χ^2 indices of fit, although this statistic has been widely criticized for having excess power to reject adequate models tested with large samples (Hu and Bentler, 1995). Thus, additional goodness of fit indices were selected to evaluate congruence between the data and proposed models including the comparative fit index (CFI; Bentler, 1990), normed fit index (NFI; Bentler and Bonett, 1980), goodness of fit index (GFI; Bentler and Bonett, 1980), and the root mean squared error of approximation (RMSEA; Steiger, 2000; Steiger and Lind, 1980) which allows for comparison of non-nested models. NFI and CFI (and typically, GFI), range in value from 0 to 1, and models with adequate fit yield values greater than 0.90, and models with a good fit yield values of 0.95 or greater (see Bentler, 1990; Bentler and Bonett, 1980). For RMSEA, values less than 0.10 indicate an adequate fit, and values of 0.06 or less indicate a good fit (see Steiger, 2000; Steiger and Lind, 1980). With the aim of balancing good fit and parsimony, and to allow for shared or common sources of variation outside of that posited in our model, we used the EQS program's modification indices as a guide in allowing correlations between error terms for some measured variables (see Bentler, 1995; Byrne, 1994).

Voluntary coping responses. Following the procedure used by Connor-Smith *et al.* (2000), we began by cross-validating the three-factor model of voluntary coping responses to stress shown in Figure 1 including factors for primary control engagement coping, secondary control engagement coping, and disengagement coping. A single higher order factor of voluntary coping responses was hypothesized to be comprised of voluntary engagement and voluntary disengagement; both of these factors loaded significantly on the higher order voluntary coping factor. The second-order latent construct voluntary engagement was comprised of the first-order latent construct primary control engagement coping (consisting of the 3-item parcels for problem solving, emotional regulation, and emotional expression), and secondary control engagement coping (consisting of the parcels for acceptance, distraction, positive thinking, and cognitive restructuring). The first-order latent construct disengagement coping was assessed by the item parcels for denial, avoidance, and wishful thinking. This model of voluntary coping was an adequate fit to the data, $\chi^2 = (24, n = 232) = 37.38$, $p < 0.05$, NFI = 0.948, CFI = 0.980, GFI = 0.969, RMSEA = 0.049. In

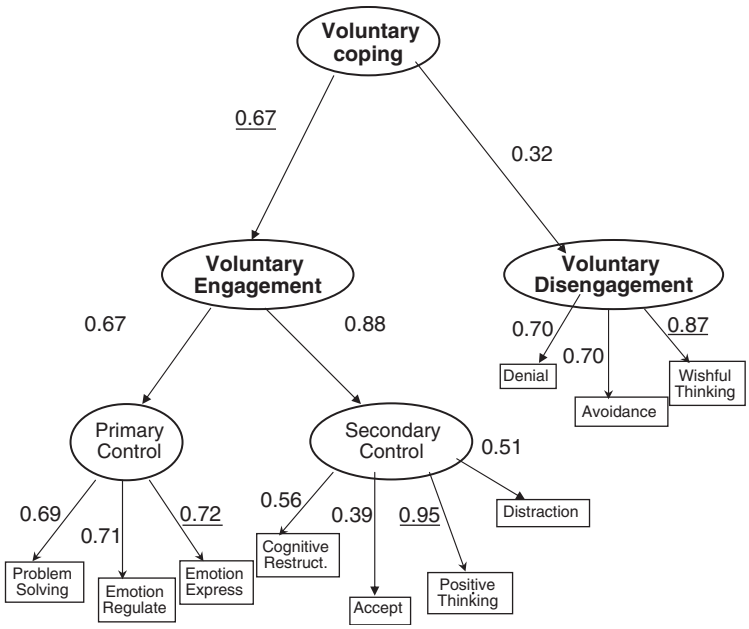

Figure 1. Confirmatory factor analysis of three-factor model of voluntary coping responses.

addition to the parameter estimates displayed in the figure, the following significant correlations resulted from allowing error terms for the indicated parcels to covary: emotional regulation with cognitive restructuring ($r = 0.11$), distraction ($r = 0.30$), denial ($r = 0.37$), avoidance ($r = 0.40$), and wishful thinking ($r = 0.71$); and acceptance with emotional expression ($r = 0.24$), cognitive restructuring ($r = 0.20$), and wishful thinking ($r = -0.36$).

Involuntary responses to stress. The proposed two-factor model of involuntary responses to stress shown in Figure 2 was tested. The item parcels for rumination, intrusive thoughts, emotional arousal, physiological arousal, and impulsive action assessed the construct involuntary engagement. The item parcels for cognitive interference, involuntary avoidance, inaction, and emotional numbing assessed the construct involuntary disengagement. This model of involuntary coping was an adequate fit to the data, $\chi^2 = (22, n = 232) = 30.07$, $p > 0.10$, NFI $= 0.979$, CFI $= 0.994$, GFI $= 0.971$, RMSEA $= 0.040$. In addition to the parameter estimates displayed in the figure, the following significant correlations resulted from allowing the error terms for the indicated parcels to covary: intrusive thoughts and rumination ($r = 0.43$), emotional arousal ($r = 0.35$), physiological arousal ($r = 0.38$); rumination and involuntary avoidance ($r = -0.17$); and emotional numbing and involuntary avoidance ($r = 0.23$). Due to the high correlation between the involuntary engagement and involuntary disengagement variables, the two-factor model was contrasted with a one-factor model. The two-factor model was retained for two reasons. First, the fit of the one-factor model was inadequate, $\chi^2 = (21, n = 218) = 179.09$, $p < 0.01$, CFI $= 0.87$, RMSEA $= 0.16$. Second, the two-factor model preserves an important theoretical distinction between engagement and disengagement responses and more closely parallels the proposed conceptual model of involuntary responses, as discussed earlier.

Alternative models of coping. In addition to validating the hypothesized conceptual model (Connor-Smith *et al.*, 2000), we examined the fit of two alternative models for classifying coping strategies that have been used in previous research on coping with breast cancer. Comparison of our

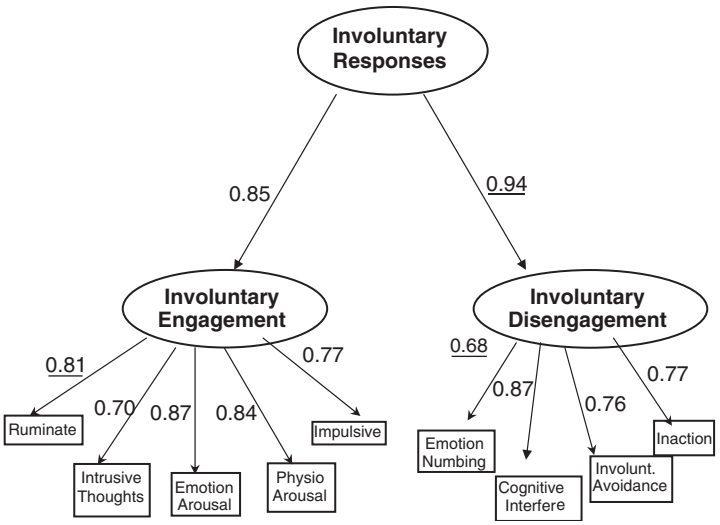

Figure 2. Confirmatory factor analysis of two-factor model of involuntary stress responses.

conceptual model to alternative models of coping indicates that it is superior to simpler problem/emotion focused and engagement/disengagement coping models. A model proposing a primary distinction between the commonly used dimension of problem- and emotion-focused coping provided a poor fit to the data, $\chi^2 = (31, n = 218) = 225.10$, $p < 0.01$, CFI = 0.61, RMSEA = 0.17. A model distinguishing only between engagement and disengagement coping strategies also provided a poor fit to the data, $\chi^2 = (31, n = 218) = 166.46$, $p < 0.01$, CFI = 0.73, RMSEA = 0.14.

Correlations among RSQ-CV factors. The correlations of the RSQ-CV coping and involuntary stress response factors were examined in two ways—correlations among raw scores and correlations among proportion scores (see Table 3). Correlations among raw scores indicated that primary and secondary control engagement coping were positively correlated with one another ($r = 0.45$). Disengagement coping, involuntary engagement, and involuntary disengagement were all strongly positively correlated with one another (r's ranged from 0.64 to 0.75). Secondary control engagement coping was negatively correlated with both involuntary engagement ($r = -0.18$) and involuntary disengagement ($r = -0.22$). Unexpectedly, there was a small positive correlation between primary control engagement coping and involuntary engagement ($r = 0.15$). Correlations of proportion scores reflected a somewhat different pattern of associations for primary control engagement and secondary control engagement coping, which were negatively correlated with disengagement coping ($r = -0.59$ and -0.52, respectively) and the two involuntary response scales (r's ranged from -0.50 to -0.69). Similar to the analyses of raw scores disengagement coping, involuntary engagement, and involuntary disengagement were all positively correlated with one another when proportion scores were used (r's ranged from 0.30 to 0.60). Thus, consistent findings using proportion scores were more consistent with the overall conceptual model, as primary and secondary control engagement coping showed better discrimination from disengagement coping and the involuntary stress response scales when proportion scores were used.

Reliability

Internal consistency. The internal consistency reliabilities (Cronbach's alphas) for the 19 parcels and five factors on the RSQ are presented in Table 2. Internal consistencies for the 19 parcels (3 items each) ranged from 0.40 for avoidance to 0.82 for intrusion (mean $\alpha = 0.64$). Internal

Table 2. Internal consistency and test-retest reliabilities of RSQ-CV factors and items parcels

	Internal consistency	12-Week stability
Primary control engagement coping	0.80	0.50
Problem solving	0.73	—
Emotional modulation	0.46	—
Emotional expression	0.63	—
Secondary control engagement coping	0.77	0.68
Cognitive restructuring	0.42	—
Positive thinking	0.62	—
Acceptance	0.61	—
Distraction	0.64	—
Disengagement coping	0.76	0.71
Denial	0.49	—
Avoidance	0.40	—
Wishful thinking	0.66	—
Involuntary engagement	0.92	0.80
Rumination	0.73	—
Intrusive thoughts	0.82	—
Emotional arousal	0.76	—
Physiological arousal	0.75	—
Impulsive action	0.66	—
Involuntary disengagement	0.87	0.78
Emotional numbing	0.65	—
Cognitive interference	0.70	—
Escape	0.69	—
Inaction	0.66	—

consistencies for the five factors (containing from 8 to 15 items) ranged from 0.76 to 0.92 (mean $\alpha = 0.82$). The reliabilities for the parcels and factors for this sample are comparable to the reliabilities for the original samples that were used in the development of the measure (Connor-Smith *et al.*, 2000).

Stability. The stability of the five RSQ factors over 12 weeks was examined in the portion of the sample ($n = 119$) assigned to a waiting list control condition (i.e. those women who did not participate in a psychological intervention in the 12 weeks between the two administrations of the RSQ-CV). The correlations were positive and significant for all five factors, ranging from $r =$ 0.50 to 0.80 (see Table 2).

Convergent and discriminant validity

Intrusion and avoidance. Using raw scores on the RSQ-CV, the correlation of the intrusion scale on the IES was examined with the five RSQ factor scores. Convergent validity is reflected in the correlation between the intrusion scale and the involuntary engagement scale on the RSQ (intrusive thoughts, rumination); this correlation was strong and positive ($r = 0.81$, $p < 0.01$). Discriminant validity is represented in the correlations of the IES intrusion scale with the other four RSQ scales; these correlations ranged from $r = -0.14$

Table 3. Correlations between RSCQ-CV factor scores (raw and proportion scores)

	1	2	3	4	5
Raw scores					
1. Primary control engagement	—				
2. Secondary control engagement	0.45**	—			
3. Disengagement	0.07	−0.02	—		
4. Involuntary engagement	0.15*	−0.18**	0.64**	—	
5. Involuntary disengagement	0.00	−0.22**	0.73**	0.75**	—
Proportion scores					
1. Primary control engagement	—				
2. Secondary control engagement	0.10	—			
3. Disengagement	−0.59**	−0.52**	—		
4. Involuntary engagement	−0.50**	−0.69**	0.30**	—	
5. Involuntary disengagement	−0.60**	−0.67**	0.50**	0.60**	—

*$p < 0.05$,
**$p < 0.01$.

(secondary control engagement coping) to $r = 0.55$ (involuntary disengagement). The mean of the absolute values of the discriminant validity correlations was $r = 0.34$. The convergent validity correlation was then compared with the average of the discriminant validity correlations using the Fisher's z transformation for comparing correlations (Howell, 2002). Results yielded a Fisher's $z = 8.31$, which well exceeds the critical value of 1.96, $p < 0.05$; that is, the convergent validity correlations of the RSQ-CV raw score scales with the IES intrusion scale were significantly greater than the discriminant validity correlations. These analyses were repeated using the proportion scores on the RSQ-CV and the difference for the correlation of the IES intrusion scale; the involuntary engagement scale of the RSQ-CV ($r = 0.80$) differed significantly from the mean of the correlations of the intrusion scale with the other RSQ-CV scales (mean $r = 0.46$), Fisher's $z = 6.54$, $p < 0.05$.

The IES avoidance scale was used to test for convergent validity with the raw scores on the RSQ-CV disengagement coping scale ($r = 0.62$) and involuntary disengagement scale ($r = 0.56$; mean $r = 0.59$). Discriminant validity was reflected in the correlations of the IES avoidance scale and the other three RSQ scales; these correlations ranged from $r = -0.02$ (secondary control coping) to $r = 0.44$ (involuntary engagement); the mean of the discriminant validity correlations was $r = 0.18$. The mean of the convergent validity correlations and the mean of the discriminant validity correlations were compared using Fisher's z transformation. The Fisher's z value of 5.33 is significant, $p < 0.05$, indicating that the convergent validity correlations with the IES avoidance scale are significantly greater than the discriminant validity correlations. In analyses using the RSQ-CV proportion scores the difference between the mean of the correlations of the IES avoidance scale with the RSQ-CV disengagement coping and involuntary disengagement scales (mean $r = 0.53$) was not significantly different from the mean of the correlations of the avoidance scale with the other three RSQ-CV scales (mean $r = 0.42$), Fisher's $z = 1.51$, n.s.

Perceived control. Correlations of the RSQ-CV factors and the perceived control over physical symptoms and control over emotions subscales on the BCPCS are presented in Table 4. For both raw scores and proportion scores on the RSQ-CV, the correlations with perceived control were significant and in the expected direction. That is, with one exception, primary and secondary control engagement coping were positively correlated with perceived control over physical symptoms and emotions, whereas disengagement coping and involuntary engagement and disengagement were negatively correlated with perceived control. The correlations were of comparable magnitude for raw scores and proportion scores.

Table 4. Correlations of RSQ-CV scale raw and proportion scores with perceived control over physical symptoms and emotional distress

	Control over physical symptoms	Control over emotional distress
Primary control engagement coping	0.19**	0.04
	0.27**	0.35**
Secondary control engagement coping	0.26**	0.40**
	0.19**	0.63**
Disengagement coping	−0.14*	−0.34**
	−0.12	−0.24**
Involuntary engagement	−0.24**	−0.59**
	−0.24**	−0.64**
Involuntary disengagement	−0.26**	−0.47**
	−0.27**	−0.47**

Correlations using raw scores are reported on the top line and correlations using proportion scores are reported on the bottom line for each of the RSQ-CV scales.
*$p < 0.05$,
**$p < 0.01$.

Correlations with emotional distress

One the most important applications of a measure of coping is the association between coping and symptoms of emotional distress. As a preliminary check of these relationships, the association between the RSQ-CV scales and symptoms of anxiety and depression were examined. The correlations of the RSQ-CV raw scores and proportion scores with the BAI and the BDI-II are presented in Table 5. In analyses with raw scores, primary control engagement coping was not associated with symptoms of depression or

Table 5. Correlations among RSQ-CV scale raw and proportion scores with measures of emotional distress

	BAI	BDI-II	Intrusion	Avoidance
Primary control engagement	0.02	−0.03	0.15*	−0.07
	−0.41**	−0.47**	−0.40**	−0.49**
Secondary control engagement	−0.17*	−0.25**	−0.14*	−0.02
	−0.51**	−0.60**	−0.60**	−0.39**
Disengagement	0.49**	0.58**	0.51**	0.62**
	0.33**	0.43**	0.33**	0.53**
Involuntary engagement	0.63**	0.70**	0.81**	0.44**
	0.60**	0.67**	0.80**	0.37**
Involuntary disengagement	0.60**	0.67**	0.55**	0.56**
	0.56**	0.64**	0.49**	0.52**

Correlations using raw scores are reported on the top line and correlations using proportion scores are reported on the bottom line for each of the RSQ-CV scales.
*$p < 0.05$,
**$p < 0.01$.

anxiety. As expected, secondary control engagement coping was negatively associated with both types of symptoms ($r = -0.17$ and -0.25, $p < 0.05$). Disengagement coping, involuntary engagement, and involuntary disengagement responses were all moderately to highly correlated with symptoms of anxiety and depression ranging from 0.49 to 0.70.

In the analyses using proportion scores on the RSQ-CV, the correlations of disengagement coping, involuntary engagement, and involuntary disengagement with the BAI and BDI-II were relatively unchanged from the correlations using the raw scores (i.e. disengagement coping, involuntary engagement, and involuntary disengagement were all significantly positively correlated with the BDI-II and the BAI, *r*'s ranging from 0.33 to 0.67). However, the correlations of primary control engagement coping with the BAI ($r = -0.41$) and the BDI-II ($r = -0.47$) were now negative, moderate in magnitude and statistically significant. The correlations of secondary control engagement coping with the BAI ($r = -0.51$) and the BDI-II (-0.60) were much stronger in magnitude than the correlations found using raw scores. These findings are consistent with those of Connor-Smith *et al*. (2000) who found that proportion scores for primary and secondary control engagement coping were more strongly (and negatively) correlated with symptoms than were raw scores.

DISCUSSION

The present study reports on the development of a measure and further tests a model of voluntary and involuntary responses to the stress of the diagnosis and treatment of breast cancer. In a sample of 232 women with newly diagnosed breast cancer, the reliability, construct validity, and criterion validity of the RSQ-CV were evaluated. Results of CFA indicate that patients' responses on the RSQ-CV were consistent with the hypothesized model of coping and involuntary stress responses. The internal consistency reliabilities and stability of the five coping and stress response factors were adequate to excellent, however, reliabilities for the 3-item parcels that reflect more specific types of coping were generally adequate to poor due the smaller number of items comprising these parcels. The criterion validity of the RSQ-CV factors was established through correlations with other measures of stress responses in this sample; convergent validity coefficients with the intrusion and avoidance scales of the IES were strong and exceeded the discriminant validity coefficients. Overall, the results support the use of the RSQ-CV in the assessment of coping and stress responses in women with newly diagnosed breast cancer. Moreover, the results support a dual-process model of controlled and automatic responses to

the stress of the diagnosis and treatment of breast cancer.

Patients endorsed the cancer-related stressors on the RSQ-CV to varying degrees. Uncertainty about the future and stress related to diagnosis and treatment of the disease were all endorsed by over half of the sample. Disruptions in family, work, household functioning, and finances were all endorsed by 35–40% of participants. Even though this sample included only patients with non-metastatic disease, 41% of the patients endorsed fears about death as a significant source of stress. The inclusion of these stressors addresses a limitation of previous measures in that these measures have asked patients how they coped with their cancer without specifying which aspects of the disease, its treatment, and its effects on their daily lives was the focus of their coping efforts. The inclusion of these stressors on the RSQ-CV may have helped to prime respondents to focus on those aspects of the disease and its treatment that have been stressful for them and that have prompted their coping efforts. Future analyses will examine the types of coping responses that are associated with specific stressors that are associated with breast cancer.

The results of the CFA provide support for the hypothesized theoretical model of three factors of voluntary coping responses and two involuntary stress response factors. With regard to voluntary coping responses, factors representing two forms of engagement coping (primary control engagement and secondary control engagement coping) and one factor for disengagement coping provided an excellent fit with the data. These findings replicate previous tests of this model using the RSQ (Benson *et al*., 2004; Connor-Smith and Calvete, 2004; Connor-Smith *et al*., 2000; Wadsworth *et al*., 2004), suggesting that this is a relatively robust and replicable model of coping and stress responses that is consistent across several cultural groups, age groups, and types of stress. Furthermore, two alternative models of coping (problem/emotion-focused and approach/avoidance) were tested and did not achieve an adequate fit with the data, a finding that is consistent with other tests of these models of coping (Skinner *et al*., 2003). Thus, the dual-process model of coping and stress responses that was used to guide the development of the RSQ-CV appears to be a better fit with the structure of coping responses of breast cancer patients than does the widely used problem- and emotion-focused model or an approach/avoidance model.

Several features of the dual-process model of coping and stress responses are noteworthy. primary control engagement coping includes both efforts to address stressors related to breast cancer and negative emotions in response to these stressors. The common element of these responses is that they involve direct attempts to control the stressor or one's negative emotions. Secondary control engagement coping, in contrast, involves coping efforts that are intended to adapt to and accept stress that is associated with the diagnosis and treatment of breast cancer. These coping responses are primarily cognitive in nature, including reframing the source of stress, focusing on the positive, and acceptance of the problem. Finally, disengagement coping responses, including cognitive and behavioral avoidance, loaded on a distinct factor. In contrast to previous models of coping in which avoidance and other methods of disengagement coping have been included in the category of emotion-focused coping (e.g. Tobin *et al*., 1989), disengagement responses on the RSQ-CV form a distinct factor. This separation of avoidance from other coping strategies is clinically meaningful, allowing for more specific assessment of coping and stress responses. This specificity can translate into more refined interventions aimed to encourage the use of adaptive coping skills.

Consistent with the dual-process model, the RSQ-CV further differs from other instruments that have been used to measure coping with breast cancer in that it includes scales to assess involuntary engagement and disengagement stress responses. The hypothesized two-factor model of involuntary responses achieved an excellent fit with the data and this model was superior to an alternative model that included only one factor for involuntary responses. The inclusion of the involuntary scales along with the voluntary coping scales provides a more comprehensive assessment of the full range of stress responses involved in adaptation to breast cancer.

The five factors achieved adequate to excellent internal consistency and adequate stability over 12 weeks. Thus, scores on these factors are sufficiently reliable for use in testing the associations of coping and stress responses with other constructs. Although the subtypes of coping and stress responses that are represented in the 3-item parcels (e.g. problem solving, emotional expression, acceptance) are of potentially of considerable

importance, the reliabilities for these parcels are not sufficient in most instances for their use in other analyses (see also Connor-Smith *et al*., 2000). This is a consequence of the relatively broad scope of the RSQ-CV; coverage of a wide range of coping and stress responses limits the number of items that can be included to measure specific subtypes.

Although the results of the CFA support three distinct coping factors and two distinct involuntary stress response factors, there are significant correlations among these scales. The involuntary engagement and disengagement scales are strongly correlated, both in analyses using raw scores and using scores that reflect the proportion of total responses. Thus, a strong factor that characterizes involuntary responses underlies these two factors and likely reflects processes that are rapid and are experienced as outside of personal control. The content of these items also suggests that they reflect relatively poor regulation of involuntary stress responses, regardless of whether the responses are oriented toward engaging with or disengaging from stress and negative emotions. Although disengagement coping responses are a distinct factor in this model, these responses are moderately correlated with the two involuntary scales in the analyses using proportion score and highly correlated with the involuntary scales using raw scores. This suggests that patients who use more disengagement coping are also characterized by higher levels of uncontrollable, involuntary stress responses, a pattern that is consistent with previous findings on the positive association between avoidance coping and intrusive thoughts (e.g. Primo *et al*., 2000).

The RSQ-CV coping and involuntary stress response scales achieved adequate convergent and discriminant validity with the intrusion and avoidance scales on the IES. Intrusive thoughts on the IES were strongly correlated with the involuntary engagement scale on the RSQ-CV, and this convergent validity correlation was significantly greater than the discriminant validity correlations of the instrusive thoughts scale with the other scales on the RSQ-CV. Similarly, the IES avoidance scale achieved convergence with the disengagement coping and involuntary disengagement scales at a level that exceeded the discriminant correlations with the other RSQ-CV scales. It is noteworthy that the IES avoidance scale was also significantly and positively correlated with raw scores on the RSQ-CV involuntary engagement scale, a finding that is consistent with the significant correlation between the IES avoidance and intrusion scales. Moreover, the discriminant validity of the RSQ-CV with the IES was better with the raw scores as compared with the proportion scores for primary and secondary control engagement coping. This reflects the generally stronger association of proportion versus raw scores on these two scales with measures of psychological distress (see Connor-Smith *et al*., 2000). Overall, these correlations support the use of the RSQ-CV as a single instrument to assess voluntary and involuntary engagement and disengagement responses to the stress of breast cancer.

The RSQ-CV factors also displayed the expected pattern of correlations with two dimensions of perceived control—control over physical symptoms and control over emotions. Both primary and secondary control engagement coping were positively correlated with both dimensions of perceived control. Conversely, disengagement coping was negatively correlated with perceptions of control. These associations are consistent with the control model on which the RSQ-CV is based (e.g. Weisz *et al*., 1994). Efforts to act on the source of stress or one's responses (primary control coping) and efforts to adapt to the stressor or one's reactions (secondary control) are linked with greater perceived control, with the strongest associations found between secondary control coping and perceived control over one's emotional distress. Although this pattern is consistent with theory, future research is needed to disentangle the direction of this relationship.

One of the most important uses of any measure of coping or stress responses is to examine associations with symptoms of emotional distress, especially anxiety and depression. In this regard, preliminary analyses were reported of the association of the RSQ-CV scales with symptoms on the BAI and BDI-II. These initial analyses indicate that primary control engagement and secondary control engagement coping are associated with lower symptoms of both types of distress, although these associations were significant for primary control coping only when proportion scores were used, whereas the correlations for secondary control coping were significant for analyses using both raw and proportion scores. Furthermore, the correlations for secondary control coping were relatively stronger than for primary control coping in analyses of raw and proportion scores. These findings are consistent with previous studies that

have found proportion scores of coping to be relatively less affected by response sets and biases than raw scores (e.g. Connor-Smith *et al.*, 2000; Forsythe and Compas, 1987; Osowiecki and Compas, 1998; Vitaliano *et al.*, 1990). The overall pattern of correlations is consistent with previous conceptualizations of secondary control coping as an adaptive response to the uncontrollable stress that is typically encountered with a serious illness (e.g. Weisz *et al.*, 1994). In contrast, disengagement coping and both involuntary response scales were associated with higher levels of distress. These initial analyses suggest that, like measures of emotional approach coping (Stanton *et al.*, 2000), the RSQ-CV adequately distinguishes between adaptive efforts to manage and regulate negative emotions and coping responses that involve disengagement or are experienced as involuntary and are less adaptive. Conclusions regarding the relation between coping and stress responses on the RSQ-CV and emotional distress await more rigorous analyses in prospective designs and in the context of interventions on these coping responses; however, these initial findings are encouraging.

Although the results of this study suggest that the RSQ-CV is a potentially useful tool for research on coping with the stress of breast cancer, there are several areas that require further work. First, the sample was biased in that it included a disproportionate number of women who had volunteered for a randomized clinical trial testing psychological interventions and the relatively low response rate. Future research needs to include a more broadly representative sample of patients. Second, further tests of the validity of the RSQ-CV are needed in relation to criterion measures that do not rely on self-report. For example, the association of the RSQ-CV with reports from other informants or with performance-based measures will be important to examine. Finally, the current sample was limited in terms of ethnicity. The performance of the RSQ-CV in more diverse populations of women with breast cancer needs to be examined. These limitations notwithstanding, the RSQ-CV appears to be a measure that will help to understand the range of coping and stress responses in the process of adaptation to breast cancer.

ACKNOWLEDGEMENTS

This research was supported by grant RO1CA67936 from the National Cancer Institute.

NOTE

1. The version of the RSQ-CV used in this study also included 6 additional items added to the end of the measure that were included to specifically assess some aspects of coping that were the focus of one of the interventions in the clinical trial. These items have not been included in previous versions of the RSQ and were not included to represent the theoretical model that was tested here. For these reasons, the additional items were not included in the analyses.

REFERENCES

Anderson JC, Gerbing DW. 1988. Structural equation modeling in practice: A review and recommended two-step approach. *Psychol Bull* **103**: 411–423.

Andrykowski MA, Cordova MJ, Studts JL, Miller TW. 1998. Posttraumatic stress disorder after treatment for breast cancer: Prevalence of diagnosis and use of the PTSD Checklist–Civilian Version PCL–C as a screening instrument. *J Consult Clin Psychol* **66**: 586–590.

Barrett LF, Tugade MM, Engle RW. 2004. Individual differences in working memory capacity and dual-process theories of the mind. *Psychol Bull* **130**: 553–573.

Beck AT, Steer RA. 1990. *The Beck Anxiety Inventory*, *Manual*. The Psychological Corporation: New York.

Beck AT, Steer RA, Brown GK. 1996. *Beck Depression Inventory*, *Manual*. (2nd edn.), The Psychological Corporation: New York.

Benson MA, Compas BE, Layne CM *et al.*, 2004. Measurement of coping strategies and involuntary stress responses in the aftermath of war : A study of Bosnian adolescents. Manuscript submitted for publication.

Bentler PM. 1990. Comparative fit indices in structural models. *Psychol Bull* **107**: 238–246.

Bentler PM. 1995. *EQS Structural Equations Program Manual*. Multivariate Software, Inc.: Encino, CA.

Bentler PM, Bonett DG. 1980. Significance tests and goodness of fit in the analysis of covariance structures. *Psychol Bull* **88**: 588–606.

Bradley CJ, Given CW, Roberts C. 2002. Race, socioeconomic status, and breast cancer treatment and survival. *J Natl Cancer Inst* **94**: 490–496.

Byrne BM. 1994. *Structural Equation Modeling with EQS and EQS/Windows*: *Basic concepts*, *Applications*, *and Programming*. Sage: Thousand Oaks, CA.

Carver CS, Pozo C, Harris SD *et al.*, 1993. How coping mediates the effect of optimism on distress: A study of women with early stage breast cancer. *J Pers Soc Psychol* **65**: 375–390.

Carver CS, Scheier MF, Weintraub JK. 1989. Assessing coping strategies: A theoretically based approach. *J Pers Soc Psychol* **56**: 267–283.

Classen C, Koopman C, Angell K, Spiegel D. 1996. Coping styles associated with psychological adjustment to advanced breast cancer. *Health Psychol* **156**: 434–437.

Cohen M. 2002. Coping and emotional distress in primary and recurrent breast cancer patients. *J Clin Psychol Med Settings* **9**: 245–251.

Compas BE, Conner J, Osowiecki D, Welch A. 1997. Effortful and involuntary responses to stress: Implications for coping with chronic stress. In *Coping with Chronic Stress*, Gottlieb BH (ed.). Plenum: New York; 105–130.

Compas BE, Connor-Smith JK, Saltzman H, Thomsen AH, Wadsworth M. 2001. Coping with stress during childhood and adolescence: Progress, problems, and potential. *Psychol Bull* **127**: 87–127.

Compas BE, Luecken L. 2002. Psychological adjustment to breast cancer. *Curr Dir Psychol Sci* **11**: 111–114.

Compas BE, Stoll MF, Thomsen AH, Oppedisano G, Epping-Jordan JE, Krag DN. 1999. Adjustment to breast cancer: Age-related differences in coping and emotional distress. *Breast Cancer Res Treat* **1233**: 195–203.

Connor-Smith JK, Calvete E. 2004. Cross cultural equivalence of coping and involuntary responses to stress in Spain and the United States. *Anxiety Stress Coping* **17**: 163–185.

Connor-Smith JK, Compas BE, Wadsworth ME, Thomsen AH, Saltzman H. 2000. Responses to stress in adolescence: Measurement of coping and involuntary responses to stress. *J Consult Clin Psychol* **68**: 976–992.

Davidson RJ, Jackson DC, Kalin NH. 2000. Emotion, plasticity, context, and regulation: Perspectives from affective neuroscience. *Psychol Bull* **126**: 890–909.

Dunkel-Schetter C, Feinstein LG, Taylor SE, Falke RL. 1992. Patterns of coping with cancer. *Health Psychol* **11**: 79–87

Epping-Jordan JE, Compas BE, Osowiecki DM *et al.* 1999. Psychological adjustment to breast cancer: Processes of emotional distress. *Health Psychol* **18**: 315–326.

Folkman S, Lazarus RS. 1980. An analysis of coping in a middle-aged community sample. *J Health Soc Behav* **21**: 219–239.

Folkman S, Lazarus RS. 1985. If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *J Pers Soc Psychol* **48**: 150–170.

Forsythe CJ, Compas BE. 1987. Interaction of cognitive appraisals of stressful events and coping: Testing the goodness of fit hypothesis. *Cognitive Ther Res* **11**: 473–485.

Glinder J, Compas BE, Langrock A, Beckjord E. 2006. Perceived control and breast cancer: development of a multidimensional measure of control. *Psychology and Health* (in press).

Horowitz MJ, Wilner N, Alvarez W. 1979. Impact of Event Scale: A measure of subjective stress. *Psychosom Med* **41**: 209–218.

Howell DC. 2002. *Statistical Methods for Psychology*, (5th edn.). Pacific Grove: CA: Duxbury.

Hu L, Bentler PM. 1995. Evaluating model fit. In *Structural Equation Modeling*: *Issues*, *Concepts*, *and Applications*, Hoyle RH (ed.). Sage: Newbury Park, CA; 76–99.

Leucken LJ, Compas BE. 2002. Stress, coping and immune function in breast cancer. *Ann Behav Med* **24**: 336–344.

McCarty CA, Weisz JR, Wanitromanee K *et al.*, 1999. Culture, coping, and context: Primary and secondary control among Thai and American youth. *J Child Psychol Psychiatry Allied Discip* **40**: 809–818.

McCaul KD, Sandgren AK, King B, O'Donnell S, Branstetter A, Foreman G. 1999. Coping and adjustment to breast cancer. *Psycho-Oncology* **8**: 230–236.

Mishel MH, Sorenson DS. 1993. Revision of the ways of coping checklist for a clinical population. *West J Nurs Res* **15**: 59–74.

Nelson DV, Friedman LC, Baer PE, Lane M (1989). Attitudes to Cancer: Psychometric properties of fighting spirit and denial. *Journal of Behavioural Medicine* **12**: 341–355.

Nezu CM, Nezu AM, Friedman SH *et al.*, 1999. Cancer and psychological distress: Two investigations regarding the role of social problem-solving. *J Psychosoc Oncol* **16**: 27–40.

Osowiecki D, Compas BE. 1998. Psychological adjustment to cancer: Control beliefs and coping in adult cancer patients. *Cognitive Ther Res* **22**: 483–499.

Primo K, Compas BE, Oppedisano G, Howell DC, Epping-Jordan JE, Krag DN. 2000. Intrusive thoughts and avoidance in breast cancer: Individual differences and associations with psychological distress. *Psychol Health*, **14**: 1141–1153.

Rosberger Z, Edgar L, Collet J, Fournier MA. 2002. Patterns of coping in women completing treatment for breast cancer: A randomized controlled trial of Nucare, a brief psychoeducational workshop. *J Psychosoc Oncol* **20**: 19–37.

Shiffrin RM. 1997. Attention, automatism, and consciousness. In *Scientific Approaches to Consciousness*, Cohen JD, Schooler JW (eds). Erlbaum: Mahwah, NJ.

Shiffrin RM, Schneider W. 1977. Controlled and automatic human information processing: II. Perceptual learning, automatic attending, and a general theory. *Psychol Rev* **84**: 127–190.

Skinner EA, Edge K, Altman J, Sherwood H. 2003. Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychol Bull* **129**: 216–269.

Stanton AL, Danoff-Burg S, Cameron CL *et al.*, 2000. Emotionally expressive coping predicts psychological

and physical adjustment to breast cancer. *J Consult Clin Psychol* **68**: 875–882.

Steiger JH. 2000. Point estimation, hypothesis testing, and interval estimation using the RMSEA: Some comments and a reply to Hayduck and Glaser. *Struct Equat Model* **7**: 149–162.

Steiger JH, Lind JC. 1980. Statistically based tests for the number of common factors. *Paper presented at the Annual Meeting of the Psychometric Society*, Iowa City, IA.

Tobin DL, Holroyd KA, Reynolds RV, Wigal JK. 1989. The hierarchical factor structure of the Coping Strategies Inventory. *Cognitive Ther Res* **13**: 343–361.

Vitaliano PP, DeWolfe DJ, Maiuro RD, Russo J, Katon W. 1990. Appraised changeability of a stressor as a modifier of the relationship between coping and depression: A test of the hypothesis of fit. *J Pers Soc Psychol* **59**: 582–592.

Wadsworth ME, Rieckmann T, Benson MA, Compas BE. 2004. Coping and responses to stress in Navajo adolescents: Psychometric properties of the Responses to Stress Questionnaire. *J Community Psychol* **32**: 391–411.

Weisz JR, McCabe MA, Dennig MD. 1994. Primary and secondary control among children undergoing medical procedures: Adjustment as a function of coping style. *J Consult Clin Psychol* **62**: 324–332.

