The Influence of Benefit Finding on Activity Limitation

and Everyday Adaptation to Chronic Pain

by

Jeffrey Scott Kinderdietz

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved May 2012 by the
Graduate Supervisory Committee:

Alex Zautra, Chair
Mary Davis
Manuel Barrera
Morris Okun

ARIZONA STATE UNIVERSITY

August 2012

ABSTRACT

In rehabilitation settings, activity limitation can be a significant barrier to recovery. This study sought to examine the effects of state and trait level benefit finding, positive affect, and catastrophizing on activity limitation among individuals with a physician-confirmed diagnosis of either Osteoarthritis (OA), Fibromyalgia (FM), or a dual diagnosis of OA/FM. Participants (106 OA, 53 FM, and 101 OA/FM) who had no diagnosed autoimmune disorder, a pain rating above 20 on a 0-100 scale, and no involvement in litigation regarding their condition were recruited in the Phoenix metropolitan area for inclusion in the current study. After initial questionnaires were completed, participants were trained to complete daily diaries on a laptop computer and instructed to do so a half an hour before bed each night for 30 days. In each diary, participants rated their average daily pain, benefit finding, positive affect, catastrophizing, and activity limitation. A single item, "I thought about some of the good things that have come from living with my pain" was used to examine the broader construct of benefit finding. It was hypothesized that state and trait level benefit finding would have a direct relation with activity limitation and a partially mediated relationship, through positive affect. Multilevel modeling with SAS PROC MIXED revealed that benefit finding was not directly related to activity limitation. Increases in benefit finding were associated, however, with decreases in activity limitation through a significant mediated relationship with positive affect. Individuals who benefit find had a higher level of positive affect which was associated with decreased activity limitation. A suppression effect involving

i

pain and benefit finding at the trait level was also found. Pain appeared to increase the predictive validity of the relation of benefit finding to activity limitation. These findings have important implications for rehabilitation psychologists and should embolden clinicians to encourage patients to increase positive affect by employing active approach-oriented coping strategies like benefit finding to reduce activity limitation.

DEDICATION

For Kirk,

Whose love, encouragement, and support have made

all life's challenges less daunting.

LOUWHAM!

This dissertation is also dedicated to Maz

for many, many, many reasons,

not the least of which is

marshaling an army of prayers and a legion of beads!

ACKNOWLEDGMENTS

successful searches for internship training opportunities. I could not imagine my graduate experience without kicking back in Manuel's office and laughing and learning.

I remember Dr. Okun shaking my hand in congratulations when I received my undergraduate degree from ASU. He shook my hand again after the successful defense of this document. His support and congratulations will always hold a special place in my heart. Dr. Okun stepped up and agreed to serve on my committee in the eleventh hour. He provided insight and guidance that was invaluable. His service on my committee and support of this thesis will always be remembered fondly and with much appreciation.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

A large number of military personnel sustain injuries that result in activity limitation requiring rehabilitation services to alleviate. Additionally, the incidence of age-related activity limitation and disabilities is projected to increase from 5.1 million long-term disabilities in 1986 to between 14.8 and 22.6 million by 2040 (Brown, DeLeon, Loftis & Scherer, 2008). This increase may be an underestimate as the number of individuals over 65 climbs from 40 to 80 million and the population of seniors over the age of 85 grows 350% by 2050 (U.S. Census Bureau, 2004). These dramatic increases are projected to exponentially raise demand for rehabilitation services and may prevent millions from receiving care.

Changes in medical models, over the past two decades, have opened the doors for rehabilitation psychologists to improve the current quality and effectiveness of care. In the past, the medical community and World Health Organization (WHO) limited their physical disabilities conceptualization to the direct result and consequence of biological dysfunction (Dixon, Johnston, Rowley & Pollard, 2008). The model used by the WHO, the International Classification of Functioning, Disability, and Health (ICIDH), ignored psychological variables (World Health Organization, 1980). The most recent model, the ICF (International Classification of Functioning), no longer defines impairment as disability and handicap but instead as activity limitation and participation

restrictions. This model also now recognizes the importance of psychological and environmental factors (Johnston & Pollard, 2001).

Psychological research related to health outcomes has focused primarily on dysfunction and adverse factors. By comparison, there have been relatively few studies focusing on positive psychological variables in relation to health. These studies have examined positive psychological constructs among individuals with disparate medical conditions including: arthritis (Dannoff-Burg & Revenson, 2005; Danoff-Burg, Agee, Romanoff, Kremer & Strosberg, 2006), acquired brain injury (McGrath & Linley, 2006), stroke (Gillen, 2005), amputation (Phelps, Williams, Raichle, Turner & Ehde, 2008), MS (Hart, Vella & Mohr, 2008), lupus (Danoff-Burg et al., 2006), HIV/AIDS (Siegel & Schrimshaw, 2007; Carrico et al., 2006), tinnitus (Davis & Morgan, 2008), breast cancer (Antoni et al., 2006; Urcuyo, Boyers, Carver & Antoni, 2005; McGregor et al., 2004; Carver & Antoni, 2004) and prostate cancer (Kinsinger, et al., 2006). This relative dearth of research leaves us with very little knowledge about the effects of positive psychological constructs in relation to health.

Investigators have recently suggested benefit finding may play a critical role in activity limitation (Bower, Low, Moskowitz, Sepha & Epel, 2008). No research to date has examined the effect of benefit finding on activity limitation among individuals with chronic pain conditions. It is important to examine these possible effects among individuals with chronic pain conditions because arthritis is more prevalent as individuals' age and military service members report significant chronic joint pain as a result of wearing heavy body armor and

2

carrying weighty backpacks and weaponry for sustained periods of time. Investigating these possible effects may prove critically important for rehabilitation researchers and providers because participation in physical and occupational therapy is a crucial component for recovery. In addition to the implications for the rehabilitation system, there is also ample evidence suggesting that reducing activity limitation improves both physical [reduction in the risk of coronary heart disease, hypertension, colon cancer, diabetes, obesity, and stroke] (Wijndaele et al., 2007; Paffenbarger, Hyde, Wing & Hsieh, 1986; US Department of Health and Human Services, 1996) and mental health (Paluska & Schwenk, 2000).

Research on benefit finding has increased over the past two decades along with other positive psychological constructs. Investigators studying benefit finding have called for additional research to identify the mechanisms underlying the effects of benefit finding in individuals with arthritis and chronic pain conditions (Danoff-Burg et al., 2006). Researchers have also advocated for additional studies that examine behavioral and physical correlates of benefit finding (Youngmee, Schultz & Carver, 2007).

Chapter 2

BENEFIT FINDING

Challenges in operationally defining constructs and problems with theory have plagued the study of benefit finding. The terminology describing constructs under study have been used interchangeably over the past two decades. Benefit finding, for example, has been used interchangeably with adversarial growth, balance of benefit to cost, posttraumatic growth, stress-related growth, positive reframing and meaning making (Helgeson, Reynolds, & Tomich, 2006; Gillen, 2005; Phipps, Long, & Ogden, 2007; Tedeschi & Calhoun, 1996; Tomich & Helgeson, 2004; Andrykowski, Brady, & Hunt, 1993; Cordova, Cunningham, Carlson, & Andrykowski, 2001). In addition, posttraumatic growth is also used interchangeably with resilience which should continue to plague scholars. Researchers argue that the aforementioned constructs should not be used synonymously (Phipps et al., 2007; Davis, Nolen-Hoeksema, & Larson, 1998; Luszcynska, Mohamed, & Schwarzer, 2005).

Tennen and Affleck (2005), in a recent book chapter, discussed theories related to benefit finding as an "assumptive world." This is an accurate description and little has been done to remedy this situation. The current assumptive theories dominating the world of benefit finding propose it to be (1) a selective appraisal process, (2) a coping strategy and (3) a late emerging process allowing for adjustment to adversity. Tennen and Affleck (2005) underscore the fact that there is no empirical support to these persisting theories. They discuss several other proposed theories in this same chapter but again emphasize their

lack of empirical support (for a complete description see Tennan & Affleck, 2005).

As previously stated, many investigators define benefit finding as a selective appraisal process that may be employed when in threatening situations wherein individuals seek and find something positive (Tedeschi & Calhoun, 1996). Benefit finding is also considered to be an active cognitive strategy that leads to a rebuilding of cognitive schemas or beliefs that were threatened as a result of a significant trauma, either directly after, or temporally distanced from the aversive event. It is speculated that benefit finding might then be followed by behavioral or effortful change that leads to posttraumatic growth (Phelps et al., 2008). For example, an individual might reappraise their life after a traumatic event, decide they have a deeper purpose, quit a dead end job and devote their life to more meaningful work thereby providing them with a greater sense of joy.

According to models of growth advocated by Tedeschi & Calhoun (2004) traumas pose a significant threat to a benevolent world view and require cognitive reprocessing to reduce dissonance (Taylor, 1983). Individuals that are able to make this cognitive shift may then experience posttraumatic growth (Phelps et al., 2008; Tedeschi & Calhoun, 1996; Tedeschi & Calhoun, 2004). Posttraumatic growth is elicited by a shift in an individual's goals, view of themselves, and relationships, such as a more meaningful reason for living or a deeper appreciation of friends and family. The experience of coping with a traumatic incident could propel an individual to thrive, adapt, and function better than before the event occurred.

Individuals that do not shift after a traumatic event may instead ruminate, a negative cognitive process, that can often include blaming others, viewing oneself as a victim, focusing on what might have been if not for a given experience, and thoughts, such as "Why me?" Depression, distress, and PTSD symptoms can occur if this cognitive shift is not made and the individual continues to ruminate (Phelps et al., 2008; Tedeschi & Calhoun, 2004). Rumination may be the non-adaptive cognitive process that explains why many individuals are never able to find benefits even several years after an aversive event (Davis & Morgan, 2008).

The most recent study published examining benefit finding measured positive changes utilizing the widely-used 43-item SRGS-R. The SRGS-R is an appraisal of stress related growth and is often used as a measure of benefit finding. This scale appears to be an excellent measure of post traumatic growth but fails to capture the cognitive appraisal process of benefit finding that precedes the reported change or growth. Another measure widely used in the study of benefit finding is the Perceived Benefits Scale (Park, Chmielewski, & Blank, 2010; Helgeson, et al., 2006). This scale again measures life changes reported by individuals "now" and asks if these changes are better or worse than pre-trauma levels. These scales have been used in several studies including a comprehensive meta-analytic review of benefit finding (Hart, Vella, & Mohr, 2008; Helgeson, et al., 2006). The construct under examination in these studies appears to be post traumatic growth or changes that have transpired after the cognitive reappraisal

process of benefit finding occurred. The majority of published research examining benefit finding is actually studying perceived change or growth.

In the current study benefit finding is defined as a selective appraisal process that may be employed when in threatening or aversive situations wherein individuals seek and find something positive (Tedeschi & Calhoun, 1996).

Chapter 3

PREDICTORS OF BENEFIT FINDING

The literature was examined to determine possible individual differences in personality and social situation that could affect an individual's ability to benefit find. Individual differences in benefit finding may arise from several potential sources including race/ethnicity, SES, education level, age, history of childhood sexual abuse, social support, coping strategies, and dispositional optimism.

Several studies have found that African American and Hispanic women reported finding more benefits than Caucasian women (Urcuya et al., 2005; Tomich & Helgeson, 2004; Phipps et al., 2007; Helgeson et al., 2006). Researchers have also found that the lower a woman's SES, the greater her likelihood of reporting benefits (Tomich & Helgeson, 2004). This research focused on the effects of benefit finding among women with Stage I, II and III breast cancer. Tomich and colleagues (2004) interviewed women at four, seven, and thirteen months after diagnosis and assessed benefit finding and quality of life measures. They inferred, based on their findings, that both minority women and those of lower SES may have experienced daily discrimination that better prepared them to derive benefits from adverse events (Tomich & Helgeson, 2004). Other studies however have shown contradictory findings wherein women with higher SES report more benefit finding (Cordova et al., 2001).

Contradictory findings also exist in relation to benefit finding and education levels. Studies examining caregivers of cancer patients found that

lower levels of education were related to greater benefit finding, which was consistent with the results of other recent studies examining patient's education levels (Siegel & Schrimshaw, 2007, Tomich & Helgeson, 2004; Rinaldis, Pakenham, & Lynch, 2010). A third study however found that women with higher education levels reported more benefit finding (Sears, Stanton, & Danoff-Burg, 2003).

There is also contradictory evidence in relation to perceived severity of the aversive event. Some studies suggest that greater stress or perceived severity of disease state elicits greater benefit finding (Tomich & Helgeson, 2004; Sears et al., 2003; Lechner et al., 2003) whereas other studies have found the opposite (Stanton, Bower, & Low, 2006). This leaves the association of perceived severity and benefit finding in question.

Several studies have found that younger individuals report greater levels of benefit finding (Helgeson et al., 2006; Lechner et al., 2003; Milam, 2004). Differences in benefit finding related to age may be explained by research that found disability onset to be experienced differently by younger individuals. Younger persons described a sense of role loss whereas their older counterparts described a sense of lost time (Kim, 2002).

Research has also shown an association between the use of approach oriented and active coping strategies and benefit finding (Urcuya et al., 2005; Ho, Chan, & Ho, 2004; Nolen-Hoeksema & Davis 2005; Luszcynska et al., 2005). A study that examined positively focused writing interventions found an active approach oriented coping strategy had beneficial consequences for participants.

Interestingly, the researchers noted that individuals were typically surprised on the first day by the difficulty of the benefit finding task. One participant noted, "turning arthritis into something positive would be like changing a dog into a cat" (Danoff-Burg et al., 2006). This study provides evidence that people who are anxious, avoidant and experiencing chronic pain may respond positively to benefit finding with an appropriate intervention. Danoff-Burg and colleagues (2006) suggested that these individuals may not have previously taken the opportunity to consider positive aspects of their condition.

Research has also shown that women with breast cancer who employ active versus avoidant coping strategies show better psychological adjustment (Friedman, Nelson, Baer, Lane, & Smith, 1990). Researchers have also found that people with more social resources adjust better after trauma (Alperovitz, 2001). Social support and coping strategies are discussed together because there appears to be a relation between them. Research indicates that people with more social support use more active coping strategies (Moos & Schaefer, 1993) whereas individuals that use avoidant coping strategies have strained or less social support (Devine, Parker, Fouladi, & Cohen, 2003). A recent study found similar results among patients coping with cancer who reported higher levels of social support and more benefit finding. These patients also predicted less recovery time when asked to make a speculative prognosis (Schwarzer, Luszczybska, Boehmer, Taubert, & Knoll, 2006). Social support received and support satisfaction has also been shown to be positively associated with an individual's ability to benefit find in several other studies (Sears et al., 2003; Siegel &

Schrimshaw, 2007). This connection is not surprising when one considers that a

ubiquitous category in studies examining benefits found by individuals following

adverse events is a realization of the importance of friends and family in ones life.

The type of support received also appears to be important and may change over

time. Emotional support appears to be more important leading up to, or shortly

after an aversive event whereas informational support is more crucial when

individuals are coping with stress and its consequences (Schwarzer et al., 2006).

Optimism is another strong and consistent predictor of benefit finding.

Individuals who expect positive things to happen in their lives appear to look for

opportunities to find the good in seemingly bad situations (Nolen-Hoeksema &

Davis 2005). Hart and colleagues (2008) found that the relation of benefit finding

and depression was significantly mediated by increased optimism. Several other

studies have also found a relationship between dispositional optimism and benefit

finding (Davis et al., 1998; Tedeschi & Calhoun, 1996; Sears et al., 2003). The

important role of social support and optimism in relation to benefit finding is well

established and therefore will not be investigated further in the current study.

Chapter 4

BENEFIT FINDING AND POSITIVE AFFECT (PA)

Investigators have shown higher levels of benefit finding to be related to increases in positive affect (Tomich & Helgeson 2002; Helgeson et al., 2006). Longitudinal studies and a recent meta-analysis support this position and indicate that benefit finding may precede changes in positive affect (Helgeson et al., 2006; Stanton et al., 2006). A growing body of work indicates that positive affect may help people cope with aversive situations (Zautra, Johnson, & Davis, 2005; Isen, 2005) and may enhance health outcomes. Researchers have speculated that positive affect may serve as a psychological pathway and mediate the effects of benefit finding on health related outcomes (Siegel & Schrimshaw, 2007; Bower et al., 2008). Positive affect is associated with a tendency to turn outward and view the environment as a source of pleasure and reward (Strand, Rich, & Zautra, 2007). This type of orientation is associated with motivating individuals to be more active and engage in a variety of pleasurable and rewarding activities (Strand et al., 2007).

Positive affect has been shown to act as a stress buffer (Zautra et al., 2005). Studies have shown that inducing a change in positive affect reduced the risk of immune-related illnesses (Cohen, Doyle, Turner, Alper & Skoner, 2003; Moskowitz, 2003) and is associated with improved immune function (Davidson, Coe, Dolski, & Donzella, 1994; Carrico et al., 2006). Likewise, benefit finding may also promote a state of "psychological preparedness" that protects against the effects of future aversive experiences (Siegel & Schrimshaw, 2007; Bower et al.,

2008; Janoff-Bulman, 2006). Benefit finding may change appraisals of future

stressors from threats to challenges (McGregor et al., 2004). Carver and Antoni

(2004) found that benefit finding during the year after being diagnosed with

cancer predicted better adjustment five to eight years later. Other researchers

have found similar results showing that benefit finding early in the course of

various health conditions, including cancer, is related to better long-term

psychological adjustment, less physical symptoms, lower morbidity rates, and

better quality of life (Carrico et al., 2006; Phipps et al., 2007; Carver & Antoni,

2004; Low, Stanton, & Danoff-Burg, 2006; Hart et al., 2008). These findings

provide compelling evidence that there may also be lasting positive effects of

benefit finding in relation to aversive experiences (Carver & Antoni, 2004).

Chapter 5

CATASTROPHIZING

Catastrophizing, conceptualized as bringing to bear an exaggerated negative mental set during anticipated or actual painful experiences (Sullivan et al., 2001) was included in the current study as a covariate because it has been shown to be one of the strongest psychological predictors of pain-related outcomes (Sullivan, Thorn, Rodgers, & Ward, 2004) and appears to be a prevalent coping response in individuals with FM (Geisser et al., 2003), OA (Keefe et al., 2000), and RA (Keefe, Brown, Wallston, & Caldwell, 1989). In addition to high prevalence rates among individuals in chronic pain previous studies have shown that catastrophizing is a significant predictor of increased anxiety, anger, stress, depression, and negative affect (Martin & Dahlen, 2005). Researchers have posited that catastrophizing may be related to the aforementioned outcomes because it is a maladaptive coping strategy among individuals diagnosed with FM and RA (Hassett, Cone, Patella, & Sigal, 2000).

Research has also shown a negative association between catastrophizing and positive affect (Jones, Rollman, White, Hill & Brooke, 2003). Jones and colleagues (2003) noted that higher levels of pain catastrophizing were reported among pain patients who reported lower levels of positive affect. There is also evidence that individuals with FM report greater levels of pain catastrophizing than individuals with OA (Kratz, Davis, & Zautra, 2007) or RA (Hassett et al., 2000). Reports of increased pain intensity have also been associated with

14

increased pain catastrophising among individual with chronic pain conditions (Woby, et al., 2007).

A daily diary study examining patients with both chronic and daily fluctuations in pain found that catastrophizing tended to stay relatively stable in the absence of fluctuations in pain frequency and intensity (Turner, Mancl, & Aaron, 2004). It is possible that individuals with chronic pain conditions have both trait (more stable) and state (fluctuates with changes in pain intensity and frequency) components of catastrophizing.

No research has investigated a model of the relation of benefit finding and catastrophizing to pain-related outcomes.

Chapter 6

CURRENT STUDY

The current study contributes to scientific knowledge by addressing recent assumptions about novel predictors and outcomes of benefit finding. Each individual's ability to "find good things that have come from living with their chronic pain condition" was examined. The daily diary item quoted above was used as a measure of benefit finding and maps nicely onto the old adage about finding the silver lining in a dark storm cloud.

Studies have detailed what some of these "good things" might be as described by various patient groups and include: (1) a more patient, accepting attitude toward life, including an ability to accept events that cannot be changed, (2) a positive change in self perception that includes the strength and ability to better manage stress, (3) a greater empathy for others and increased feeling of connectedness with friends and family, and (4) a different perspective on goals and a deeper sense of purpose (Frazier, Conlon, & Glaser, 2001). These various dimensions of benefit finding have been examined separately and findings suggest different psychological processes may underlie each. For example, different coping strategies (assimilative and accommodative) were shown to affect only certain dimensions of benefit finding (Luszcynska et al., 2005).

A single item like the one used in the current study, is recommended by researchers to examine the broader construct of benefit finding (Dannoff-Burg & Revenson, 2005) and has been used in past research (Frazier et al., 2001; Frazier & Burnett, 1994; Affleck, Tennen, Croog, & Levine, 1987; Affleck, Tennen, &

Gershman, 1985; Sears et al., 2003). Also, Davis and colleagues (1998) found that finding any benefit appears to be the important predictive component not one particular benefit or the number of benefits found (Davis et al., 1998; Tennan & Affleck, 2005).

The current study is the first to examine the relation between benefit finding and activity limitation among individuals with chronic pain conditions. This research is unique in that it examines the *day-to-day* dynamic changes of benefit finding. Positive affect was also investigated as a proposed pathway mediating the effect of benefit finding on activity limitation. Researchers have posited that positive affect may serve as a possible pathway of the relation between benefit finding and activity limitation. Analyses were also conducted to rule out negative affect as a variable that might influence the relation of benefit finding on activity limitation.

This study is important because it will help inform those in the rehabilitation community, that are investing time and resources developing and implementing programs to bolster the ability to benefit find, about the potential impact on activity limitation.

Chapter 7

HYPOTHESES

Two primary questions were addressed in the current study. (1) Does

benefit finding show a direct relation with activity limitation? (2) Does positive

affect mediate the relation between benefit finding and activity limitation?

Two general hypotheses were stated prior to analysis of these data. It was

hypothesized that benefit finding would have a direct relation with activity

limitation and a partially mediated relation by way of positive affect.

The model used to examine the state or level-1 relation of benefit finding

to activity limitation is presented below.
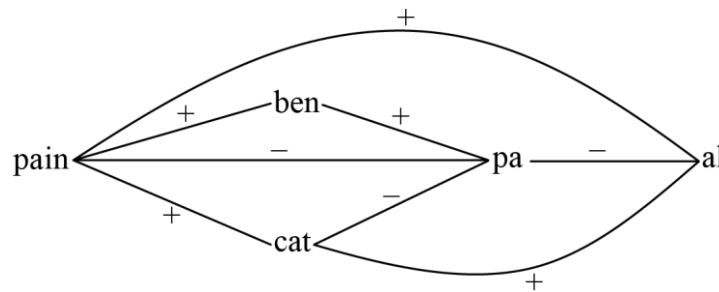
Figure 1. Hypothesized State Model

The model used to examine the trait or level-2 relation of benefit finding

to activity limitation is presented below.
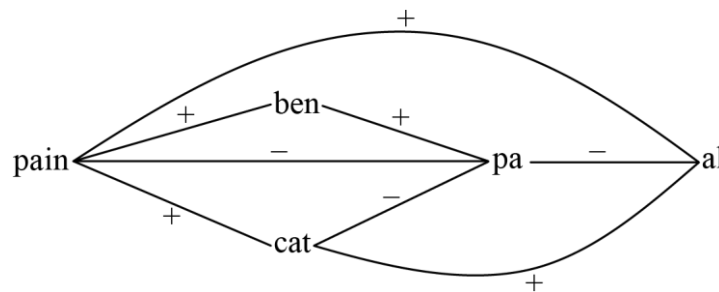
Figure 2. Hypothesized Trait Model

Negative affect was also examined to rule out any significant effect on the hypothesized relation between benefit finding and activity limitation. The pathway from benefit finding to catastrophizing was also explored. As mentioned earlier, catastophizing was thought to be a ruminative process that might not allow for benefit finding and therefore likely unrelated.

Interaction effects for benefit finding were also examined for each model predicting activity limitation. Pain and benefit finding, benefit finding and catastrophizing, and a three-way interaction involving pain, benefit finding, and catastrophizing were probed. In addition, variables of interest were included and excluded in a series of test equations until the overall model that best described the relation between benefit finding and activity limitation emerged.

Chapter 8

METHOD

Subjects

Participants were 260 women between the ages of 38 and 72 with a physician confirmed diagnosis of either OA (N=106), FM (N=53), or a dual diagnosis of OA/FM (N=101). Participants were recruited in the Phoenix metropolitan area from health expos, physician contacts, newspaper advertisements, senior citizen groups, and mailings to members of the Arthritis Foundation. Included in the study were participants who had no diagnosed autoimmune disorders, a pain rating above 20 on a 0-100 scale, and no involvement in litigation regarding their condition. The confirmation of physician diagnosis was supplemented by a tender point exam conducted by trained research staff members.

Procedure

After being screened into the study all participants returned an informed consent form by mail and were mailed an initial questionnaire that contained items to assess demographic data and health status. The initial questionnaire was picked up at the time of the initial visit. All initial visits were performed in the participant's home by trained female research assistants and consisted of the completion of study questionnaires, a multiple tender point examination, and a range of motion joint exam to reconfirm FM diagnosis. Participants were then trained to complete daily diaries on a laptop computer and instructed to do so a half an hour before bed each night for 30 days. Participants were given an

20

emergency pager number to call research staff immediately if they had any problems with the laptop. Software on the laptop prevented entry of data on days other than the correct day. In the event of laptop malfunction, several paper diaries were provided for participant use until a research assistant was able to travel to the participant's home and replace the malfunctioning laptop. In each diary, participants rated their average daily pain, activity limitation, positive & negative affect, catastrophizing, and benefit finding. Items were imbedded in the daily diaries along with others not in the proposed study (e.g., pain appraisals, coping strategies and mood). Participants were visited by a clinician at the end of the 30 days to collect the laptop and any paper diaries. Participants were debriefed and compensated by the clinician on this visit. The overall rate of completion for the diaries was 92.5%.

Measures

Demographic Variables. Background data was examined for each participant including: age, ethnicity, sex, income, and education level from the Initial Questionnaire. These were evaluated as possible predictors of individual differences in the variables of interest.

Benefit Finding. One item from the daily diaries was used to assess benefit finding. The item was, "I thought about some of the good things that have come from living with my pain." Participants were asked to select on a 5-point Likert-type scale their level of agreement with the aforementioned statement from Strongly Disagree to Strongly Agree.

Activity Limitation. To assess activity limitation, the SF-36 from the

Medical Outcomes Study was administered daily (Ware, Kosinski, & Keller,

1994). The SF-36 consists of 36 items that form eight scales: Physical

Functioning, Role Physical (activity limitation due to physical problems), General

Health, Role Emotional (activity limitation due to emotional problems), Bodily

Pain, Social Functioning, Vitality, General Health and Mental Health. The Role

Physical scale was used in the current study. Participants responded daily to the

following questions: (1) Did you cut down the amount of time you spent on work

or other activities? (2) Did you accomplish less than you would like? (3) Were

you limited in the kind of work or other activities you did? and (4) Did you have

difficulty performing the work or other activities? The questions were answered

in reference to Today, have you had any of the following problems with your

work or other regular daily activities <u>as a result of your condition?</u> Responses

selected were: (1) No, (2) Yes, Slightly or (3) Yes, Very Much. Activity

limitation scores were computed by averaging the four items.

Positive Affect and Negative Affect. Positive and negative affect were

measured in the daily dairies using 10 items each from the Positive and Negative

Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988), which tap the

positive affect (PA) and negative affect (NA) dimension of mood. Scoring

procedures by (Watson & Clark, 1999) were used to calculate positive affect by

determining the mean of the 10 items in the affect categories. Participants were

asked to indicate on a 5-point Likert-type scale (1) ''Very slightly/not at all, (2) A

little, (3) Moderately, (4) Quite a bit and (5) Extremely ''How much you have felt

this way today" in reference to the positive and negative affect adjectives: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, active, guilty, afraid, hostile, nervous, distressed, jittery, irritable, upset, ashamed, and scared. Daily positive and negative affect scores were computed by averaging the ten items.

Catastrophizing. Daily pain catastrophizing was assessed in the daily diaries with two questions from the Coping Strategies Questionnaire (CSQ; Rosentiel & Keefe, 1983), in which participants rated their level of agreement with each statement for that day: "I worried about whether my pain would ever end" and "I felt my pain was so bad I couldn't stand it any more". Ratings were made on a scale of 1 to 5 with 1 meaning "Strongly Disagree" and 5 meaning "Strongly Agree." Daily catastrophizing scores were computed by averaging the two items.

Daily pain. Participants rated their pain daily in the diaries with the standard instruction for a numerical rating scale (Jensen, Karoly, & Braver, 1988; Zautra, Smith, Affleck, & Tennen, 2001), "What number between 0 and 100 best describes your average level of arthritis and or fms pain today? A zero (0) would mean "no pain" and a one hundred (100) would mean "pain as bad as it can be." Daily pain scores were the self-reported average level of pain mentioned above.

Data Analytic Plan

Daily diary data from the OA, FM, and OA/FM samples were used to probe the predicted role of benefit finding on activity limitation among individuals with chronic pain conditions. Multilevel modeling was used as the

23

primary data analytic tool to examine the daily diary data. This method is particularly useful for the analysis of data that have a nested hierarchical structure. The daily diary data take a hierarchical form, with up to 31 observations nested within each of the 260 participants. All multilevel analyses were conducted using the SAS PROC MIXED software (Littell et al., 1996).

Level-1 predictor variables in the current study were centered under a procedure referred to as group-mean centering or centering within cluster (Enders & Tofighi, 2007). For each observation, the participant's mean was subtracted from the daily score, yielding an index of within-person daily change. Level-2 predictor variables were centered using grand mean centering which addresses problems with estimation of intercepts. Grand mean centering is recommended because the 0 values will fall in the middle of the distribution of the predictors, the intercept estimates will have much more precision and are interpretable (Enders & Tofighi, 2007).

Activity limitation was the primary criterion variable to be predicted in the analysis of the overall model. There were two basic types of prediction equations in the multilevel analyses: a level-1 equation, which examined the influence of within-person variations of key variables on activity limitation, and a level-2 equation, which tested the relation of between-person variations on key variables. In essence, the level-2 variables addressed questions regarding between-person differences and take the following form: Do people who score higher on the predictor (e.g., average benefit finding) also have less activity limitation? Level-1 questions addressed "when" rather than "who": for example, "When a person

24

reports engaging in more benefit finding, do they also report less activity limitation?" Interactions between two level-1 variables: for example, "When people benefit find more, is there a weaker relation between an elevation in pain and activity limitation?" Interactions were also assessed across levels: for example, "Do people who have high average benefit finding show fewer activity limitation, when pain is high than people who have low benefit finding?"

The level-1 equation examined within-person variation in benefit finding (daily benefit finding), pain (daily pain), positive affect (daily positive affect), and catastrophizing (daily catastrophizing) related to daily activity limitation. To prepare for this analysis, daily deviation scores on benefit finding, pain, positive affect, and catastrophizing were computed by subtracting each participant's average score on those variables across the daily diaries from the participant's own daily score on each variable. The subtraction yielded daily deviation scores from the participant's own daily score on each of the key variables: benefit finding, pain, positive affect, and catastrophizing.

The equation was initially specified at level-1 as follows:

Level-1: daily activity limitation = $\beta_0 + \beta_1$ pain + β_2 benefit finding + β_3 positive affect + β_4 catastrophizing + β_5 pain by benefit finding + r. (1)

β_0 yields an estimate of the average daily activity limitation, and β_1 to β_5 provide slope estimates of the effects of predictor variables on daily activity limitation. In addition to pain, benefit finding, positive affect, catastrophizing, and the interaction, initial models also included the day number in the study to test for any effects of the day of assessment on these prediction equations. The effect of

day was not significant and, therefore was dropped from the prediction equation (the random effect was not significant).

Between-person differences in the level of the daily variables were also probed through analyses at level-2. The focus for these analyses was on the differences in levels of pain, benefit finding, positive affect, and catastrophizing reflected in the grand mean centered scores of each of these variables for each participant. In addition to each of these variables, diagnosis and age were also added to further examine individual differences. These variables were used as predictors of variance in level-1 activity limitation (the level-1 intercept: β_0) and slopes of the relationships between deviation scores and activity limitation (β_1, β_2, β_3, and β_4 in the prior level-1 equation).

The first level-2 equation for this model was as follows:

Level-2: $\beta_0 = \gamma_{00} + \gamma_{01}$ pain $+ \gamma_{02}$ benefit finding $+ \gamma_{03}$ positive affect $+ \gamma_{04}$ catastrophizing $+ \gamma_{05}$ age $+ \gamma_{06}$ diagnosis $+ \mu_0$. (2)

The other specifications used were selected following the recommendations of Singer (1998) to identify the best fitting model of the variances and covariances of the examined model. Goodness-of-fit tests were used to examine whether the daily deviations in pain, benefit finding, positive affect, and catastrophizing also varied randomly across participants.

Effect sizes for multilevel models were computed by calculating proportional reduction of variance from the null model. To begin the process the models included only the intercept as predictor of the outcome variable. The proportional reduction in variance was calculated comparing the variance

26

component of the original null model with the residual estimate of the new model

including all predictor/s of interest (Raudenbush & Bryk, 2002). The residual

estimate of the full model is then subtracted from the residual estimate of the null

model and the result is divided by the estimate of the null model to arrive at the

proportional reduction in variance. Thus if the proportional reduction in variance

was .06 then approximately 6% of the outcome in question is accounted for by the

predictor.

Chapter 9

RESULTS

The distributional properties of all predictor variables were examined and
determined to be within the acceptable ranges (skew < 2.00 kurtosis < 2.00). In
relation to intercorrelations (See Tables 1 and 2), benefit finding, as expected, was
positively correlated with positive affect and negatively correlated with activity
limitation. Level-2 benefit finding, as predicted, was positively correlated with
pain. Surprisingly, level-1 benefit finding however was negatively correlated with
pain suggesting that when an individual reports more pain they also report
engaging in less benefit finding. Benefit finding was not significantly correlated
with catastrophizing. Activity limitation was also positively correlated with pain
and catastrophizing and negatively correlated with positive affect. Catastrophizing
was positively correlated with pain and negatively correlated with positive affect.
Lastly, pain was negatively correlated with positive affect.

Table 1.

Intercorrelations of All Level-1 Study Variables

	Pain	Benefit Finding	Catastrophizing	Positive Affect	Activity Limitation
ΔPain	-	-.10**	.43**	-.25**	.14**
ΔBenefit Finding		-	-.11**	.12**	-.02**
ΔCatastrophizing			-	-.26**	.10**
ΔPositive Affect				-	-.15**
Activity Limitation					-

Table 2.

Intercorrelations of All Level-2 Study Variables

	Pain	Benefit Finding	Catastrophizing	Positive Affect	Activity Limitation
Grand Mean Pain	-	.18**	.49**	-.26**	.33**
Grand Mean Benefit Finding		-	.05**	.08**	-.05**
Grand Mean Catastrophizing			-	-.43**	.30**
Grand Mean Positive Affect				-	-.22**
Activity Limitation					-

Demographics and Diagnostic Differences in Variables of Interest

Individual differences were examined to expand current knowledge in relation to benefit finding. No difference was found in the ability to predict benefit finding based on age $F(1, 249)=.50$, p=NS ($R^2 = .001$), education level $F(1, 248)=2.59$, p=NS ($R^2 = .007$), or income $F(1, 221)=.20$, p=NS ($R^2 = .001$). Separate analyses were also conducted comparing scores on benefit finding among African American, Hispanic, and Caucasian participants. No differences in levels of benefit finding were found based on ethnicity.

Demographic variables were also tested as predictors of positive affect, pain, catastrophizing, and activity limitation averaged across diary days. Age significantly predicted positive affect, $F(1, 244)=8.47$, p<.05 ($R^2 = .033$), such that older people reported more positive affect on average over the course of diaries than younger people. Age was not significantly associated with activity limimtation $F(1, 244)=0.05$, p=NS ($R^2 = .001$) pain, $F(1, 244)=1.49$, p=NS ($R^2 = .006$) nor catastrophizing, $F(1, 244)=.65$, p=NS ($R^2 = .003$). Neither income nor

ethnicity significantly predicted positive affect or pain measures. Income level, however was a significant predictor of catastrophizing, such that more income was associated with less catasrophizing, $F(1, 222)=5.49$, $p<.05$ ($R^2 = .024$). The same relationship was found between education level and catastrophizing, such that more education was associated with less catastrophizing, $F(1, 248)=5.30$, $p<.05$ ($R^2 = .024$). Education level was neither a significant predictor of positive affect, $F(1, 222)=.91$, $p=NS$ ($R^2 = .004$) nor pain scores, $F(1, 222)=2.44$, $p=NS$ ($R^2 = .011$).

Demographic differences by diagnosis were examined, the means and standard deviations of which are presented in Table 3. OAs were older than both other groups (FM: $p<.001$; OA/FM: $p<.05$), while OA/FMs were older than FMs ($p<.05$). FMs reported a higher average income range than the other groups (FM: \$40-50,000; OA: \$30-40,000; OA/FM: \$25-30,000), but the diagnostic groups were not statistically different in percent reporting at or above the sample median of \$30-40,000, $\chi^2=4.23$, $p=NS$. Diagnosis groups did not differ based on ethnicity or education level with all groups reporting "some college" and all groups were mostly comprised of Caucasians, $F(1, 256)=.004$, $p=NS$.

Next, diagnostic differences in study variables were explored. Means and standard deviations of benefit finding, pain, positive affect, catastrophizing, and activity limitation by diagnostic group are listed in Table 3. Across diary days, both FM and OA/FM participant groups reported more pain than the OA group, $F(2, 259)=33.66$, $p<.0001$. Consistent with past findings regarding reports of positive affect among FM patients, there was a significant main effect for

30

diagnosis on daily positive affect, $F(2, 259)=10.94$, $p<.01$, indicating that

OA/FMs and FMs reported significantly less positive affect across diary days

than OAs (see Table 3 for means and standard deviations). FMs and OA/FMs

did not significantly differ in positive affect levels.

Table 3.

Means on demographics and key study variables by diagnosis

| | OA | | FM | | OA/FM | |
	N=106		N=53		N=101	
Demographic Variables	M/%	SD	M/%	SD	M/%	SD
Age	60.11[a]	7.07	52.86[b]	8.13	56.72[c]	8.13
Ethnicity (% Caucasian)	94% [a]		87% [a]		93% [a]	
Income ($30-40,000)	67% [a]		76% [a]		44% [a]	
Daily Measures	M	SD	M	SD	M	SD
Pain	42.62[a]	24.81	53.57[b]	24.57	58.13[b]	22.27
PA	2.92[a]	.99	2.45[b]	.84	2.54[b]	.73
Catastrophizing	1.96[a]	.95	2.10[a]	1.03	2.35[a]	1.05
Activity Limitation	1.51[a]	.39	1.56[a]	.40	1.76[b]	.33
Benefit Finding	2.63[a]	1.03	2.65[a]	1.12	2.88[a]	.97

Note. Values in each row sharing the same superscript are not significantly different from each other. Significant differences were observed at the *p*<.05 level. Means, percentages, and standard deviations of demographic variables were obtained by running descriptives in SPSS. Means and standard deviations (SD) for the daily measures were obtained from the LS Means statement in PROC MIXED (Littell et.al., 1996). Percentage representation by Caucasians per diagnostic group is reported. Percent within each diagnostic group reporting income at or above the sample median of $30-40,000 is reported.

The within-person level-1 analyses focused on daily deviation scores of benefit finding, pain, positive affect, and catastrophizing. Benefit finding significantly predicted activity limitation when examined separately, β = -0.023, p < .001 (See Table 4). The estimated effect size of benefit finding was .0019 or less than 1%. The relation of benefit finding became non-significant however with the inclusion of positive affect into the equation (See Table 5). Based on this result, the potential of a mediated pathway of positive affect was further explored.

Table 4.

Level-1 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-1 (df = 5805)					
ΔBenefit Finding	-.023	.01	-3.17	10.04	< .001

Table 5.

Level-1 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-1 (df = 5803)					
ΔPain	.00	.00	15.96	254.73	<.001
ΔBenefit Finding	.00	.01	-.20	.09	NS
ΔPositive Affect	-.12	.01	-18.29	334.46	<.001

To investigate the hypothesis that positive affect might mediate the relation between benefit finding and activity limitation, three separate multilevel models were run. In the first model benefit finding was entered as the only predictor of activity limitation (See Table 6). This model was used to assess whether benefit finding significantly predicted activity limitation when no covariates were present in the model. As indicated above, benefit finding did significantly predict activity limitation in the first model, β = -0.023, p < .001. The second model included both positive affect and benefit finding as predictors of activity limitation (See Table 7). In the second model, benefit finding did not significantly predict activity limitation, β = -0.008, p = ns, but positive affect did, β = -0.150, p < .001. Based on the significance of benefit finding in the first model but not in the second, a test for mediation was conducted. The third model consisted of positive affect predicted by benefit finding (See Table 8). Positive affect was significantly predicted by benefit finding, β = 0.10, p < .001.

Model 1: PAL=γ00+cBF+uoj+rij

Model 2: PAL=γ00+bPA+c'BF+uoj+rij

Model 3: PA=γ00+aBF+uoj+rij

Table 6.

Level-1 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-1 (df = 5805)					
ΔBenefit Finding	-.023	.01	-3.17	10.04	< .001

Table 7.

Level-1 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-1 (df = 5804)					
ΔBenefit Finding	-.01	.01	-1.30	1.69	NS
ΔPositive Affect	-.15	.01	-21.11	445.45	< .001

Table 8.

Level-1 Multilevel Model Predicting Positive Affect

Predictor variable	β	SE	t	F	p
Level-1 (df = 6939)					
ΔBenefit Finding	.10	.01	9.25	85.49	< .001

The overall mediation effect was then calculated by multiplying coefficient "a" from model 3 ($\beta = 0.10$) by coefficient "b" from model 2 ($\beta = -0.150$). Multiplying these coefficients together yielded a mediated effect of -0.05. PRODCLIN program was used to calculate the asymmetric 95% confidence interval. The lower asymmetric confidence limit was -0.020 and the upper asymmetric confidence limit was -0.013. Because this interval did not include zero, the mediation effect was concluded to be significant ($p < .05$).

34

The between-person level-2 analyses focused on grand mean centered levels of pain, benefit finding, positive affect, and catastrophizing. Benefit finding was not related to activity limitation when examined separately $\beta = -0.012$, $p < ns$ (See Table 9). However, a suppression effect was revealed when benefit finding ($\beta = -0.041$, $p < .05$) was examined in conjunction with pain ($\beta = 0.001$, $p < .001$) (See Table 10). The relation of benefit finding remained significant with the inclusion of all variables of interest until positive affect was added to the equation, at which time the relation of benefit finding to activity limitation only approached significance $\beta = -0.036$, $p = .0617$ (See Table 11 and 12).

Table 9.

Level-2 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-2 (*df* = 253)					
Grand Mean Benefit Finding	-.01	.02	-0.56	.31	NS

Table 10.

Level-2 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-2 (*df* = 252)					
Grand Mean Pain	.01	.00	8.68	73.35	<.001
Grand Mean Benefit Finding	-.04	.02	-2.10	4.42	<.05

Table 11.

Level-2 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-2 (*df* = 251)					
Grand Mean Pain	.01	.00	5.83	33.93	<.001
Grand Mean Benefit Finding	-.04	.02	-2.09	4.38	<.05
Grand Mean Catastrophizing	.09	.02	4.11	16.91	<.001

Table 12.

Level-2 Multilevel Model Predicting Activity Limitation

Predictor variable	β	SE	t	F	p
Level-2 (*df* = 250)					
Grand Mean Pain	.01	.00	5.69	32.38	<.001
Grand Mean Benefit Finding	-.04	.02	-1.88	3.52	NS .0617*
Grand Mean Positive Affect	-.05	.02	-2.29	5.24	<.05
Grand Mean Catastrophizing	.07	.02	3.09	9.53	<.05

The relation of benefit finding to catastrophizing was examined in both level-1 and level-2 models and found to be NS (See Tables 13 and 14). Interaction effects for benefit finding were also probed for models predicting activity limitation. Significant interactions were found predicting activity limitation from (a) pain and benefit finding, $F(1,5805)=7.31$, $p< .05$), (b) benefit finding and catastrophizing $F(1,5805)=5.02$, $p< .05$), and a three-way interaction from (c) pain, benefit finding, and catastrophizing, $F(1,5805)=6.12$, $p< .05$). In each case the interactions, however, had extremely small beta coefficients, $β = 0.0009$, $β = 0.0228$, $β = 0.0011$, respectively, and when each was removed from the equation

an increase in model fit occurred. As a result, the interactions were eliminated

from the model.

Table 13.

Level-1 Multilevel Model Predicting Catastrophizing

Predictor variable	β	SE	t	F	p
Level-1 (df = 6957)					
ΔBenefit Finding	-.01	.01	-1.34	1.37	NS

Table 14.

Level-2 Multilevel Model Predicting Catastrophizing

Predictor variable	β	SE	t	F	p
Level-2 (*df* = 258)					
Grand Mean Benefit Finding	.05	.06	.88	.77	NS

The overall model that best described the relationship between benefit

finding and activity limitation was examined and found to contain the intercept,

level-1 and level-2 measures (daily deviation and grand mean centered scores) of

pain, benefit finding, catastrophizing and positive affect. In this model, both state

and trait levels of benefit finding were non-significant whereas all other variables

were significant predictors of activity limitation (See Table 15). Also, daily

deviations in pain, benefit finding, positive affect, and catastrophizing showed

significant random effects (Z=5.09, p< .001, Z=2.74, p< .01, Z=3.96, p< .001, and

Z=3.75, p< .001), respectively. The significance of these random effects indicates

that there was significant variance between persons in their daily reports (See

37

Table 15). The proportion of variance explained by this model is .2465 or 25% of activity limitation.

Table 15.

Multilevel Modeling Predicting Activity Limitation

	Random effects				
	Subject	β	SE	Z	p
Intercept	ID	.06	.01	10.45	<.001
ΔPain	ID	.00	2.79	5.09	<.001
ΔBenefit Finding	ID	.00	.00	2.83	<.01
ΔPositive Affect	ID	.01	.00	3.96	<.001
ΔCatastrophizing	ID	.01	.00	3.75	<.001
Residual		.06	.00	48.12	<.001
	Fixed effects				
Predictor variable	β	SE	t	F	p
Level-1 ($df = 5802$)					
ΔPain	.00	.00	8.88	78.91	<.001
ΔBenefit Finding	.00	.01	.23	.05	NS
ΔPositive Affect	-.12	.01	-12.95	167.58	<.001
ΔCatastrophizing	.03	.01	3.61	13.06	<.001
Level-2 ($df = 250$)					
Grand Mean Pain	.01	.00	5.50	30.23	<.001
Grand Mean Benefit Finding	-.03	.02	-1.64	2.69	NS
Grand Mean Positive Affect	-.06	.02	-2.62	6.85	<.001
Grand Mean Catastrophizing	.08	.02	3.35	11.23	<.001

Note. An autoregressive matrix was used to model the error variance on the dependent variable. ID = subject identifier.

The relation of negative affect was tested in reference to benefit finding and activity limitation for both state and trait models. In both cases negative affect was non-significant and appeared to not be a confounding variable insofar as its' inclusion would not change the significance of any variables of interest. The

inclusion of negative affect in the state and trait models did not improve overall

model fit (See Tables 16 and 17).

Table 16.

Level-1 Multilevel Model Predicting Activity Limitation with Negative Affect

Predictor variable	β	SE	t	F	p
Level-1 ($df = 5769$)					
ΔPain	.00	.00	13.06	170.61	<.001
ΔBenefit Finding	.00	.01	-.20	.04	NS
ΔPositive Affect	-.12	.01	-17.53	307.29	<.001
ΔCatastrophizing	.03	.01	5.39	29.01	<.001
ΔNegative Affect	-.01	.01	-1.03	1.05	NS

Table 17.

Level-2 Multilevel Model Predicting Activity Limitation with Negative Affect

Predictor variable	β	SE	t	F	p
Level-2 ($df = 248$)					
Grand Mean Pain	.01	.00	5.63	31.66	<.001
Grand Mean Benefit Finding	-.03	.02	-1.84	3.37	NS
Grand Mean Positive Affect	-.05	.02	-2.24	5.00	<.05
Grand Mean Catastrophizing	.06	.02	2.48	6.16	<.01
Grand Mean Negative Affect	.05	.05	1.12	1.26	NS

Chapter 10

DISCUSSION

In the current study the relation of state and trait levels of benefit finding on activity limitation were examined in individuals with chronic pain conditions. The study also sought to investigate positive affect as a proposed pathway mediating the relation of benefit finding to activity limitation. Analyses were also conducted to rule out negative affect as a potential confound that might influence the relation of benefit finding on activity limitation. Lastly, this study evaluated state and trait versions of the model to provide information about the relation of benefit finding on activity limitation.

The current study used a single item measure for benefit finding. Researchers examining the effects of benefit finding have utilized a global single item measure and various scales. The Perceived Benefits Scale and SRGS-R are the two most frequently used measures. These scales however fail to capture the cognitive appraisal process of benefit finding. Indeed, one of the most frustrating things about studying benefit finding has been the lack of correspondence between variables and measures. Despite researchers stating that they are measuring benefit finding in their research articles they are, for the most part, examining post traumatic growth. In most cases what is being reported as benefit finding in the title and body of research articles does not correspond with the measures chosen and the researchers own description of the measures in the methods section. For example, a recent study asked the question if benefit finding among women with breast cancer was always good (Tomich & Helgeson, 2004).

The researchers then proceeded to operationally define benefit finding as

"positive changes that result from the trauma of being diagnosed with cancer."

They measured benefit finding by "tapping domains of personal *growth*…

Participants rated the extent to which attitudes and behaviors had *changed* as a

result of having breast cancer." Researchers have argued that benefit finding and

growth are distinct and should not be used synonymously (Phipps et al., 2007;

Davis, et al., 1998; Luszcynska, et al., 2005) however the trend to use these terms

synonymously has continued uninterrupted.

The diagnosis of individuals in the current study was examined.

Consistent with previous findings regarding reports of positive affect among FM

patients, there was a significant main effect for diagnosis on daily positive

affect, $F(2, 259)=10.94$, $p<.01$, indicating that OA/FMs and FMs reported

significantly less positive affect across diary days than OAs (see Table 3 for

means and standard deviations). FMs and OA/FMs did not significantly differ in

positive affect levels. These findings may point to an affective disturbance

characterized primarily by a deficit in positive affect for individuals carrying a

FM diagnosis compared to those with OA-only (Davis, Zautra, & Reich, 2003).

Interventions targeting individuals with FM should be examined taking this

possible affective disturbance into account. Treatment methods may be less

effective if targeting positive affect. Other interventions including efforts to

reduce catastrophizing may prove more effective.

Three key demographic covariates, SES, race, and education, were also

examined as they have been found to be associated with benefit finding in

previous studies. In the current study, women with higher levels of education and SES did not report more benefit finding. In addition, race was examined and no significant differences were found in the use of benefit finding. These findings do not agree with the research findings of (Tomich & Helgesons, 2004) who found that minority women and women with high SES reported greater levels of *benefit finding*. The inferences made by Tomich and Helgesons (2004) that daily discrimination faced by both groups of women in some way better prepared them to derive benefits from adverse events was not supported by the current study. The lack of concordance in results however may be related to the measures used to examine benefit finding by Tomich and Helgesons, (2004). They examined benefit finding by using eight positive growth domains and asked individuals how much they had changed in each domain as a result of having breast cancer. In their research benefit finding was not measured as the cognitive appraisal process that preceded and lead to change but was the growth that resulted from each individual's diagnosis.

Level-1 benefit finding was found to be significantly negatively correlated with activity limitation, as hypothesized. State level benefit finding was related to an increase in positive affect which in turn was related to a decrease in activity limitation. The relation of benefit finding to activity limitation became non-significant when positive affect was included in the equation. Based on previous research it was expected that positive affect would either partially or fully mediate the relation. The current study explored the question of mediation and found that benefit finding demonstrated indirect effects on activity limitation through

positive affect; suggesting those higher in benefit finding had higher levels of positive affect and in turn lower levels of activity limitation.

Negative affect was examined in both state and trait models as a potential confounding variable because it was likely correlated with benefit finding, positive affect, and activity limitation. In both models negative affect was non-significant and appeared to not be a confounding variable. The inclusion of negative affect in the equations failed to significantly change any of the variables of interest and also failed to improve overall model fit.

Possible suppressor effects were also investigated through an examination of the role of pain on benefit finding. Initially, benefit finding at the trait level appeared to be unrelated to activity limitation. In examining the relation further, evidence of a suppression effect involving pain and benefit finding emerged. Benefit finding went from a non-significant to significant predictor of activity limitation with the inclusion of pain in the equation. Instead of decreasing the direct effect of pain on activity limitation the opposite occurred and pain appeared to increase the predictive validity of benefit finding. This finding is noteworthy in that pain may mask the relation of benefit finding on activity limitation. One possible explanation for this finding is that when individuals are in greater pain they refrain from a lot of activities including benefit finding. This information could be provided to patients and staff to assist in patient recovery and may come as a surprise to both because of this masked relation.

Although this study had several strengths, there are limitations that should be considered when interpreting the results. The model was evaluated in a manner

43

that suggested that benefit finding and positive affect precede activity limitation; however, causality was not evaluated. It may be the case that higher levels of activity limitation led to lower positive affect. It is also possible that some of the relations modeled are bidirectional in nature, such as the relationship between benefit finding and positive affect or positive affect and activity limitation.

Individuals in the current study had physician confirmed diagnoses of RA, OA, and/or FM. Research suggests that a majority of arthritis patients do not engage in recommended levels of physical activity (Shih et al., 2006). In the current study, activity limitation was reported on 77% of the daily diary data. Generalizing the findings of the current study to a broader rehabilitation population may be problematic as a result of the increased baseline levels of physical activity among arthritis patients.

The current study included individuals with chronic pain conditions who were not undergoing treatment in an inpatient rehabilitation facility. Future studies could benefit from examining these questions in a longitudinal framework in a rehabilitation setting. Daily diaries could be used again to examine the dynamic relation between variables and capture causal relations between benefit finding, positive affect, and activity limitation.

Additional psychological risk factors, such as anxiety and fear of pain could be included in future models. For example, fear of pain could prevent individuals from physical activity after injury limiting rehabilitation efforts. Fear of pain and fear avoidance measures have been shown to be important predictors of activity levels among chronic pain patients (Keefe, et al., 2004). Social support

and perceived control should also be examined in relation to activity limitation because there is evidence that they reduce pain reports and increase physical function (Cross, March, Lapsley, Byrne, & Brooks, 2006). In addition, other variables not included in this analysis such as inflammation could contribute to activity limitation and warrant further examination.

A benefit and possible limitation of the daily diary method of data collection is that it yields a great deal of power which may lead to statistically significant findings that are relatively unimportant clinically. The effect sizes for the estimates of interaction between pain and benefit finding, benefit finding and catastrophizing, and the three-way interaction between pain, benefit finding, and catastrophizing were close to zero ($\beta = 0.0009$, $\beta = 0.0228$, $\beta = 0.0011$, respectively). As a result, the interactions were not included in the final model. However, these were the only results in the current study (excluding the level-1 analysis from benefit finding to activity limitation; conducted prior to the exploration of positive affect as a significant mediator) that had extremely small effect size estimates and a proportion of variance change that approached zero.

One further limitation must be mentioned in relation to multilevel data and effect sizes. There is no agreed upon method for determining effect size in multilevel data. The acceptable method is to calculate proportional reduction of variance from a null model (Raudenbush & Bryk, 2002). An agreed upon method for determining effect size would improve the interpretation of complicated nested data.

Despite these limitations, this study has provided valuable information that likely has implications for future research and clinical practice. This is the first study to examine both benefit finding and activity limitation among individuals with chronic pain conditions using daily diary data. Results from this study provide information about the relation of benefit finding on activity limitation. Benefit finding was shown to be indirectly related to activity limitation suggesting that this factor should be considered in determining future interventions. Evidence of an interesting and counterintuitive suppression effect was also found showing that pain may mask the relation of trait level benefit finding on activity limitation.

Interventions that best reduce activity limitation should be examined. Based on a review of the literature and findings from the current study the use of groups to provide information, support, and active coping strategies (e.g. writing exercises) to rehabilitation patients should be considered. Schwarzer and colleagues (2006) found that informational support was crucial at the stage where individuals are coping with stress and its consequences. Support from the groups could benefit individuals in various ways. Research indicates that people with greater social support use more active coping strategies (Moos & Schaefer, 1993). In addition, the support derived from the groups would likely increase adherence with tasks assigned to members including potential writing interventions. Positively focused writing interventions were studied and found to have beneficial consequences for participants (Danoff-Burg et al., 2006). This type of active approach oriented coping strategy could be employed to benefit patients in a rehabilitation setting in both their down time while resting in their rooms and as

part of group activities. Exercises targeting increased use of benefit finding could be employed to increase positive affect and education and exercises designed to reduce catastrophizing could be also be utilized to target several different pathways that effect activity limitation.

Future research should investigate the selective appraisal process of benefit finding that precedes growth or change. In addition, future research should be devoted to examining the benefit of a single item or global measures versus multiple item scales that comprise the suspected dimensions of benefit finding. Future research could also examine the benefits of increasing the number of dairies completed daily. In the current study diaries were completed nightly across 30 days. This method allows a window into within-person variance that is not possible with traditional cross-sectional research. It would be interesting to capture additional within-person variance by increasing the number of diaries completed throughout the day. For example an individual could complete diaries more often throughout the day when engaging in benefit finding (Affleck, Tennen, & Zautra, 2006).

Future research should also examine whether individuals that benefit find have changes in restorative systems including the autonomic nervous system (ANS) and the HPA axis. Positive affect may serve as a buffer that prevents inflammation which could lead to a reduction in activity limitation. If benefit finding increases positive affect and the latter acts as a buffer that reduces inflammation it could be of major benefit in rehabilitation efforts. Recent work on cognitive emotion regulation also suggests that prefrontal and cingulate regions

may be involved in cognitive reappraisal (Ochsner & Gross, 2008). As researchers continue to examine affective neuroscience these areas could be explored during tasks of benefit finding.

In conclusion, this study sought to test the relation between benefit finding and activity limitation. Results indicate that individuals who benefit find have a higher level of positive affect which may lead to decreased activity limitation. The meditational model supported by this study is consistent with speculation of researchers studying the effects of benefit finding on health related outcomes (Siegel & Schrimshaw, 2007; Bower et al., 2008). Bidirectional relationships are possible however and should be examined with longitudinal data in future studies.

These findings should embolden clinicians to encourage patients to employ active approach oriented coping strategies like benefit finding to increase positive affect and reduce activity limitation. Decreases in activity limitation should reduce the amount of time patients need to recover in inpatient rehabilitation settings. Addressing psychological and physiological relations of activity limitation may prove not only imperative to the overburdened health care system but critical to patient recovery efforts.

REFERENCES

Affleck, G. Tennen, H., & Gershman, K. (1985). Cognitive adaptation to high-risk infants: The search for mastery, meaning, and protection from future harm. *American Journal of Mental Deficiency, 89,* 653-656.

Affleck, G. Tennen, H., & Levine, S. (1987). Causal attribution, perceived benefits, and morbidity after a heart attack: An 8-year study. *Journal of Counseling and Clinical Psychology, 55,* 29-35.

Affleck, G., Tennen, H., Zautra, A.(2006). Depression history and coping with chronic pain: A daily process analysis. *Health Psychology.*

Affleck, G., Tennen, H., Zautra, A., Urrows, S., Abeles, M., & Karoly, P. (2001).Women's pursuit of personal goals in daily life with fibromyalgia: A value-expectancy analysis. *Journal of Consulting and Clinical Psychology*, *69,* 587–596.

Alperovitz, D.J. (2001). Discrepancy between desired and actual level of active participation in treatment and use of social support as a predictor of adjustment to prostate cancer. *Dissertation Abstrtracts International 62* (4B): 2045.

Andrykowski, M. A., Brady, M. J., & Hunt, J. W. (1993). Positive psychosocial adjustment in potential bone marrow transplant recipients: Cancer as a psychosocial transition. *Psycho-Oncology, 2,* 261-276.

Antoni, M. H., Lechner, S. C., Kazi, A., Wimberly, S. R., Sifre, T., Glück, S. (2006). How stress management improves quality of life after treatment for breast cancer. *Journal of Counseling and Clinical Psychology, 74* (6), 1143-1152.

Bower, J. E., Low, C. A., Moskowitz, J. T., Sepha, S., & Epel, E. (2008) Benefit finding and physical health: Positive psychological changes and enhanced allostasis. *Social and Personality Psychology Compass, 2/1,* 223-244.

Brown, K. S., DeLeon, P. H., Loftis, C. W., & Scherer, M. J. (2008). Rehabilitation psychology: Realizing the true potential. *Rehabilitation Psychology, 53* (2), 111-121.

Carrico, A. W., Ironson, G. Antoni, M. H., Lechner, S. C., Durán, R. E., Kumar, M., & Schneiderman, N. (2006). A path model of the effect od spirituality on depressive symptoms and 24-h urinary-free cortisol in HIV-positive persons. *Journal of Pschosomatic Research, 61,* 51-58.

Carver, C. S., & Antoni, M. H. (2004). Finding bebefit in breast cancer during the
year after diagnosis predicts better adjustment 5 to 8 years after diagnosis.
Health Psychology, 23 (6), 595-598.

Cohen, S., Doyle, Will J., Turner, R. B., Alper, C., & Skoner, D. P. (2003).
Emotional style and susceptibility to the sommon sold. *Psychosomatic
Medicine, 65* (4), 652-657.

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,* 176-185.

Cross, M. J., March, L. M., Lpsley, H. M., Byrne, E., & Brooks, B. M. (2006)
Patient self-efficacy and health locus of control: Relationships with health
status and arthritis-related expenditure. *Rheumatology, 45,* 92-96.

Danoff-Burg, S., Agee, J. D., Romanoff, N. R., Kremer, J. M., & Strosberg, J. M.
(2006). Benefit finding and expressinve writing in adults with lupus or
rheumatoid arthritis. *Psychology and Health, 21* (5), 651-665.

Danoff-Burg, S., Revensen, T. A., (2005). Benefit-finding among patients with
rheumatoid arthritis: Positive effects on interpersonal relationships.
Journal of Behavioral Medicine,28 (1), 91-103.

Davidson, R. J., Coe, C. C., Dolski, I., & Donzella, B. (1994). Individual
differences in prefrontal activation asymmetry predict natural killer cell
activity at rest and in response to challenge. *Brain, Behavior, and
Immunity, 13* (2), 93-108.

Davis, C. G., & Morgan, M. S. (2008). Finding meaning, perceiving growth, and
acceptance of tinnitus. *Rehabilitation Medicine, 53* (2), 128-138.

Davis, C., Nolen-Hoeksema, S., & Larson, J. (1998). Making sense of loss and
benefiting from the experience: two construals of meaning. *Journal of
Personality and Social Psychology, 75,* 561–574.

Davis, M. C., Zautra, A. J., and Reich, J. W. (2003). Vulnerability to stress among
women in chronic pain from fibromyalgia and osteoarthritis. Ann. Behav.
Med. 23: 215–226.

Devine, D., Parker, P. A., Fouladi, R.T., Cohen, L. (2003). The association
between social support, intrusive thoughts, avoidance, and adjustment
following an experimental cancer treatment. *Psycho-Oncology, 12* (5),
453–462.

Dixon, D., Johnston, M., Rowley, D., & Pollard, B. (2008). Using ICF and Psychological models of behavior to predict mobility limitations. *Rehabilitation Psychology, 53* (2), 191-200.

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*(2), 121-138.

Frazier, P., & Burnett, J. (1994). Immediate coping strategies among rape victims. *Journal of Counseling and Development, 72,* 633-639.

Frazier, P., Conlon, A., & Glaser, T. (2001). Positive and negative life changes following sexual assault. *Journal of Counsulting and Clinical Psychology, 69* (6), 1048-1055.

Friedman, L., Nelson, D., Baer, P., Lane, M., & Smith, F. (1990). Adjustment to breast cancer: A replication study. *Journal of Psychosocial Oncology 8,* 27–40.

Geisser, M. E., Robinson, M. E., Miller, Q. L., & Bade, S. M. (2003). Psychosocial factors and functional capacity evaluation among persons with chronic pain. *Journal of Occupational Rehabilitation, 13*(4), 259-276.

Gillen, G. (2005). Positive consequences of surviving a stroke. *American Journal of Occupational Therapy, 59* (3), 346-350.

Hart, S. L., Vella, L., & Mohr, D. C. (2008). Relationships among depressive symptoms, benefit-finding, optimism, and positive affest in multiple sclerosis patients after psychotherapy for depression. *Health Psychology, 27* (2), 230-238.

Hassett, ,A.L.A.L., Cone, ,J.D.J.D., Patella, ,S.J.S.J., & Sigal, L. H. L. (2000). The role of catastrophizing in the pain and depression of women with fibromyalgia syndrome. *Arthritis and Rheumatism, 43*(11), 2493-2500.

Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A mera-analytic review of benefit finding and growth. *Journal of Counsulting and Clinical Psychology, 74* (5), 797-816.

Ho, S. M., Y., Chan, C. L. W., & Ho, R. T. H. (2004) Posttraumatic growth in Chinese cancer survivors. *Psycho-Oncology, 13,* 377-389.

Isen, A. M. (2005). A role for neuropsychology in understanding the facilitating influence of positive affect on social behavior and cognitive processes. . In C. R. Snyder (Ed.), *Handbook of positive psychology* (pp. 528-540). Cary, NC: Oxford University Press.

Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L. G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of Posttraumatic Growth: Research and Practice.* (pp. 81-99) Mahwah, NJ: Lawrence Erlbaum Associates.

Jensen, M. P., Karoly, P., & Braver, S. (1986). The measurement of clinical pain intensity: A comparison of six methods. *Pain, 27*(1), 117-126.

Johnston, M., & Pollard, B. (2001), Consequences of disease: Testing the WHO international classification of impairments, disabilities, and handicaps (ICIDH) model. *Social Science & Medicine, 53,* 1261-1273.

Jones, D. A., Rollman, G. B., White, K. P., Hill, M. L., & Brooke, R. I. (2003). The relationship between cognitive appraisal, affect, and catastrophizing in patients with chronic pain. *The Journal of Pain,* 4, 267-277.

Keefe, F. J., Affleck, G., France, C. R., Emery, C. F., Waters, S., Caldwell, D. S., Wilson, K. (2004). Gender differences in pain, coping, and mood in individuals having osteoarthritic knee pain: A within-day analysis. *Pain, 110*(3), 571-577.

Keefe, F. J., Brown, G. K., Wallston, K. A., & Caldwell, D. S. (1989). Coping with rheumatoid arthritis pain: Catastrophizing as a maladaptive strategy. *Pain, 37*(1), 51-56.

Keefe, F. J., Lefebvre, J. C., Egert, J. R., Affleck, G., Sullivan, M. J., & Caldwell, D. S. (2000). The relationship of gender to pain, pain behavior and disability in osteoarthritis patients: The role of catastrophizing. *Pain, 87*(3), 325-334.

Kim, J. J. (2002). Spirituality and the disability experience: Faith, subjective well being, and meaning and purpose in the lives of persons with disabilities. *Dissertation Abstracts International: Section B: The Sciences and Engineering,* 63 (4-B): 2062.

Kinsinger, D. P., Penedo, F. J., Antoni, M. H., Dahn, J. R., Lechner, S., & Schneiderman, N. (2006). Psychosocial and sociodemographic correlates of benefit-finding in men treated for localized prostate cancer. *Psycho-Oncology,* 15, 954-961.

Kratz, A. L., Davis, M. C., & Zautra, A. J. (2007). Pain acceptance moderates the relation between pain and negative affect in female osteoarthritis and fibromyalgia patients. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine, 33*(3), 291-301.

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, 491-499.

Littell, R. C., Milliken, G. A., Stroup, W. W., & Wolfinger, R. D. (1996). *SAS system formixed models*. Cary, NC: SAS Institute.

Low, C. A., Stanton, A. L., Danoff-Burg, S. (2006) Expressive disclosure and benefit finding among breast cancer patients: mechanisms for positive health effects. *Health Psychology, 25,* 181–189.

Luszcynska, A., Mohamed, N. E., & Schwarzer, R. (2005). Self-efficacy and social support predict benefit finding 12 months after cancer surgery: The mediating role of coping strategies. *Psychology, Health & Medicine, 10* (4), 365-375.

Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. *Personality and Individual Differences, 39*(7), 1249-1260.

McGrath, J. C. & Linley, P. A. (2006). Post-traumatic grouth in acquired brain injury: A preliminary small scale study. *Brain Injury, 20* (7), 767-773.

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,* 1-8.

Milam, J. E. (2004). Posttraumatic growth among HIV/AIDS patients. *Journal of Applied Psychology, 34,* 2353–2376.

Moos, R., Schaefer, J. (1993). Coping resources and processes: Current concepts and measures. In L. Goldberger and S. Breznits (Eds.), *Handbook of Stress: Theoretical and Clinical Aspects (2nd edn).* (pp. 234-287). New York: The Free Press.

Moskowitz, J. T. (2003). Positive affect predicts lower risk of AIDS mortality. *Psychosomatic Medicine, 65*, 620-626.

Nolen-Hoeksema, S., & Davis, C. G. (2005). Positive responses to loss. In C. R. Snyder (Ed.), *Handbook of Positive Psychology* (pp. 598-607). Cary, NC: Oxford University Press.

Ochsner, K. N., & Gross, J. J. (2008). Cognitive emotion regulation: Insights from social cognitive and affective neuroscience. *Association for Psychological Science, 17* (2), 153-158.

Paffenbarger, R. S., Hyde, R. T., Wing, A. L., & Hsieh, C. C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine, 314,* 605-613.

Paluska, S. A., & Schwenk, T. L. (2000). Physical activity and mental health: Current concepts. *Sports Medicine, 29,* 167-180.

Park, C. L., Chmielewski, J., & Blank, T. O. (2010). Post-traumatic growth: finding positive meaning in cancer survivorship moderates the impact of intrusive thoughts on adjustment in younger adults. *Psychooncology, 19* (11), 1139-1147.

Phelps, L. F., Williams, R. M., Raichle, K. A., Turner, A. P., & Ehde, D. M. (2008). The importance of cognitive processing to adjustment in the 1st year following amputation. *Rehabilitation Psychology, 53* (1), 29-38.

Phipps, S., Long, A. M., & Ogden, J. (2007). Benefit finding scale for children: Preliminary findings from a childhood cancer population. *Journal of Pediatric Psychology, 32* (10), 1264-1271.

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods (2nd ed.). Thousand Oaks, CA: Sage.

Rinaldis, M., Pakenham, K. I., & Lynch, B. M. (2010). Relationships between quality of life and finding benefits in a diagnosis of colorectal cancer. *The British Psychological Society. 101,* 259-275.

Rosenstiel A. K., & Keefe F. J. (1983) The use of coping strategies in chronic low back pain patients: relationship to patient characteristics and current adjustment. *Pain. 17,* 33–44.

Schwarzer, R., Luszczybska, A., Boehmer, S., Taubert, S., & Knoll, N. (2006). Changes in finding benefit after cancersurgery and the prediction of well-being one year later. *Social Science & Medicine, 63,* 1614-1624.

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,* 487-497.

Shih, M., Hootman, J. M., Kruger, J., & Helmick, C. G. (2006). Physical activity in men and women with arthritis national health interview survey, 2002. *American Journal of Preventive Medicine, 30*(5), 385-393.

Siegel, K., & Schrimshaw, E. W. (2007). The stress moderating role of benefit finding on psychological distress and well-being among women living with HIV/AIDS. *AIDS Behavior, 11,* 421-433.

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: Lawrence Erlbaum Associates.

Strand, E. B., Reich, J. W., & Zautra, A. J. (2007). Control and causation as factors in the affective value of positive events. *Cognitive Therapy Research, 31*, 503-519.

Sullivan, M.J.L., Thorn, B., Rodgers, W., & Ward, L.C. (2004). Path Model of psychological antecedents to pain experience: Experimental and clinical findings. *Clinical Journal of Pain, 20* (3), 164-173.

Taylor, S. E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist, 38,* 1161-1173.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15,* 1–18.

Tedeschi, R., & Calhoun, L. (1996). The posttraumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9,* 455–472.

Tennen, H., & Affleck, G. (2005). Benefit-finding and benefit-reminding. In C. R. Snyder (Ed.), *Handbook of positive psychology* (pp. 584-597). Cary, NC: Oxford University Press.

Tomich, P. L., & Helgeson, V. S. (2002). Five years later: A cross-sectional comparison of breast cancer survivors with healthy women. *Psycho-Oncology, 11*, 154-169.

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.

Turner, J. A., Mancl, L., & Aaron, L. A. (2004). Pain-related catastrophizing: A daily process study. *Pain, 110*(1-2), 103-111.

U.S. Department of Health and Human Services. (1996). *Physical activity and health: A report of the surgeon general.* Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

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.

Ware, J. E., Kosinski, M., & Keller, S. D. (1994). SF-36 physical and mental health summary scales: A user's manual. Boston, MA: The Health Institute, New England Medical Centre.

Wijndaele, K., Matton, L., Duvigneaud, N., Lefevre, J., De Bourdeaudhuij, I., Duquet, W., et al. (2007). Association between leisure time physical activity and stress, social support and coping: A cluster-analytical approach. *Psychology of Sport and Exercise, 8,* 425-440.

Woby, S. R., Roach, N. K., Urmston, M., & Watson, P. J. (2007). The relation between cognitive factors and levels of pain and disability in chronic low back pain patients presenting for physiotherapy. *European Journal of Pain, 11*(8), 869-877.

Youngmee, K., Schultz, R., & Carver, C. S. (2007). Benefit finding in the cancer caregiving experience. *Psychosomatic Medicine, 69,* 283-291.

Zautra, A. J., Johnson, L. M., & Davis, M. C. (2005). Positive affect as a source of resilience for women in chronic pain. *Journal of Counseling and Clinical Psychology, 73* (2), 212-220.

Zautra, A. J., Smith, B., Affleck, G., & Tennen, H. (2001). Examinations of chronic pain and affect relationships: Applications of a dynamic model of affect. *Journal of Consulting and Clinical Psychology, 69,* 785–796.

APPENDIX A

SF-36

SF-36 Self-report Physical Function Subscale

Instructions: The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a Lot	Yes, Limited a Little	No, Not Limited at All
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports?	1	2	3
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf.	1	2	3
Lifting or carrying groceries.	1	2	3
Climbing several flights of stairs.	1	2	3
Bending, kneeling, or stooping.	1	2	3
Walking more than one mile.	1	2	3
Walking several blocks.	1	2	3
Walking more than one block.	1	2	3
Bathing or dressing yourself.	1	2	3

APPENDIX B

POSITIVE AND NEGATIVE AFFECT SCHEDULE

Positive and Negative Affect Schedule (PANAS)

Instructions: The following words describe different feelings and emotions. Please indicate the extent to which you have felt this way during the last week by marking the circle under the choice.

	None of the time	Little of the time	Some of the time	Most of the time	All of the time
[Positive Affect Items]					
active	1	2	3	4	5
enthusiastic	1	2	3	4	5
attentive	1	2	3	4	5
strong	1	2	3	4	5
proud	1	2	3	4	5
alert	1	2	3	4	5
excited	1	2	3	4	5
inspired	1	2	3	4	5
determined	1	2	3	4	5
interested	1	2	3	4	5
[Negative Affect Items]					
guilty	1	2	3	4	5
afraid	1	2	3	4	5
hostile	1	2	3	4	5
nervous	1	2	3	4	5
distressed	1	2	3	4	5
jittery	1	2	3	4	5
irritable	1	2	3	4	5
upset	1	2	3	4	5
ashamed	1	2	3	4	5
scared	1	2	3	4	5