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Persons living with chronic low back pain (PLWCLBP) represent a major health concern. Up to 84% of people at some point experience chronic back low pain (CLBP) with sizeable fiscal and emotional cost. If a connection between anger and CLBP can be understood, PLWCLBP can learn to better manage CLBP by managing their anger. This descriptive study that used survey methodology, was designed to assess the relationship between anger and CLBP; if that differs by gender; and if anger rumination is an influence. Five self report questionnaires were used to elicit data about pain perception, pain behavior, anger, and anger rumination in addition to demographic information. Inclusion criteria for the convenience sample were adult men and women; experiencing CLBP for three months or more; able to read and understand English; and able to understand the research process. The sample was recruited from offices of chiropractors, acupuncturists, orthopedist, pain clinics and through social nomination. Data were analyzed using descriptive statistics, Pearson Product-Moment correlations, Student t-tests and multiple regressions. Vigorous response to recruitment required the sample size to be increased. Except with pain behavior, no statistically significant difference by gender was seen in distribution of any variable. Pain perception was moderately correlated with pain behaviors and intensity. State-Anger and Anger Rumination were significantly correlated with CLBP of both genders. State-Anger was significantly related to pain perception, intensity, and behavior, and in fact was predictive of them. With the exception of pain behavior, which may be culturally determined, the findings did not

support a gender difference in how PLWCLBP experience pain and anger. These findings underscore the importance of individualizing pain assessment and appreciating that the experiences of PLWCLBP are unique and complex. There are several implications for nursing and health care professionals. PLWCLBP may report pain perception that does not seem to be consistent with present pain intensity. Since State-Anger was correlated with CLBP, interventions addressing anger may be useful in working with PLWCLBP. Gender specific anger group interventions may not be necessary. Anger rumination was related to both State-Anger and pain behavior and can be included in holistic treatment plans for PLWCLBP. Nurses need to know techniques to effectively work with patients who are angry to manage their own responses and to teach techniques to patients and families.

CHRONIC LOW BACK PAIN AND ANGER: INFLUENCING EFFECT OF
RUMINATION AND GENDER

by

Ann Quinlan-Colwell

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Approved by

Committee Chair

To my father, Clancy, John-Michael, Brian, June, Lili-Agnes, Debbie and Joe

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of
The Graduate School at The University of North Carolina at Greensboro.

Committee Chair _____
Dr. Anita Tesh

Committee Members _____
Dr. Lynne Pearcey

Dr. W. Richard Cowling, III

Dr. Francis J. Keefe

Date of Acceptance by Committee

Date of Final Oral Examination

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CHAPTER I

BACKGROUND AND SIGNIFICANCE

Chronic Low Back Pain

World wide, chronic low back pain (CLBP) is a significant contributor to disability, impaired quality of life, decreased ability to perform work, and absence from work (c.f. Ehrlich, 2003; Natvig, Eriksen, & Bruusgaard, 2002; USDOL, 2002). It is estimated that half of the five million Americans who live with CLBP are handicapped by it (Slipman, Shin, Patel, Issac, Huston, & Lipetz, 2002) and this appraisal is seen in similar proportions in all cultures (Ehrlich, 2003). While back pain is the most frequent reason for visits to health care providers, it is rare for the cause of the pain to be explicitly identified (Ehrlich, 2003). Annual direct care expenditures for CLBP in the US total \$25 billion (Slipman, Shin, Patel, Issac, Huston, & Lipetz, 2002).

Persons living with chronic low back pain (PLWCLBP) pose a significant health concern (c.f. Centers for Disease Control & Prevention, 2007; Ghaffari, Alipour, Farshad, Yensen, & Vingard, 2005; McBeth & Jones, 2007). Despite the prevalence and impact of CLBP no single treatment approach has proven to be effective (Ehrlich, 2003) and interventions to date have demonstrated variable benefit (c.f. Carson, Keefe, Fras, Lynch, & Thorp, 2005; Chou, Qaseem, Snow, Casey, Cross, & Shekelle, 2007; Weinstein, Lurie, Tosteson, Skinner, Hanscom, & Tosteson, 2007). The variability in treatment

effectiveness may be related to not adequately addressing all salient qualities involved in the multidimensional experience of CLBP.

Relationship of Chronic Low Back Pain and Anger

The literature indicates that anger potentially is an important component of the experience of living with CLBP. Anger has been implicated as a contributing factor (Braha & Catchlove, 1986), a correlate (Fernandez & Turk, 1995), a key component (Greenwood, Thurston, Rumble, Waters, & Keefe, 2003), and the sequel (Earman, Andersson, Leavitt, McNeill, Durudogan, & Reagan, 1996) to the experience of CLBP. If the anger component is not addressed, it is conceivable that treatment may focus only on the symptom, rather than the cause (Newman, Gray, & Fuqua, 1999). Even though anger, like pain, is a complex experience, during the early 20th century the relationship between the two was purported to simply be that the internalization of anger manifested as pain (c.f. Braha & Catchlove, 1986; Pilowsky & Spence, 1976; Spielberger & Reheiser, 2003). Since there is no evidence to support this belief, it is now considered to be controversial (F.J. Keefe, personal communication June 18, 2009).

It is not clear if the relationship between anger and pain differs depending upon whether the anger is State-Anger or Trait-Anger or the way anger is controlled or expressed. While State-Anger (SA) is an emotional state in which anger is experienced as a response to an occurrence, Trait-Anger (TA) is an innate personality characteristic that guides how anger is experienced (Spielberger, Reheiser, & Syderman, 1995). Spielberger (1999) described Anger Expression (AX) and Anger Control (AC) with each

consisting of two sub-categories. Anger Expression-Out (AX-O) refers to anger directed toward others or the environment, while Anger Expression-In (AX-I) is anger that is directed toward oneself or suppressed. Anger Control-Out (AC-O) is anger that is managed to avoid expressing the anger toward others, while Anger Control-In (AC-I) is the process of reducing angry feelings that are then suppressed (Spielberger, 1999).

Role of Rumination in Anger and Chronic Low Back Pain

By contributing to the internal expression of pain or AX-I, rumination has been proposed by several researchers (c.f. Burns, Quartana, & Bruehl, 2008; Linden, Hogan, Rutledge, Chawla, Lenz, & Leung, 2003; Stimmel, Crayton, Rice, & Raffeld, 2006) as a potential salient feature in the relationship of anger with chronic pain. The idea of continually revisiting anger when it is suppressed is characteristic of rumination that has been associated with AX-I (Burns, Quartana, & Bruehl, 2008; Sukhodolsky, Golub, & Cromwell, 2001). Specifically, Ursin (2005) suggested that continually revisiting negative thoughts can become a psychobiological substrate in which anger can perpetuate additional pain.

Relationship of Gender to Chronic Low Back Pain

It is reported that women experience back pain more frequently than men (Carr, Lemanek, & Armstrong, 1998; IASP, 2007; Tousignant-Laflamme, Rainville, & Marchand, 2005). Gender differences regarding responses to chronic pain and foci of distress associated with pain have been discussed (Raak & Wahren, 2006; Rustøen,

Wahl, Hanestad, Lerdal, Paul, & Miaskowski, 2004; Vallerand & Polomano, 2000). There may be psychological, social, physiological (IASP, 2007; Tousignant-Laflamme, Rainville, & Marchand, 2005), or genetic (Carr, Lemanek, & Armstrong, 1998; IASP, 2007) components to these differences. While reports of the relationship of pain to negative mood and gender are mixed (Hirsh, Waxenberg, Atchison, Gremillion, & Robinson, 2006), psychosocial factors and emotions have been more clearly associated with gender related differences in pain (IASP, 2007).

Relationship of Gender to Anger

Gender differences have been noted with both pain and anger. Paradoxically, while women are generally viewed as being emotionally more expressive than men, the converse is seen with the emotion of anger (Sharkin, 1993). Interestingly, little gender difference has been seen when the sources, intensity, (Diffenbacher, Oetting, Thwaites, Lynch, Baker, & Stark, 1996) and expressions of anger are examined (Diffenbacher, Oetting, Thwaites, Lynch, Baker, & Stark, 1996; Thomas, 1989). There is also little difference seen in the suppression of anger (Thomas, 1989). While women were found to be more likely to discuss their feelings of anger, Thomas indicated they were more likely to exhibit them somatically. These findings support the import of further exploring the role of rumination and gender in the relationship between pain with the various aspects of anger.

Purpose

Aristotle, in part, defined anger as “an impulse accompanied by pain” (Kemp & Strongman, 1995, p. 398). The current study explored whether chronic pain is a symptom accompanied by anger, and if the anger is characterized by rumination and affected by gender. The relationship between anger, anger rumination, gender and pain in PLWCLBP were examined.

The importance of this study was underscored by the degree of disability, and lack of effective treatment available for PLWCLBP (Ehrlich, 2003; Slipman, Shin, Patel, Issac, Huston, & Lipetz, 2002). It was anticipated that if anger rumination was identified as a strong correlate with pain in this group, beneficial treatments designed to control the ruminating behavior could be taught to help PLWCLBP manage their pain (Linden, Hogan, Rutledge, Chawla, Lenz, & Leung, 2003). This belief was supported by findings in which mindfulness meditation (Kostanski & Hassed, 2008; Oman, Shapiro, Thoresen, Plante, & Flinders, 2008) and group mindfulness cognitive therapy (Kingston, Dooley, Bates, Lawlor, & Malone, 2007) were effective interventions among people who endorsed ruminating behavior.

Conceptual Framework

Melzack’s (2001) Neuromatrix Theory of Pain, which is the latest advancement in a series of revisions (Hoffert, 1986) of Melzack and Wall’s (1965) Gate Control Theory of Pain, in part formed the conceptual basis of this study. It expanded upon the original

theory that experiences of pain incorporate physiological, psychological, cognitive, and emotional components and interactions (McCaffery, Frock, & Garguilo, 2003) that coordinate with gating mechanisms in the Central Nervous System to allow or block pain messages through the afferent and efferent nerve pathways to the brain. Through the Gate Control Theory, the psychological factors involved in pain were first seen as elemental to the pain experience rather than as a reaction to it (Melzack, 1993).

Through the revised theory, Melzack (2004; 2005) has described pain as a subjective experience that is influenced by many factors unique to the experiencing individual. In the Neuromatrix Theory, Melzack (2001) proposed that genetic and sensory factors determine a neurosignature for pain, which in turn is transformed by sensory and cognitive inputs (Melzack, 2001). Contextually, Melzack (2005) described pain as a subjective experience influenced by many interrelated factors, including personal history and personal meaning, which is cyclically, processed resulting in subsignatures that modify the neurosignature. Through the body-neuromatrix the person develops an awareness of pain. Following recognition and synthesis of the pain experience, behavior specific to the pain develops.

Thus, the actual experience of the person in pain is distinct, resulting from a synthesis of unique sensory and physical features that are affected by both genetic and experiential factors. Although Melzack did not specifically discuss the impact of gender, since it is part of one's genetic and sensory make up, considering gender as influencing the experience of pain is in harmony with his work (R. Melzack, personal communication, June 8, 2009).

The notion that pain is mutually experienced physically and emotionally, as well as mutually affected by inherent and lived experiences, is consistent with Spielberger's framework regarding concepts of state and Trait-Anger (Spielberger, Sydeman, Owen, & Marsh, 1999). Spielberger purported that anger is an emotion, and as such is complex with "different psychobiological states or conditions that have both phenomenological and psychological properties" (Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995, p. 43), as well as physical manifestations (Spielberger & Reheiser, 2003; Spielberger, Sydeman, Owen, & Marsh, 1999).

Spielberger and colleagues (Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995) consider Trait-Anger to be an innate personality characteristic. The degree of Trait-Anger an individual possesses determines the number and frequency of situations the person perceives as provoking them to anger (Spielberger & Reheiser, 2003, Spielberger, Reheiser, & Sydeman, 1995; Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995). Also consistent with the interplay of multiple factors in Melzack's concept of pain, Spielberger's concept of State-Anger is defined as "a psychobiological state or condition consistent with subjective feelings of anger ... with concomitant activation or arousal of the autonomic nervous system" (Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995, p. 47).

Melzack's and Spielberger's conceptualizations of pain and anger as multifaceted experiences affecting the whole person are compatible with Watson's holistic nursing theory of Human Science and Human Caring (1988). Through the guidance of Watson's theory, nurses accept patients as individuals and understand the context of their pain and

anger within a phenomenal field consisting of perceptions, meanings, and personal history. Within transpersonal caring occasions, holistic nurses assess and join with patients in empathic linkages while recognizing and accepting the unique qualities of the individual patient (Watson, 1988). Holistic nurses use this caring approach to effectively understand and help patients manage their unique experiences of pain, including components of anger that are central to it. This requires holistic nurses to develop knowledge of the pain and anger experiences, along with treatment options. Watson wrote “Human caring is not just an emotion, concern, or benevolent desire. Human caring involves values, a will, a commitment to care, knowledge, caring actions, and consequences” (1988, p. 129).

Through the theoretical lens of these theories, anger, rumination and gender are put forward as being potentially significant and even integral, in many chronic pain experiences, including CLBP. A melding of the theories of Melzack, Spielberger and Watson provides a structure that facilitates understanding of the complex interaction of anger and pain.

Specific Aims

PLWCLBP represent a significant health concern (Gua, Tanaka, Halperin, & Cameron, 1999). In this study, it was anticipated that PLWCLBP may manifest anger related to pain causation, diagnosis ambiguity, inadequate analgesia, ensuing lifestyle alterations, self blame, relationship changes, health care provider skepticism, episodic recurrence and lack of effective treatments. The association of anger and chronic pain has

garnered increasing interest during the past ten years (Appendix A). Research has investigated the relationship of anger, chronic pain and endogenous opioids (c.f. Bruehl, al'Absi, France, France, Harju, Burns, & Chung, 2007; Burns & Bruel, 2005); the effect of anger and anger management style on muscles (Burns, 2006a; Burns, Bruehl, & Quartana, 2006); catecholamine-sensitive pain mechanisms with anger out (Bruehl, Burns, Chung, Ward, & Johnson, 2002), and the relationship of suppressing angry thoughts with pain intensity (Burns, Quartana, Gilliam, Gray, Matsuura, Nappi & Wolfe, 2008). These findings support the importance of further exploring the prevalence and experience of anger among PLWCLBP. Less is known about the roles of rumination and gender in the relationship between anger and chronic pain. The specific aims of this study were to explore the relationship of pain to anger in PLWCLBP, how anger rumination is involved, and to identify any differences between genders. It was proposed that if the connections between anger, anger rumination, gender and CLBP could be understood, this information could be shared with health care providers caring for PLWCLBP. This would encourage providers to identify appropriate interventions to help PLWCLBP to better manage and alleviate their pain by managing their anger. If rumination was identified as a significant factor, interventions could be specifically targeted to address that process. If gender was identified as a significant factor, different interventions for men and women could be specifically targeted.

Preliminary Work

A pilot study was conducted to assess the feasibility of recruiting PLWCLBP and the appropriateness of using the State-Trait-Anger Expression Inventory-2 (STAXI-2) with sub-scales and the Short-Form McGill Pain Questionnaire (SF-MPQ) among PLWCLBP. Packets with the questionnaires (STAXI-2, SF-MPQ, and demographic tool) were distributed to the offices of two chiropractors. A total of 20 packets were distributed with a return rate of 55%. Respondents completed 11 packets and none were blank. The participants in the pilot study were almost evenly divided between women (54%) and men (45%) suggesting that a gender balanced sample of PLWCLBP that would not require special analysis procedures is possible. Their SF-MPQ scores and the scores of the STAXI-2 sub-scales confirmed that these tools were appropriate to measure pain and anger among this sample. The AR scale was not pilot tested since the concept of rumination playing an important role in the relationship between chronic pain and anger was not realized until after that study began.

During the pilot work, the researcher received numerous offers to recommend a relative, friend or the persons themselves to participate in the study. Since recruitment was limited to chiropractic offices, these potential participants were missed opportunities. At least some of these individuals were either being treated by a provider other than a chiropractor or not receiving care for their CLBP, their participation would have increased the heterogeneity of the sample. Considering this, social nomination was added as a recruitment strategy for this study.

Research Questions

- (1) What is the distribution of pain perception, pain intensity, pain behavior, State-Anger (SA) and Trait-Anger (TA), Anger-control (AC), Anger-expression (AX), and Anger Rumination (AR) among PLWCLBP, and do these differ by gender?
- (2) What are the relationships of SA, TA, AC, AX, and AR with pain perception, pain intensity, and pain behavior scores reported by PLWCLBP, and do these relationships differ by gender?
- (3) Can pain perception, pain intensity, and pain behavior scores be explained by AR, SA, TA, AC, AX, and gender?

Conceptual Definitions

Pain

Pain is a subjective and multiphasic experience with an intensity that can only be determined by the experiencing person (McCaffery & Pasero, 1999). Merskey specifically described it as a distasteful sensory or emotional experience (1986). Subsequently, the International Association for the Study of Pain and the American Pain Society define pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (2007). Consistent with this is the often quoted definition of McCaffery and Pasero that “pain is whatever the experiencing person says it is, existing whenever he says it does” (1999, p.17). Pain is also a “private experience that has important social consequences” (Keefe,

Beaupre, & Gil, 1996, p. 259) and “is made evident to others through behavior” (Keefe & Dunsmore, 1992, p.92). The pain related behaviors may reflect efforts to manage pain (Keefe & Dunsmore, 1992). Through these lenses, pain is seen as a complex and highly individual experience that affects the life experiences of those living with chronic pain. In addition, it must always be remembered that pain is a symptom with diagnostic meaning beckoning further investigation (Brand & Yancy, 1997; Melzack, 2001; Melzack, 2005).

The perception of pain is highly subjective and often challenging for the experiencing person to communicate (Keefe & Dunsomre, 1992). Pain involves sensations that are influenced by physical input, emotional responses (Melzack, 2001; Twycross, 2000), cognitive interpretation (Melzack, 2001; Russell, 1998), experiential context (Russell, 1998; Twycross, 2000), cultural beliefs (Engbers, Vollenbroek-Hutten, & Van Harten, 2005), and personal history of pain (Melzack, 2005; Russell, 1998). Despite pain being a diverse, interwoven, complex experience, patients are most often asked to describe their pain on a linear zero to ten scale (McCaffery & Pasero, 1999).

Chronic Low Back Pain

Chronic low back pain was conceptually defined as pain in the lumbar region of the back that lasts longer than the period of time expected for healing or longer than three months (Andersson, 1999; NIH, 2009).

Anger

Anger was conceptually defined as a strong feeling of objection or discontentment with a person or situation. It can be synonymous with feelings of annoyance, irritation,

rage, resentment, fury, infuriation, antagonism, or being incensed or maddened (Greenwood, Thurston, Rumble, Waters, & Keefe, 2003; Laird, 1974; Spielberger, Jacobs, Russell, & Crane, 1983). It is often the response to expectations of self or others not being met, or behavior of self or others perceived as being unacceptable or unsatisfactory (Williams & Williams, 1993). Theoretically, the concept of anger is a basic but complex emotion and process (Paulus, Fedler, Leckband, & Quinlan, 2006; Power & Tsia, 2007).

Spielberger (1999) posited that, like anxiety, anger can and often needs to be considered and measured both as a state and a trait experience. Spielberger defined *State-Anger* (SA) as “an emotional state or condition that consists of subjective feelings of tension, annoyance, irritation, fury and rage, with concomitant activation or arousal of the autonomic nervous system” (1983, p. 168-169). He described *Trait-Anger* (TA) as being the individual frequency and intensity with which the person perceives experiences as producing angry feelings and with which S-anger occurs over time (Spielberger, 1988; Spielberger, 1999; Spielberger, Sydeman, Owen, & Marsh, 1999). This is particularly important in answering the current research questions and identifying differences when measuring state versus Trait-Anger.

Anger Inhibition

Anger inhibition, also referred to as anger-in, was associated by Freud, Engel and Alexander with patients who repressed angry feelings and as a result were prone to pain or hypertension (Burns, Quartana, & Bruehl, 2008). Burns and colleagues note that in alliance with Alexander, Funkenstein depicted anger inhibition as “a process of directing

anger inward toward the self” (2008, p. 260). Consistent with Engel’s work, Harburg depicted anger inhibition as “the actual halting of verbal and physical responses associated with angry emotion” (Burns, Quartana, & Bruehl, 2008, p. 260). Based upon work by Rosenzweig, Spielberger differentiated the personality dynamics involved between “impunitive persons, who do not experience anger during anger provoking situations, and intrapunitive persons who turn anger inward and often blame themselves for the anger that is directed toward them by others” (Spielberger, Ritterband, Syderman, Reheiser, & Unger, 1995, p.48). Akin to anger-in, Burns, Quartana, and Bruehl (2008) suggest that *anger repression* occurs when angry feelings are totally denied and there may not be conscious awareness.

Anger-out

Anger-out is used to describe the process by which individuals become angry and direct their anger outward, either physically or verbally, toward the origin of the anger or toward others (Spielberger, Reheiser, & Sydeman, 1995; Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995). While anger-out and anger-in are opposite constructs of the *Anger Expression (AX) Scale* (Spielberger, Reheiser, & Sydeman, 1995) studies have shown relationships between each of them with pain. Bruehl, Chung, and Burns (2006) discussed AO from psychological, genetic, gender, endogenous opioid, and behavioral perspectives. They concluded that high Trait-Anger-out seems to be involved in heightened response to pain stimuli, although the relationship is not clear. Subsequent research indicated that the quality of anger-out is related to opioid dysfunction, but further research is needed (Bruehl, Chung, Burns, & Diedrich, 2007).

Spielberger, Reheiser, and Syderman (1995) further categorized anger by the manner in which individuals typically convey their anger. *Anger expression* (AX) refers to the manner in which anger is manifested. The first sub-category is *Anger Expression-In* (AX-I), which is suppressed and emotionally expressed. In contrast *Anger Expression-Out* (AX-O) refers to anger that is directed outward toward other people or things. The second major category, *Anger-Control* (AC) reflects the methods by which people try to control anger and is similarly divided into the subcategories of *Anger Control-In* (AC-I) and *Anger Control-Out* (AC-O). Greenwood, Thurston, Rumble, Waters and Keefe (2003), noted that high anger control can limit healthy expression of anger.

Anger Rumination

Anger Rumination (AR) was conceptually defined as passively but repetitively thinking about the emotion of anger (Nolen-Hoeksema, 2000; Sukhodolsky, Golub, & Cromwell, 2001) or “mood and evaluations related to that mood” (Stimmel, Crayton, Rice, & Raffeld, 2006, p. 22). Despite these characterizations, there is no single definition of the more general term rumination (Smith & Alloy, 2009). Sukhodolsky, Golub, and Cromwell (2001) developed and tested the anger rumination scale to assess rumination specifically in conjunction with feelings of anger.

Operational Definitions

Pain

Three operational definitions of pain were used in this study. The total score and the adjusted visual analog scale (VAS) score on the Short-Form McGill Pain

Questionnaire (SF-MPQ)(McDonald & Weiskopf, 2001) measured the individual perception of pain and intensity of pain respectively.

The total score on the SF-MPQ (McDonald & Weiskopf, 2001) measured the individual perception of the character of pain. Total scores include the sensory, affective and evaluative (the score of the present pain intensity) can range from zero to 40 with zero being no pain and 40 being maximum pain. The VAS is a line on which the individuals marked the point at which they perceived the intensity of their pain to be.

Pain was also measured as pain behavior using the Pain Behavior Checklist (PBC) that measured the feelings, thoughts and behaviors (Kearns, Haythornthwaite, Rosenberg, Southwick, Giller, & Jacob, 1991) reported by the participant as being related to the experience of living with CLBP. Scores on the PBC can range from zero to 102. The PBC has four subscales (Affective Distress, Distorted Ambulation, Facial/Audible Expression and Seeking Help), of these the Affective scale proved to be of particular interest among this study population.

Anger

The operational definition of State-Anger was the individual's score on the Spielberger State-Anger sub-scale, which can range from 15 (no anger) to 60 (maximum anger). For Trait-Anger it was the individual's score on the Spielberger Trait-Anger sub-scale, which can range from ten (no anger)to 40 (maximum anger). Similarly, for Anger Control and Anger Expression, it was the corresponding scores from the Spielberger sub-scales that can each range from eight to 32 (Spielberger, 1999).

Anger Rumination and Gender

The operational definition of Anger Rumination was the individual score on the Anger Rumination Scale that can range from 19 to 76 (Sukhodolsky, Golub, & Cromwell, 2001). *Gender* was operationally defined as the self recorded designation of the person as being either male or female.

Assumptions

A number of assumptions inspired this study. First, pain and anger are multifaceted and individually experienced phenomena. Second, there are gender differences in many human experiences. Third, abstract perceptions and emotions can approximately be quantified using instruments with known validity and reliability and appropriate statistical analysis.

Finally, effective interventions to manage the anger associated with CLBP are necessary. It was theorized by the researcher that if the relationships of anger, anger rumination and gender with pain were better understood, effective interventions could be recommended to reduce the duration, severity, and chronicity of the CLBP experience, providing the PLWCLBP the opportunity to improve his or her quality of life.

CHAPTER II

LITERATURE REVIEW

Chronic Pain

While acute pain is a symptom that beckons intervention (Brand, 1997; IASP, 2004; Melzack, 2004), chronic pain does not serve that useful purpose (IASP, 2004; Melzack, 2005). Acute pain generally has an identifiable cause and treatment, while the cause of chronic pain is often difficult to ascertain (Cui, Matsushima, Aso, Masuda, & Makita, 2009; NIH, 2009). Chronic pain is classified as pain that continues beyond the expected period of healing existing longer than three to six months (IASP, 2004; NIH, 2009; Von Korff & Dunn, 2008). With approximately 20% of adults in developed countries living with chronic pain, it is a significant health care concern and “a disease in its own right” (IASP, 2004, p. 2).

Chronic Low Back Pain

With frequent psychosocial features, and multiple dimensions, CLBP is more complex than acute occurrences of low back pain (LBP) (Ehrlich, 2003; Tunks, Crook, & Weir, 2008; Von Korff & Dunn, 2008). This is further complicated when the etiology and pathophysiology causing the pain cannot be identified (Waddell, 1998) and a cure cannot be provided (Russell, 1998).

In 1997, among every 1000 adult Americans, 32 endorsed physical limitations due to CLBP (CDC & NIH, 2007, p. 2.11). The following year, Shelerud (1998) noted that the prevalence reached epidemic proportions. It is estimated that CLBP is experienced on a regular basis by 51%, and at some point in time by 84%, of people (McBeth & Jones, 2007; McPhillips-Tangum -Tangum, Cherkin, Rhodes, & Markham, 1998). In the World Health Organization collaborative study, the back was identified as the most common pain site (Gureje, Von Korff, Simon, & Gater, 1998). Among US citizens, back and neck pathologies are the second leading cause of disability (Strine & Hootman, 2007). Often, instances of initial injury are compounded by recurrent injuries and pain. The world wide recurrence rate after initial back injury is estimated at 40% to 70% (Ghaffari, Alipour, Farshad, Yensen, & Vingard, 2005). Through a study using mailed surveys in Canada, it was found that 20% of back pain recurs within six months and it is more recurrent with aging (Cassidy, Cote, Carroll, & Kristman, 2005). Following surgical intervention, failed back surgery syndrome is estimated to occur in 5% to 40% of cases (Weiner, Sakamoto, Perera, & Breuer, 2006) with more than 60% of the individuals experiencing continual back/leg pain following surgery (Slipman, Shin, Patel, Issac, Huston, & Lipetz, 2002).

The back is a leading site of pain among individuals older than 65 years, and among nursing home residents, approximately 45% to 80% have back pain that impairs their ability to function (Davis & Srivastava, 2003). More than one in three (36%) community-dwelling older people endures CLBP (Cayea, Perera, & Weiner, 2006; Weiner, Sakamoto, Perrara, & Breuer, 2006). In contrast with the Medicare patient

coverage increase of 131.7% between 1991 and 2002, the increase in Medicare patients with LBP was 310% (Weiner, Kim, Bonino, & Wang, 2006).

While CLBP is commonly considered a diagnosis of the elderly, it is not unique to that age group. Among the 15% to 45% percent of those afflicted with CLBP who are less than 45 years old, it is the foremost reason for physical limitation (CDC & NIH, 2000). It is seen among children and adolescents with increasing frequency (Tunks, Crook, & Weir, 2008). One study among Italian teenagers found that 20.5% of 7500 children between 13 and 15 reported LBP (Masiero, Carraro, Celia, & Eleerman, 2007). Since CLBP affects individuals across the age spectrum, it not only is a current health problem but will continue to be one for many years to come.

While personal characteristics such as age, gender, weight, and physical fitness are linked to back problems (Shelerud, 1998), in 1996, Wegman and Fine estimated that 28 to 50 percent of back pain was due to work related factors. Of patients with work related CLBP, 26% were noted to have psychological disturbances including anger issues (Earman, Andersson, Leavitt, McNeill, Durudogan, & Reagan, 1996).

Financial Impact of Chronic Low Back Pain

In 1990, CLBP was the leading reason for workers compensation, causing 40% of employee absences in the US (Gua, Tanaka, Halperin, & Cameron, 1999). From their study, Earman, Andersson, Leavitt, McNeill, Durudogan, & Reagan (1996) reported the cost of low back pain (LBP) for 157 patients with work related injuries was more than \$6.5 million with a mean case cost of \$41,727. In 2002, in the US, more than 83 million days were lost from work due to reports of back pain (Bureau of Labor Statistics, 2002).

In 2009, the National Institutes of Health reported LBP as the primary reason for disability related to work situations. This concern is not unique to the US, in Norway, LBP is a predictor of long term disability (Natvig, Eriksen, & Bruusgaard, 2002).

The cost of CLBP has been associated with being older, male, and married (Earman, Andersson, Leavitt, McNeill, Durudogan, & Reagan, 1996), as well as with lower socio-economic status, lowers salaries, lower education and un-employment (McBeth & Jones, 2007). In 1990, it was estimated that the cost of CLBP in the US was between \$50 and \$100 billion (Gua, Tanaka, Halperin, & Cameron, 1999). In 2006, Katz estimated the annual cost had risen to \$100 to \$200 billion.

Health Care Impact of Chronic Low Back Pain

Praemer, Furner, and Rice (1992) reported that back pain ranked second among reasons for physicians' visits, third among surgical procedures and fifth for hospitalization. In 1998, "total incremental direct health care costs attributable to low back pain in the US were estimated at \$26.3 billion" (Chou, Qaseem, Snow, Casey, Cross, & Shekelle, 2007, p. 478). There are more than 15 million physician visits each year due to CLBP (Strine & Hootman, 2007), and it is the leading cause of consultation with orthopedic and neurosurgeons (McPhillips-Tangum, Cherkin, Rhodes, & Markham, 1998). McPhillips-Tangum and colleagues (1998) found nearly all those participating in their study reported diagnosis or the etiology source of the CLBP as a prime reason for consulting with a physician. At the same time, specific pathoanatomical diagnosis is most often elusive (Bruer, Pappagallo, Ongesng, Akhtar, & Goldfarb, 2008).

PLWCLBP also contribute to congestion in Emergency Departments. Jorgensen (2007) found that costs ranged from \$399 to \$1,943 per ED visit, and 3% of the patients were seen more than twice, accounting for 12.4% of the total ED charges for the year. From 1991 to 2002, Medicare costs associated with LBP increased by 387% (Weiner, Kim, Bonino, & Wang, 2006). In addition, CLBP is one of the most common reasons people utilize complementary modalities (Patel, Euler, & Audette, 2007).

A study assessing the prevalence of PLWCLBP specifically in North Carolina reported that the prevalence and associated costs had increased significantly during the past decade in that state (Freburger, Holmes, Agans, Jackman, Darter, Wallace, et al. 2009). Clearly, PLWCLBP represent a significant health issue (Gua, Tanaka, Halperin, & Cameron, 1999). Rudy, Weiner, Lieber, Slaboda, and Boston,(2007) observed that despite what is known about the significant negative impact on mobility and lifestyle, it is difficult to determine the actual impact considering complications related to co-morbid conditions.

Psycho-social Impact of Chronic Low Back Pain

While many of the co-morbidities have physical manifestations, often they are experienced in the psychological realm (Tunks, Crook, & Weir, 2008). In their study with 320 community dwelling adults between 65 and 84 years old, there were significant differences in the biomedical, psychosocial and functional realms between those suffering with CLBP and those without CLBP (Rudy, Weiner, Lieber, Slaboda, & Boston, 2007). Depression, measured by the Geriatric Depression Scale, was marked among those with CLBP. This is consistent with findings among individuals in general

who live with chronic pain (c.f. Burns, Higdon, Mullen, Lansky, & Wei, 1999; Fishbain, Cutler, Rosmoff, & Rosmoff, 1997; Keefe, Lumley, Anderson, Lynch, & Carson, 2001; Russell, 1998).

Keeley, Creed, Tomenson, Todd, Borglin, and Dickens (2008) reported that not only did psychosocial factors, including anxiety, depression and fear avoidance, negatively affect the health-related quality of life of PLWCLBP, but they correlated with an increase in health care provider visits. Keefe, Lumley, Anderson, Lynch, and Carson noted that “emotional inhibition and avoidance of conflict is an important distinguishing characteristic among patients with chronic low back pain” (2001, p. 594). The effective management of this disorder could clearly offer both quality of life and financial benefits.

Management of Chronic Low Back Pain

Nationally and internationally, CLBP currently is managed in a variety of ways (c.f. Chou, Qaseem, Snow, Casey, Cross, & Shekelle, 2007; Engbers, Vollenbroek-Hutten, & Van Harten, 2005). Treatment modalities include surgical (Weinstein, Lurie, Tosteson, Skinner, Hanscom, & Tosteson, 2007), pharmacological (Kelly, Cook, Kaufman, & Anderson, 2008), cognitive behavioral (Keefe, Beaupre, & Gil, 1996), and nonpharmacological interventions (Chou, Qaseem, Snow, Casey, Cross, & Shekelle, 2007). These interventions are used singularly and in various combinations. One reason for combining interventions is because multi-modal analgesia involves using different therapies in combination to provide improved management of pain while minimizing side effects (Polomano, Rathmell, Krenzischek, & Dunwoody, 2008). Yet despite the availability of treatment options, many people do not experience adequate relief. The

success of therapies has been attributed to individual patient qualities (Talo, Forssell, Heikkonen, & Puukka, 2001).

Chronic Low Back Pain and Gender

Berkley (1997) posited that chronic pain conditions are more prevalent in women. Women are reported to experience back pain one and one half times more frequently than their male counterparts (IASP, 2007). Even though it is accepted that gender difference exist in both acute and chronic pain experiences, this area of investigation is relatively new and the information is not consistent (Vallerand & Polomano, 2000).

A Swedish study reported that prevalence of low back pain among women increased by four percent during one 16 year period (Leijon & Mulder, 2009). A study in the Netherlands reported less disability among women than men living with CLBP (Wijnhoven, de Vet, & Picavet, 2007).

While a number of genes and proteins may be involved in gender differences related to pain and analgesia, it is likely that the differences are located in the descending pain modulatory pathway (IASP, 2007). In a Canadian study of healthy volunteers, when pain was inflicted, there was a corresponding increase in heart rate among men but not among the women (Tousignant-Laflamme, Rainville, & Marchand, 2005).

Men and women also seem to have different responses to chronic pain and different foci for pain related suffering. Women tend to focus their distress on the interference that chronic pain has on their ability to function and enjoy life (Vallerand & Polomano, 2000). In a study with Norwegian adults with chronic pain, women reported higher quality of life despite higher pain intensity scores (Rustøen, Wahl, Hanestad,

Lerdal, Paul, & Miaskowski, 2004). It was of interest however, that fewer women in the study were unemployed, and unemployment was correlated with greater pain in men. It may be that the women reported their quality of life higher because they were still able to function as evidenced by continuing to work.

In a study with a small sample (12 subjects) over six years, female subjects tended to participate in catastrophizing, but the male subjects did not (Raak & Wahren, 2006). This is noteworthy, since pain catastrophizing, defined as “an individual’s tendency to focus on and exaggerate the threat value of painful stimuli and negatively evaluate one’s own ability to deal with pain” (Keefe, Lumley, Anderson, Lynch, & Carson, 2001, p. 590), has been identified as a major predictor of pain, pain related disability, and health care utilization (Keefe, Rumble, Scipio, Giordano, & Perri, 2004). In fact, pain catastrophizing explained the difference that was seen between men and women regarding pain and mood. While psychosocial factors and emotions have been associated with gender related differences in pain (IASP, 2007), reports of the relationship of pain with negative mood and gender are mixed (Hirsh, Waxenberg, Atchison, Gremillion, & Robinson, 2006). Of the negative emotions, Averill (1983) identified anger as perhaps the most commonly occurring.

Anger and Gender

Anger can be seen as a paradoxical juncture in discussions of emotion and gender. Sharkin (1993) noted that while women tend to be more emotionally expressive, the exception to this is expressing anger. Similarly he noted that while men tend to not be

emotionally expressive, the exception to this is the expression of anger. Yet, a review of several studies showed little difference in the identified source, intensity, expression, and consequences of anger in men and women (Diffenbacher, Oetting, Thwaites, Lynch, Baker, & Stark, 1996).

Similarly, in a longitudinal study, Thomas (1989) found that women were not more likely to suppress or express their anger, but they were more likely to discuss their angry feelings and for their anger to manifest in physical symptoms. Anger is considered to be a vital element in the physical, cognitive and social health of women (Thomas, Smucker, & Droppleman, 1998).

Newman, Gray, and Fuqua (1999) found that while there were no appreciable differences in scores on State-Anger, Trait-Anger Temperament, Trait-Anger Reaction, Anger-In, Anger-Out, and Anger-Control, there was significantly greater correlation, among women, with Anger-In and depression as well as with four of the other five anger scales. The authors suggested that this may be reflective of Anger-In being an important feature of the way women experience anger and a perception by women of having few choices regarding their expression of anger.

Thus, anger may be experienced and manifested differently in males and females. As Fernandez and Turk (1995) note, expression of anger is often not socially accepted, and it is anticipated that suppression of anger is common among women. Burns and colleagues (Burns, Johnson, Devine, Mahoney, & Pawl, 1996; Burns, Johnson, Devine, Mahoney, & Pawl, 1998) studied the relationship of anger and gender among patients with chronic pain and within the framework of marital relationships and found gender

differences, marital strain, and the need for further research. A strong gender difference was that the worst adjustment to living with chronic pain was seen in men who were strong hostile anger *suppressors* and women who were strong hostile anger *expressors*.

There may also be important gender differences in the function of anger relative to associated events (Newman, Gray, & Fuqua, 1999) and the way women report pain (Forgays, Spielberger, Ottaway, & Forgays, 1998). It is possible that the meaning, perception, process, experience and context of anger may be different among men and women. Also the role of rumination in anger experiences, with related pain consequences, may differ by gender.

Finally, it is possible that many women believe the expression of anger is not socially acceptable (Thomas, Smucker, & Droppleman, 1998) and may perceive and report their anger differently than do men (Forgays, Spielberger, Ottaway, & Forgays, 1998). It has been suggested that many women consider expressing anger as being inconsistent with the traditional perception of the feminine gender role (Sharkin, 1993). Such beliefs are entrenched in our culture. While Shakespeare often developed assertive female roles, those characters tended to be the lower class woman who functioned in contrast to the passive, idealized upper class heroines (Williamson, 1982).

Anger

Long before The Bard, anger was the object of discussion, conjecture and writings during the days of Seneca, Aristotle and Galen (Kemp & Strongman, 1995). Aristotle, who associated anger with pain and distress as well as with pleasure, described an angry

person as being agitated due to their perception of a situation and wanting to subsequently take action regarding it (Cooper, 1996). Later, in the 19th century, Darwin considered anger to be a powerful emotion and state of mind that motivated all animals to defend themselves (Spielberger & Reheiser, 2003). This description impressed Spielberger who, along with Jacobs, Russell, and Crane, described anger as “an emotional state that consists of feelings that vary in intensity, from mild irritation or annoyance to intense fury and rage” (1983, p. 162). Spielberger later expanded that definition to include provocation or activation of the autonomic nervous system that is generally associated with the concept of anger, but is often confounded with aggression and hostility (Spielberger & Reheiser, 2003).

Akin to Aristotle, Williams and Williams (1993) noted that anger is often the response, when expectations of either self or others are not met or when the behavior of self or others is perceived to be unsatisfactory. Fernandez and Turk cited Smedslund’s definition of anger as “a feeling involving a *belief* that a person one cares for has, intentionally or through neglect, been treated without respect, and *want* to have that respect reestablished” (1995, p. 165). The authors noted that most frequently, the person one most cares for is the self. They further note that this definition encompasses cognitive appraisal and action tendency, which they include as the two defining qualities of anger. From a Buddhist perspective it is not possible to separate the emotion of anger from the experience of anger within the body (Hanh, 2001). Burns, Quartana, and Bruehl (2008) echoed and expanded upon this when they reminded us that at a minimum, anger responses involve an interplay of physical, behavioral and subjective experiences.

Similarly, research correlating anger with cardiovascular (CV) disease (Rosenman, 1985; Spielberger, Jacobs, Russell, & Crane, 1983; Suls & Bunde, 2005; Williams & Williams, 1993); cancer (Thomas, Groer, Davis, Droppleman, Mozingo, & Pierce, 2000); and metabolic disorders (Richards, Hof, & Alvarenga, 2000; Siegman, Malkin, Boyle, Vaitkus, Barko, & Franco, 2002) has considered the interaction of the emotions and the body. It has long been known that anger has physical manifestations, and that suppressed anger has damaging effects in the physical and psychosocial domains (Hanh, 2001; Spielberger, Johnson, Russell, Crane, Jacobs, & Worden, 1985; Williams and Williams, 1984). Spielberger (1999) theorized that anger is a psychobiological concept experienced both emotionally and physically.

Analogous to the relationship between pain and anger, the relationship between anger and cardiovascular pathology has periodically been investigated (Rosenman, 1985; Spielberger, Jacobs, Russell, & Crane, 1983; Suls & Bunde, 2005; Williams & Williams, 1993) resulting in a rich body of literature. Assessment of anger involvement in cardiovascular pathology was in fact a major reason for developing the original State-Trait-Anger Scale (STAS) (Spielberger, Johnson, Russell, Crane, Jacobs, & Worden, 1985). Spielberger (1999) theorized that while anger is a psychobiological concept experienced both emotionally and physically, there are a number of styles in which it is manifested. Anger management styles are the predetermined inclinations to either suppress (anger control) or express (anger expression) and are primarily determined by personality type (c.f. Bruehl, Chung, Burns, & Diedrich, 2007; Burns, Bruehl, &

Quartana, 2006; Burns, Johnson, Mahoney, Devine, & Pawl, 1996; Burns, Quartana, & Bruehl 2008; Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995).

Anger and Pain

Hypotheses about the possible relationship between anger and pain have a long history. Freud linked anger with aggression and believed that when it could not be managed appropriately it became internalized, resulting in psychosomatic illnesses including pain. (Spielberger & Reheiser, 2003; Spielberger, Reheiser, & Sydeman, 1995). Fifty years ago, Engel described people who restrain or suppress anger as *pain prone patients* (Burns, Quartana, & Bruehl, 2008). Freud and Engel portrayed illness and pain as resulting from inappropriately managed anger with the implication that suppressed anger caused pain. As noted, this cause and effect theory is no longer in vogue. The relationship of pain and anger is considered much more complex.

More than 30 years ago Pilowsky and Spence (1976) reported that while patients with intractable pain (IP) did not report greater frequency of feeling angry, they did endorse significantly more inhibition of anger, which was illustrative of a reluctance or inability to express anger toward others. They did not find that, as a group, those with IP experienced anger more frequently than the control group, but those with IP did not respond as well to conventional treatments. With caution, they concluded that the unique qualities of each individual must be considered when assessing the relationship between pain and anger.

The work of Pilowsky, and others suggested the prevalence of suppressed anger was greater among people living with chronic pain (PLWCP) than with individuals not doing so (Burns, Johnson, Devine, Mahoney, & Pawl, 1996). Keefe and colleagues reported on the findings of Pilowsky and Spence that demonstrated a positive correlation of greater inhibition of anger with PLWCP who did not have a favorable response to medical treatment (Keefe, Lumley, Anderson, Lynch & Carson, 2001). Braha and Catchlove (1986) noted patients with chronic pain had difficulty recognizing feelings of anger and proposed that these unrecognized feelings were internalized and then manifested in pain or increased pain. Braha and Catchlove (1986) went further and suggested the inhibition of anger is actually to blame for chronic pain. The implication is that suppressed anger contributes to, intensifies or even causes the chronicity of pain, leading to less benefit garnered from traditional interventions.

Of particular note is the research investigating the relationship between anger and pain that has been conducted during the past 20 years (c.f. Bruehl, Chung, & Burns, 2003; Burns, 1997; Burns, 2006a; Fernandez & Turk, 1995). In 1993, Izard proposed that the mechanisms of emotions, including anger, are complex and involve activation of the subcortical and corticolimbic pathways. Izard continued with the suggestion that there may be a mechanism whereby “pain elicits anger without cognitive mediation” (1993, p. 79) as a result of afferent messages being sent to the thalamus and amygdala. Kearns, Rosenberg, and Jacob (1994) studied 142 chronic pain patients and reported greater levels of pain among those patients who were inclined to internalize anger and avoid conflict. Later, Fernandez and Turk suggested that PLWCP “internalize their anger and

indirectly express it through pain” (1995, p.169). The latter researchers proposed the role of anger in negative emotions as comprising an affective component of chronic pain, and referred to anger as being “one of the most salient emotional correlates of pain” (Fernandez & Turk, 1995, p. 165).

Following his study with 21 undergraduate students, Gelkopf (1997) tentatively concluded that those who endorsed anger-in had greater sensitivity to pain tests. More recently, in 2003, Burns, Kubilus, Bruehl and Harden reported that in a study of 178 pain clinic patients, those who coped by repressing their emotions did not have more anger, but did report greater pain severity. Quartana, Yoon and Burns reported on two studies, of undergraduate college students, where the second study replicated the first. In both they found that those students in the anger suppression condition “endorse stronger perceptions of the anger specific element of pain than those in the control situation” (2007, p. 465). Burns, Johnson, Mahoney, Devine, and Pawl (1996) reported that, even when there is correction for depression, anger may adversely affect the adjustment of persons living with chronic pain. Subsequently, it was suggested that anger is an emotion that can influence the perception or experience of CLBP (Bruehl, Chung, & Burns, 2003; Burns, 1997; Burns, 2006b). Coates and Pretty (2003) found that TA and AO were predictive of arthritic health, including pain. It is with consideration of this complex interplay that the relationship between anger and chronic pain will be evaluated. Among 564 veterans living with chronic pain, it was found that not only did those with maladaptive anger management styles have more intense pain but there was a positive

correlation among maladaptive anger management, high pain scores and high self-efficacy (Lombardo, Tan, Jensen, & Anderson, 2005).

While much attention has been given to the relationship between anger-in and chronic pain, recent studies have investigated the relationship between anger-out and chronic pain (Bruehl, Chung, & Burns, 2006). Bruehl, Chung and Burns (2003) found a positive association between pain intensity and anger-out among people living with the chronic pain resulting from complex regional pain syndrome. Using opioid blockade, Bruehl and colleagues explored the hyperalgesic effects of Trait-Anger-in and Trait-Anger-out finding an apparent association between opioid analgesic system dysfunction and Trait-Anger-out but not Trait-Anger-in (Bruehl, al'Absi, France, France, Harju, Burns, & Chung, 2007a; Bruehl, Chung, & Burns, 2006; Bruehl, Chung, Burns, & Biridepalli, 2007; Bruehl, Chung, Burns, & Diedrich, 2007b; Burns & Bruehl, 2005). Bruehl, Chung and Burns (2003) found a positive association between pain intensity and anger-out among people living with the chronic pain resulting from complex regional pain syndrome. With 187 healthy volunteers Burns, Quartana and Bruehl (2007) reported that when people with high anger-out, make efforts to control anger; they may experience more intense pain in future episodes of pain. The regulation of endogenous opioids may be a factor in the effect of anger management style on the experience of chronic pain (Burns, Bruehl, & Caceres, 2004).

Chronic Low Back Pain and Anger

The relationship between chronic low back pain and anger has been considered and investigated from several perspectives. Carson and colleagues (Carson, Keefe,

Lowry, Porter, Goli, Fras, et al. 2007) found ambivalence over emotional expression, including expression of anger, was associated with higher pain scores. When the Minnesota Multiphasic Personality Inventory was used to assess Trait-Anger in men with chronic pain, hypochondriasis and hysteria values were elevated (Kinder, Curtiss, & Kalichman, 1986). Anger was among the psychological disturbances seen by Earman and colleagues (1996) in more than one quarter of PLWCLBP with work related origin of pain. Greenwood, Thurston, Rumble, Waters and Keefe (2003) reported that anger is a key factor in the experience of CLBP, with health care providers being only second to self as the most frequent targets of the anger.

It has been suggested that anger is an emotion that can influence both the perception and the experience of CLBP (Bruehl, Chung, & Burns, 2006; Burns, Higdon, & Mullen, 1999; Burns, Bruehl & Quartana, 2006). To study anger and chronic pain, in one instance Burns, Quartana and Bruehl (2008) used Wegner's Ironic Process Theory which purports that in certain instances efforts made to control behavior can lead to results opposite of those intended. Their findings suggested that by increasing attention to angry feelings, pain associated with anger that is internalized (anger-in) may actually be perceived with increased intensity (Burns, Quartana and Bruehl, 2008). Burns found that when PLWCLBP underwent anger recall experiences, increased tension of lower paraspinal muscles was demonstrated through EMG studies (Burns, 2006a; Burns 2006b) suggesting that at a minimum anger aggravated the physical experience of CLBP.

Burns, Bruehl, and Quartana (2006) suggested that it is possible that muscle tension increases when patients with CLBP combine anger-in with being cynically

hostile. Similar to the observation by Newman, Gray, and Fuqua (1999) regarding the relationship between anger and depression, if anger is not assessed and treated among PLWCLBP, it is possible that only the symptom is being considered, rather than the significant underlying feature or cause.

Anger and Rumination

This revisiting of anger is consistent with the theories of anger rumination (Burns, Quartana and Bruehl, 2008; Linden, Hogan, Rutledge, Chawla, Lenz, & Leung, 2003; Nolen-Hoeksema, 2000; Sukhodolsky, Golub, & Cromwell, 2001). Rumination, in general, is often noted in professional literature, yet there is no consensus on a definition or how it relates to other psychological constructs (Smith & Alloy, 2009). It has been associated with increased depressive mood, hopelessness and negative self-appraisal (Nolen-Hoeksema, 2000). Suchday, Carter, Ewart, Larkin, and Desiderato (2004) reported that following provocation of anger, rumination was positively correlated to delays in the recovery of cardiovascular patients. While Stimmel and colleagues (2006) discussed the prospect that purposeful self-rumination may be a positive method for managing pain, others found that rumination was predictive of pain related disability (Sukhodolsky, Golub, & Cromwell, 2001; Sullivan, Sullivan, & Adams 2002). Citing the earlier work of Linden and colleagues(2003) and Sukhodolsky (2001), Burns, Quartana, and Bruehl (2008) explored the possible role of rumination in the construct of Spielberger's anger expression inventory.

Significance to Nursing

Clearly, pain is a multi-dimensional subjective experience, with intensity that can only be determined by the experiencing person (McCaffery & Pasero, 1999). In addition, there is considerable data showing that individuals living with chronic pain develop individualized strategies for coping (Keefe, Rumble, Scipio, Giordano, & Perri, 2004). Thus, it is reasonable to understand that a single intervention is rarely effective. Rather, an approach similar to peeling an onion is potentially most valuable. There often are many layers in the pain process that involve perceptions, sensations (vision, scent, touch), and responses (tearing, annoyance, frustration) (Hazelett, Powell, & Androulakakis, 2002; Ray, 2002). To achieve pain relief and perceived success, these must be addressed. As noted, PLWCLBP constitute a significant percentage of patients seen by health care providers, including nurses. Working with patients to manage their pain, which is a subjective and multiphasic experience (McCaffery & Pasero, 1999), is a significant, but at times frustrating, nursing responsibility. The association between pain and anger is imperative for nurses to understand so they can improve their care of, advocacy, interactions, and educational efforts with PLWCLBP. Understanding the relationship between anger and pain will enable nurses to recommend and provide appropriate anger management interventions as a component of multi-modal therapy for PLWCLBP. Finally, with health care providers being the second most common focus of patients' anger (Greenwood, Thurston, Rumble, Waters & Keefe, 2003), it is essential for nurses to understand this anger directed toward them so they can more effectively respond to it.

The identification of gender differences related to anger among PLWCLBP provides a basis for nurses to have a fuller understanding of the CLBP experience in men and women. If there is a gender difference in the experience of pain, group therapy for anger management should be gender specific rather than gender integrated. Gender sensitive and gender specific interventions can be explored, developed and utilized. Considering anger rumination as a significant factor in the experience of CLBP, the development and teaching of cognitive behavioral interventions to modify this behavior is needed.

The majority of the literature involving anger among PLWCLBP has been authored by psychologists (CINAHL, MEDLINE, PSYC Info). Since nurses regularly interact with and care for PLWCLBP, nursing research is needed to develop nursing specific knowledge and interventions to optimize care of these patients.

This study represents an important step in addressing the potential management of pain through interventions directed at anger and anger rumination. Since there are successful cognitive behavioral interventions to manage rumination, research is needed to test the effect of interrupting the rumination component of the anger–chronic pain trajectory, if rumination is found to be an important component.

CHAPTER III

METHODS

Research Design

This was a descriptive, correlational, and cross-sectional design. The study investigated the prevalence of anger among patients with CLBP and the link that existed between State-Anger (SA), Trait-Anger (TA), Anger Control-In (AC-I), Anger Control-Out (AC-O), Anger Expression-In (AX-I), Anger Expression-Out (AX-O), Anger Rumination (AR), with pain perception, intensity and behavior. The similarities and differences of those connections among men and women were explored.

Setting and Recruitment

Participants were recruited from the private practices of an orthopedist, a spine clinic, two acupuncturists and two chiropractors located in coastal Wilmington, NC and from a pain clinic in Charlotte, NC. Additional recruitment occurred through social nomination. Based upon the ability to recruit similar subjects in the pilot study, in which the endorsement of anger among people living with CLBP was assessed, it was determined to be feasible to conduct this study in the Wilmington region. The additional pain clinic site was added when one of the providers requested to participate in the study.

Sample

The target population was community dwelling adults living with CLBP. Inclusion criteria for the convenience sample used in the study were community dwelling men and women 21 and over years of age; experiencing low back pain for more than three months; and able to read and understand English. Any person not meeting the inclusion criteria was excluded.

Basing power analysis, in part upon the pilot study that assessed the occurrence of anger among people living with CLBP (Quinlan-Colwell & Tesh, 2009), it was determined that a minimum of 80 subjects (40 men and 40 women) were needed. To compensate for possible incomplete data or factors prohibiting the use of data, the original intent was to recruit a total of 110 participants (55 men and 55 women).

Protection of Human Subjects

Protection of human subjects was insured. This study was approved by the University of North Carolina at Greensboro Institutional Review Board before any subject recruitment or data collection was undertaken. Since all forms were completed anonymously and no identifying data were collected, return of the completed forms constituted consent. The letter explaining the study and the questionnaires, informed each potential subject that this was a research study being conducted by the researcher. The cover letter included all mandated elements of the informed consent (see Appendix B). There were four amendments approved by the IRB. Three amendments requested to

include additional sites. The fourth amendment was requested to increase the sample size to 200 participants.

Instruments

Data collection for all information was through paper questionnaires completed by the subjects. Participants were asked to complete the demographic questionnaire, the SF-MPQ, STAXI-2, ARS, and PBC. When the returned packets were reviewed, it was noted that the forms were in assorted order indicating that they were not completed in a particular order.

The researcher-designed demographic questionnaire (Appendix C) collected relevant information about the participants including age, gender, ethnicity, marital status, employment standing, duration of back pain, and subject perception of the cause and description of pain. Space was provided on the demographic tool where subjects were invited to share any thoughts about their CLBP. Reliability and validity of the demographic tool were not formally assessed, but the pilot study demonstrated that it could be completed without difficulty.

Instruments to Measure Pain

Since pain is a multidimensional experience, the perception of pain, the intensity of pain, and pain behavior were assessed. The total score on the Short-Form McGill Pain Questionnaire (SF-MPQ) was used to assess pain perception (Appendix D). The SF-MPQ was derived from the McGill Pain Questionnaire by Melzack and usually takes between two and five minutes to complete (Dudgeon, Raubertas, & Rosenthal, 1993). It

consists of 11 sensory and four affective descriptors that are also rated on a four point scale ranging from none (0) to severe (3). Total scores can range from zero to 40 with zero being no pain and 40 being maximum pain. The questionnaire allows for three summary pain scores to be obtained. Concurrent validity with the long form has ranged from $r = 0.70$ to 0.88 . (McDonald & Weiskopf, 2001; Melzack, 2005a). In addition to the total score, the current pain intensity as perceived by the subject was measured using the visual analog scale (VAS).

Grafton, Foster, and Wright (2005) tested the reliability of the SF-MPQ among patients with osteoarthritis and found the intraclass correlation for the total score (0.96) and for sensory (0.95), affective (0.88) and average pain (0.89) scores to be high but, the correlation for current pain was lower (0.75). When tested among persons living with chronic cancer pain, the correlations with the Long-Form McGill Pain Questionnaire were very high, with averages of three assessments ranging from 0.84 to 0.93 (Dudgeon, Raubertas, & Rosenthal, 1993). A factorial validity study of the SF-MPQ reported internal consistency of the affective (0.76) and sensory (0.78) portions (Wright, Asmundson, & McCreary, 2001).

As noted by Kearns and colleagues (1991), it is important to include pain behavior measures when there is a goal to better understand the etiology of pain. The Pain Behavior Checklist (PBC) (Appendix E) was used to measure thoughts, feelings and behaviors that each subject associated with living with CLBP. The PBC, which contains 17 items that are rated on a seven point scale, was developed as a self-report tool (Kearns, et al, 1991). Reports of initial reliability testing of the PBC were 0.63 to 0.83 with a

coefficient alpha for the total instrument of 0.85. The stability coefficients of the PBC ranged from 0.70 to 0.87 and for the total instrument was 0.80. Among the subscales, the correlations ranged from .15 to .46 (Kearns, Haythornthwaite, Rosenberg, Southwick, Giller, & Jacob, 1991). Validity testing with the Pain Rating Index of the Mc Gill Pain Questionnaire was 0.35 ($p < .01$) and with the Pain Severity Scale was 0.30 ($p < .01$). While the 25 question PBC total had an internal consistency reliability of .85 and stability of .80, the PBC “Affective Distress” (questions 5, 6, 13, 14 and 17) had an internal consistency reliability of .82 and stability of .79 (Kerns, Haythornthwaite, Rosenberg, Southwick, Giller, & Jacob, 1991).

Instruments to Measure Anger

Anger was measured using the State-Trait-Anger Expression Inventory 2 (STAXI-2) including the State-Anger (SA), Trait-Anger (TA), Anger-Control (AC), and Anger-Expression (AX) scales (Spielberger, 1999). The STAXI-2 is a 57 item tool that includes six scales (Spielberger, 1999) and is estimated to take 15 minutes to complete (Senior, 2001). Spielberger (1999) reported normative scores with standard deviations (SD). The SA includes 15 items, and scores can range from 15 (no anger) to 60 (maximum anger) with normative scores reported as 17.9 (SD 5.26; $\alpha .92$) in females and 19.25 (SD 6.89; $\alpha .94$) in males. The TA includes 10 items, and scores can range from 10 (no anger) to 40 (maximum anger) with normative scores of 17.89 (SD 4.94; $\alpha .84$) in women and 18.40 (SD 5.42; $\alpha .86$) in men. The Anger Expression-In (AX-I), Anger Expression-Out (AX-O), Anger Control-In (AC-I), and Anger Control-Out (AC-O) each includes eight items with scores that can range from 8 to 32. The normative scores for the

AX-I were 15.86 (SD 4.36; α .78) for women and 16.35 (SD 3.99; α .74) for men. The normative scores for the AX-O were 14.69 (SD 3.70; α .74) for women and 15.42 (SD 3.74; SD .73) for men. The normative scores for AC-I were 23.28 (SD 5.92; α .93) for women and 22.60 (SD 5.82; α .91) for men. The normative scores for AC-O were 23.21 (SD 5.11; α .85) for women and 23.53 (SD 5.01; α .84) for men (Spielberger, 1999). No item is used in more than one of the sub-scales.

These values are consistent with the internal consistency seen in the antecedent STAXI. The reliability of the STAXI was high, with 0.93 for S-Anger and 0.86 for the T-Anger, with reliability coefficients ranging from 0.73 to 0.85 (Spielberger, 1988). Newman, Gray, and Fuqua (1999) reported internal consistency coefficient alphas of 0.72 to 0.92 for the original STAXI. Similarly, Fuqua, Leonard, Masters, Smith, and Campbell (1991) reported coefficient alphas for internal consistency that ranged from 0.58 (AX) to 0.91 (SA). In a 1997 study Forgays, Forgays and Spielberger, assessed the factor structure of the 44 item STAXI among a sample of 444 female and 270 male college students. The Factor Structure values ranged from 0.42 to 0.88, leading the authors to confirm the STAXI as a valid tool with the additional finding of gender differences among several of the factors.

The validity and reliability of both the STAXI and STAXI-2 have been consistently high when tested in a variety of populations and in several languages. The Russian version of the STAXI was found to have reliability ranging from 0.57 (AX-I) to 0.89) consistent with those found by Spielberger et al. (Kassinove, Sukhodolsky, Eckhardt, & Tsytsarev, 1997). Using the STAXI in Finland, Hutri and Lindeman (2002)

reported 0.74 reliability for the Anger-In scale and 0.77 for the Anger-Out scale. Lam (1999) reported Chronbach alpha of the Chinese STAXI-2 ranged from 0.74 to 0.89. More recently Maxwell, Sukhodolsky, and Sit, (2009) reported on the validity and reliability of the Chinese version of the STAXI-2 that required the elimination of some items and showed gender and cultural issues that require additional study. In Sweden, Linqvist, Daderman and Hellstrom (2003) reported high bivariate correlations of the STAXI-2 with the Novaco Anger Scale and the Provocation Inventory. The same authors reported Cronbach's alpha scores of the STAXI-2 that ranged from 0.64 (AX-O) to 0.89 (AC-I).

The STAXI and STAXI-2 have been used with a variety of populations including male prison inmates (Kroner & Reddon, 1992), infertile couples (Fassino, Piero, Boggio, Piccioni, & Garzaro, 2002), Spanish children and adolescents (del Barrio, Aluja, & Spielberger, 2004), incarcerated women (Loper & Gildea, 2004), and smoking cessation participants (Patterson, Kerrin, Wileyto, & Lerman, 2008). Finally, important for this study, the STAXI-2 was designed for use with both genders, and through cross-validation procedures, it was found to be suitable for use with individuals of either gender (c.f. Forgays, Forgays, & Spielberger, 1997; Forgays, Spielberger, Ottaway, & Forgays, 1998; Newman, Gray, & Fuqua, 1999).

Instrument to Measure Anger Rumination

The Anger Rumination Scale (ARS) (Appendix F) was used to measure the degree of anger rumination experienced. It was developed by Sukhodolsky, Golub, and Cromwell in 2001 with the purpose of assessing cognitive processes regarding anger after

it has been activated. The ARS is a 19 item tool with no sub-scales. Scores can range from 19 to 76 (Sukhodolsky, Golub, & Cromwell, 2001). Correlation results were moderate and significant ($p=0.001$) with the total ARS score (Sukhodolsky, Golub, & Cromwell, 2001). Initial reliability was reported with an internal consistency coefficient of 0.93 and test-retest coefficient as 0.77 (Sukhodolsky, Golub, & Cromwell, 2001). Cultural testing of the ARS among subjects from Great Britain and Hong Kong supported the validity of the ARS in both groups (Maxwell, Sukhodolsky, Chow, & Wong, 2005).

Coping Strategies Questionnaire

In addition, the abbreviated version of the Coping Strategies Questionnaire (CSQ)(Jensen, Keefe, Lefebvre, Romano, & Turner, 2003) with two questions from the original CSQ (Personal communication Keefe, 2009) was included. This questionnaire was included to collect information concerning the impact of coping with chronic pain for later exploratory analysis. The data from this tool were not included or analyzed as part of the current research study.

Procedures

The preliminary work (Author, 2009) indicated that site staff members are crucial in recruitment and participation of potential subjects. The researcher explained the study to staff members stressing there was no relationship of study participation with the clinical visit or care. To encourage site staff to give potential subjects the packets with

questionnaires, pastries and bagels were periodically given to the participating staff members.

Flyers advertising the study (Appendix G) were displayed at each site. Office staff asked adult patients with a diagnosis of CLBP if they were interested in participating in this study. The staff gave interested individuals the study packets. Each potential participant was given a packet with a cover letter, a demographic form, and the study questionnaires.

Upon completion, the respondents placed the questionnaires in the envelopes with no personal identifiers, sealed them and returned them to the site staff members. The respondents then received \$5.00 gift cards to local chain stores to compensate them for their time. PLWCLBP who chose not to participate were asked to return the blank packets to the site staff. The staff members placed the returned envelopes in a larger envelope that was collected by the researcher. The collection of completed forms and delivery of new packets was on schedules pre-arranged by the researcher with the staff at each site.

For participants identified through social nomination, packets with questionnaires were delivered either directly (if they approached the researcher) or through the parties nominating them. In these cases the five dollar incentive was included in the packet. These completed packets were either returned directly to the researcher or through the mail using a and envelope that was stamped and pre-addressed to the researcher.

Completed questionnaires were maintained in a locked file cabinet in the researcher's office. The information from the questionnaires was entered into an

electronic data record. This was password protected and maintained on the personal computer of the researcher. A copy of the electronic data were electronically mailed to the researcher at her University of North Carolina at Greensboro e-mail address. This provided security from possible electronic failure.

Data Analysis Plan

All data were analyzed using SPSS software. Following entry, data were reviewed and cleaned with attention to inaccuracies, inappropriate entries, outliers, wild cards and incomplete data (Polit, 1996, p. 35). Since all forms were completed anonymously, it was not possible to verify any data points. If any data were determined to be incomplete or suspect, all data for that subject were discarded. Descriptive statistics of the demographic variables were produced (Munro, 2001; Polit, 1996). The first research question asked: what was the distribution of pain perception, pain intensity, pain behavior, SA, TA, AC, AE and AR among PLWCLBP and do these differ by gender? To assess this, descriptive statistics on pain perception, pain intensity, pain behavior, SA, TA, AC-I, AC-O, AE-I, AE-O and AR were calculated for the sample over all and separately for men and women (Munro, 2001; Polit, 1996) Student's t tests were used to assess the differences by gender.

The second research question asked: what were the relationships of SA and TA, AC-I, AC-O, AE-I, AE-O and AR with pain perception, pain intensity, and pain behavior scores for PLCLBP and did these relationships differ by gender? To answer the second question, the Pearson product moment correlation coefficient (r), was used to separately

analyze the relationships between pain perception, pain intensity, and pain behavior scores and SA, TA, AC-I, AC-O, AE-I, AE-O, and AR. These correlation coefficients were calculated for the total sample and separately for men and for women.

The third research question asked can pain perception, pain intensity, and pain behavior be explained by AR, SA, TA, AC-I, AC-O, AE-I, AE-O, AR and gender? To answer this question, multiple regression was used to test the relationship of the specified independent variables with pain perception, pain intensity, and pain behavior scores (dependent variables).

Finally, narrative comments were summarized. The comments focused on the etiology and the description of CLBP as reported by the participants.

Limitations

The design was not as rigorous as a randomized control study. While self-report survey tools offer simple, easy, private, and low cost administration (Kearns, Haythornthwaite, Rosenberg, Southwick, Giller & Jacob, 1991), they do reflect the bias of the individual participant (Turk, Wack, & Kearns, 1985). In an effort to minimize the amount of subject burden, the potentially confounding variables of anxiety, depression and fear were not measured. There was not a reference group of persons not living with CLBP, to which the subjects in this study were compared. One potential threat to internal validity is that questions in one questionnaire could influence responses in subsequent instruments. Precautionary efforts included recruiting subjects in excess of the power estimate; and consistently using the same instruments.

Despite these efforts, the hazards of self report remained the major threat to internal validity. In addition, it is possible that the participants did not fully understand the questions; did not respond honestly; received help in completing the forms; or had the forms completed by a person other than the PLWCLBP. To capture and include any assistance the PLWCLBP may have had in completing the forms, a question asking if the person was helped and if so by who was included on the demographic questionnaire. The major threat to external validity was how representative the sample was of the entire population of patients who live with CLBP (Burns & Grove, 1993). Using subjects from various sites was an effort to address this concern. At the same time, while the study was conducted in one part of the country anger and gender may have different manifestations in different regions and countries.

It is acknowledged that subjects self selected to participate and their responses cannot be generalized to those who did not choose to participate. Finally, the questionnaires captured only a snapshot of the total gestalt of pain and anger experienced by the PLWCLBP. One participant from social nomination later told the person who nominated him: “I should have answered those questions today, the answers would have been very different.”

CHAPTER IV

RESULTS

Recruitment

The original desired recruitment goal was 110 participants (55 men and 55 women), with an anticipated target of 80 participants with complete data to ensure adequate power. Initially recruitment with the chiropractor and acupuncturist offices was slow, however as additional sites, were added, and as social nomination spread, recruitment increased vigorously. At two sites (orthopedist office and spine clinic), participation was so strong, that staff members requested delivery of additional packets of questionnaires, prior to the scheduled date for replenishment. Wanting to respect PLWCLBP asking to participate and to enlarge the sample, an IRB amendment was submitted and approved to increase the sample size to 200 participants.

When recruitment ended, 20 of the 213 packets that had been delivered to various sites, but not given to potential participants, were retrieved. Of the 193 packets distributed to potential participants, 173 (89.22%) were returned in time to be included in data analysis(see Table 1). Five additional packets were returned after data analysis was completed.

Table 1.
Questionnaires Returned by Site, Gender and Ethnicity (N = 213)

Site	Number Given Out	Number Returned						
		White Men	White Women	AA Men	AA Women	Other Race/Ethnicity	Returned Partially or Totally Completed	Per cent Returned
Accupuncturist	20	3	7	0	0	0	10	50%
Chiropractor	17	6	5	0	0	1	12	70%
Orthopedist	14	0	11	0	0	2	13	93%
Pain Clinic	25	7	13	0	1	2	23	92%
Spine Clinic	50	11	23	2	1	3	40 **	80%
Social Nomination	87	29	40	1	4	1	75 **	86%
Total	213	56	99	3	6	9	173*	81%

* Additional surveys were returned blank.

** 5 additional questionnaires were returned after analysis was completed.

Questionnaires Excluded

Of the 173 returned packets with questionnaires, one set was excluded from analysis because the respondent was younger than the inclusion age of 21. Twenty-six packets were excluded because the respondents did not complete the STAXI-2 or ARS. While this is not a comparatively large number (15%), it is of interest because it continued to occur even after the researcher put a note on the STAXSI-2 requesting that all questions on both sides be completed. The majority 19 (73%) of those who did not complete the STAXI-2, did not complete any questions on the back of the two sided form. One did complete the back but did not complete the front; two did not complete the

STAXI-2 at all; three partially completed the STAXI-2 but omitted more than ten questions, which is the maximum number that can be blank and allow for adjustment for analysis (Spielberger, 1999). Two of that group did not complete the ARS either. The gender distribution, of those who did not complete the STAXI-2, was exactly the same percentage as the gender distribution in the total sample with 17 (65%) female and 9 (35%) male. Similar to the total sample, their ages ranged from 21 to 73. While the respondents not completing the STAXI-2 were from each of the recruitment groups, their representation was not proportional to those participating at each site and ranged from 12% in the social nomination cohort to 22% in the pain clinic group (see Table 2).

Table 2.
Questionnaires with Incomplete STAXI-2, by Site

Site	Total Returned Questionnaires	Number with Incomplete STAXI-2	Percent with Incomplete STAXI-2
Accupuncturist	10	2	20%
Chiropractor	12	2	16%
Orthopedist	13	2	15%
Pain Clinic	23	5	22%
Spine Clinic	39	6	15%
Social Nomination *	75	9	12%
Total	172	26	15%

*One additional participant through Social Nomination was less than the inclusion age.

Usable Return Rate

Of the 172 (81%), that were returned with some degree of completion and met inclusion criteria, 146 (84.39%) packets had data sufficiently complete for analysis (see Table 3). The largest number with complete data, 65 (45%), were recruited through social nomination, with smaller representation from the spine clinic, pain clinic, orthopedist office, two chiropractor offices and two acupuncturist offices (see Table 3).

Table 3.
Usable Questionnaires, by Site (N = 146)

Site	Total Returned	Total Usable Questionnaires			Percent Returned Usable (N = 146)
		Total (N = 146)	Men (N = 51)	Women (N = 95)	
Accupuncturist	10	8	2	6	80%
Chiropractor	12	10	5	5	83.33%
Orthopedist	13	11	0	11	84.62%
Pain Clinic	23	18	7	11	78.26%
Spine Clinic	39	34	10	24	87.18%
Social Nomination *	75	65	27	38	86.66%
Total	172**	146	51	95	84.88%**

* One additional participant, through Social Nomination, was excluded because he was younger than the inclusion age.

**5 additional packets were returned after data analysis was completed.

Sample

Other than the pain clinic, which was located in south central North Carolina, all recruitment sites were located in one coastal North Carolina area. While the majority of people who participated via social nomination were from the same coastal North Carolina region, there were a few who lived in other parts of North Carolina, Virginia (2), Georgia (1) and Florida (1).

The final sample of 146 PLWCLBP consisted of 51 (35%) men and 95 (65%) women. As seen in Table 4, ages of participants ranged from 23 to 82 years with a mean of 49.12 (SD = 13.29). Despite diversifying the recruitment strategy, the majority of participants, 131 (89.73%), were Caucasian (Table 4). More than half (63.01%) were married, and 52.7% were employed outside the home. Five men reported their spouses helped them to complete the questionnaires and one woman reported a friend helped her complete it. The remaining respondents reported they completed the questionnaires without help.

The gender, age and employment characteristics of the sample were similar to what is in the literature and data regarding PLWCLBP. The sample consisted of mostly women (65%), which is consistent with the reports that women experience back pain more frequently than men (Berkley, 1997; IASP, 2007). The ages of the participants spanned adulthood with the mean age being 49.12. Again that is consistent with the literature (Carr, Lemanek, & Armstrong, 1998; CDC & NIH, 2007; IASP, 2007; Tousignant-Laflamme, Rainville, & Marchand, 2005). Consistent with Ehrlich (2003 and

Slipman and colleagues (2002) many of the respondents (22% women and 29% men) were unable to work as a result of their CLBP.

Table 4.
Demographic Characteristics of Sample

Characteristic	Men (N=51)	Women (N=95)	Total (N=146)
Mean Age (Std Dev)	50.43 (14.41)	48.41 (12.67)	49.12 (13.29)
Race/Ethnicity N (%)			
Caucasian	48 (32.88%)	83 (56.85%)	131 (89.73%)
African American	2 (1.37%)	6 (4.11%)	8 (5.48%)
Hispanic	1 (0.07%)	4 (2.74%)	5 (3.43%)
American Indian	0	1 (0.07%)	1 (0.07%)
Asian	0	0	0
Other	0	1 (0.07%)	1 (0.07%)
Marital Status N (%)			
Married	36 (24.66%)	56 (38.36%)	92 (63.01%)
Widowed	1 (0.07%)	3 (2.05%)	4 (2.74%)
Divorced	4 (2.74%)	20 (13.70%)	24 (16.44%)
Single	6 (4.11%)	11 (7.53%)	17 (11.64%)
Committed	2 (1.37%)	5 (3.42%)	7 (4.79%)
No Response	2 (1.37%)	0	2 (1.37%)
Employment Status N (%)			
Employed Outside Home	16 (10.96%)	51 (34.93%)	67 (45.89%)
Self Employed	7 (4.79%)	3 (2.05%)	10 (6.85%)
Retired	10 (6.85%)	13 (8.90%)	23 (15.75%)
Unemployed due to pain	15 (29.41%)	21 (22.10%)	36 (24.66%)
Unemployed not related to pain	3 (2.05%)	7 (4.79%)	10 (6.85%)

Data Analyses for Research Questions

Research Question One

The first research question addressed the distribution of pain perception, pain intensity, pain behavior, State-Anger (SA) and Trait-Anger (TA), Anger-control (AC), Anger-expression (AX), and Anger Rumination (AR) among PLWCLBP, and how they differ by gender. To answer this, descriptive statistics were calculated for each of the variables for the sample overall, and separately for men and women (Munro, 2001; Polit, 1996). Student's t-tests were used to assess the differences in these variables by gender (see Table 5). Pain perception was measured using the total score from the Short-Form McGill Pain Questionnaire (SF-MPQ). Pain intensity was measured using the VAS score. Pain behavior was measured by the total score on the Pain Behavior Checklist (PBC).

Assumptions for performing the Student's t test were satisfied. The ratio level variables were approximately normally distributed and there was independence of answers by men and women. Since multiple t-tests (2- tailed) were performed the more conservative approach of assuming equal variance was assumed.

As seen in Table 5, with the exception of the total pain behavior (PBC) score, there was no statistically significant difference by gender in the distribution of any of the variables throughout the sample. The difference in mean pain intensity scores, on the zero to one hundred VAS, between men and women was less than two. At the same time, within the mixed gender sample, there was marked variability of the actual VAS scores. The individual scores that were reported by participants ranged from 1 to 100. The differences in the VAS scores were reflected in the differences between the mean (54.61),

median (61.05) and mode (67.37) as well as the standard deviation (24.26) for the VAS scores.

Table 5.

Distribution of Variables Overall and by Gender (N = 146)

Variable	Men (N=51) Mean (SD)	Women (N=95) Mean (SD)	Total (N=146) Mean (SD)	t-test for Differences by Gender
State-Anger (SA)	20.76 (8.99)	20.74 (8.46)	20.75 (8.62)	-0.019 (p = .985)
Trait-Anger (TA)	16.37 (6.71)	16.63 (5.55)	16.50 (5.96)	0.250 (p = .803)
Anger Control-In (AC-I)	21.63 (5.40)	22.84 (5.79)	22.4 (5.67)	1.237 (p = .218)
Anger Control-Out (AC-O)	22.96 (5.54)	23.63 (5.50)	23.4 (5.50)	0.701 (p = .484)
Anger Expression- In (AX-I)	15.90 (3.94)	15.86 (4.70)	15.9 (4.43)	-0.050 (p = .960)
Anger Expression – Out (AX-O)	14.59 (4.97)	13.59 (3.77)	13.9 (4.24)	-1.362 (p = .175)
Anger Expression Index (AXI)	33.90 (15.90)	30.98 (14.29)	32 (14.90)	-1.133 (p = .259)
PAIN INTENSITY (VAS)	55.50 (22.27)	54.14 (25.36)	54.61 (24.26)	-0.322 (p = .748)
Pain Perception (SF=MPQ Total)	16.99 (10.25)	17.47 (11.14)	17.30 (10.80)	0.254 (p = .800)
Anger Rumination (AR)	29.47 (11.79)	31.69 (9.92)	30.92 (10.62)	1.208 (p = .229)
Pain Behavior (PBC)	41.41 (17.83)	34.20 (20.45)	36.72 (19.81)	-2.122 (p = .036)*
Pain Behavior Affective Sub-scale (ADSS)	10.90 (6.94)	9.14 (7.44)	30.92 (10.62)	0.449 (p = .167)

* significant at .05.

In many respects the anger reported by the PLWCLBP in this study was comparable to the normative groups described by Spielberger (1999). Spielberger reported percentiles of both raw scores and normalized *T* scores for all scales and subscales for various groups. The raw scores and the normalized *T* scores for normal males and females older than 16 years were used as the reference for the scores of the PLWCLBP who participated in this study.

In this sample, the Trait-Anger (TA) sample mean of 16.5 is consistent with the 40th percentile of raw scores, and 47th of the *T* scores for the reference group. Regarding the STAXI-2 sub-scales, the sample mean for AC-I, was consistent with the 45th percentile of raw scores and 48th with the *T* scores; for AC-O, it was consistent with the 50th percentile of raw scores and 49th with the *T* scores; for AX-I it was consistent with the 50th percentile of raw scores and 48th of *T* scores; and for AX-O it was consistent with the 40th percentile raw scores and 44th of *T* scores. The sample mean of 32 for the Anger Expression Index (AXI), was consistent with the 45 percentile of raw scores the 48th of *T* scores.

In contrast the sample mean for State-Anger (SA) is consistent with the 75th to 80th percentile of raw scores and the 52nd of the *T* scores for State-Anger in the normal reference group. The gender specific means for SA are higher than those reported for the raw scores for males (20.76 compared to 19.25) and females (20.74 compared to 17.90). Higher SA scores indicate rather severe feelings of anger. When the SA scores are generally elevated in relation to the TA, it is indicative that the SA is more likely situational (Spielberger, 1999).

Research Question Two

The second research question asked the relationships of SA, TA, AC, AX, and AR with pain perception, pain intensity, and pain behavior scores reported by PLWCLBP, and how these relationships differ by gender. To answer the second question, the Pearson product moment correlation coefficient (r), was used to separately analyze the relationships between pain perception, pain intensity, and pain behavior scores with the SA, TA, AC-I, AC-O, AE-I, AE-O, and AR. The correlation coefficients were calculated for the total sample and separately for men and for women.

Correlations with Pain Perception (SF-MPQ total). As seen in Table 6, weak correlations were found with pain perception (SF-MPQ) in the total mixed gender sample. There were positive and highly significant ($p < .01$) correlations with SA, TA, AX-O, AXI and ARS. AX-I had a positive correlation but it was not significant. AC-I and AC-O were negatively correlated with pain perception but only AC-O was significant ($p < .01$).

Among women, weak but statistically significant correlations were seen with many of the variables. Pain perception was significantly and positively correlated with SA ($p < .01$), TA ($p < .01$), AE-O ($p < .01$), AXI ($p = .015$), and ARS ($p = .028$). It was positively but not significantly correlated with AE-I. Similar to the other pain variables, pain perception was negatively correlated with AC-I and AC-O, but only to a significant level with AC-O.

Among men, weak but statistically significant correlations were seen with many of the variables. Pain perception was significantly and positively correlated with SA ($p =$

.011), TA ($p = .015$), AE-O ($p > .01$), AXI ($p = .031$ and ARS ($p = .022$). It was positively but not significantly correlated with AE-I. As with all of the pain variables, it was negatively correlated with AC-I and AC-O but not to a statistical level with either of them.

Table 6.

Pearson Correlations of Pain Perception (SF-MPQ) with Research Variables by Gender and Overall (N = 146)

Item	Men (n = 51) (p value)	Women (n = 95) (p value)	Total (n = 146) (p value)
Pain Intensity (VAS)	.689 ($p = .000$)**	.647 ($p = .000$)**	.658 ($p = .000$)**
Pain Behavior (PBC score)	.584 ($p = .000$)**	.549 ($p = .000$)**	.548 ($p = .000$)**
PBC Affective Subscale (ADSS)	.552 ($p = .000$)**	.426 ($p = .000$)**	.462 ($p = .000$)**
State Anger (SA)	.325 ($p = .016$)*	.460 ($p = .000$)**	.416 ($p = .000$)**
Trait Anger (TA)	.335 ($p = .016$)*	.328 ($p = .001$)**	.329 ($p = .000$)**
Anger Control-In (AC-I)	-.229 ($p = .106$)	-.102 ($p = .324$)	-.140 ($p = .091$)
Anger Control-Out (AC-O)	-.231 ($p = .102$)	-.257 ($p = .012$)*	-.247 ($p = .003$)**
Anger Expression-In (AX-I)	.065 ($p = .651$)	.094 ($p = .367$)	.085 ($p = .308$)
Anger Expression-Out (AX-O)	.398 ($p = .004$)**	.279 ($p = .006$)**	.318 ($p = .000$)**
Anger Expression Index (AXI)	.299 ($p = .033$)*	.245 ($p = .017$)*	.261 ($p = .001$)**
Anger Rumination (ARS)	.326 ($p = .020$)*	.227 ($p = .027$)*	.181 ($p = .029$)*

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Correlations with Pain Intensity (VAS). As seen in Table 7, among the total sample, pain intensity as measured by the VAS showed weak to moderate correlation with the other variables. It was significantly and positively related to SA ($p < .01$), TA ($p = 0.03$), AX-O ($p < .01$), AXI ($p = .036$), ARS ($p = .029$), Total PBC ($p < .01$), and PBC ADSS ($p < .01$). It was negatively correlated to both AC-I and AC-O.

Among women, the VAS showed weak to moderate correlation with the other variables. It was positively related to the same variables as in the total sample; however, the relationships were statistically significant only with SA ($p < .01$), total PBC ($p < .01$) and PBC ADSS ($p < .01$). While AC-I and AC-O were negatively but not significantly correlated, all other variables were positively correlated.

Among men, again weak to moderate correlations were found with the VAS and the other variables. The same statistically significant, positive relationships continued among men with SA ($p < .01$), AE-O ($p = .021$), Total PBC ($p < .01$) and PBC ADSS ($p < .01$).

Table 7.

Pearson Correlations of Research Variables with Pain Intensity (VAS) by Gender and Overall (N = 146)

Item	Men (n = 51) (p value)	Women (n = 95) (p value)	Total (n = 146) (p value)
Pain Perception (MPG-SF Total)	.689 (p = .000)**	.647 (p = .000)**	.658 (p = .000)**
Pain Behavior (PBC score)	.588 (p = .000)**	.495 (p = .000)**	.518 (p = .000)**
PBC Affective Subscale (ADSS)	.485 (p = .000)**	.356 (p = .000)**	.396 (p = .000)**
State Anger (SA)	.412 (p = .003)**	.406 (p = .000)**	.406 (p = .000)**
Trait Anger (TA)	.221 (p = .119)	.157 (p = .130)	.177 (p = .033)*
Anger Control-In (AC-I)	-.124 (p = .387)	-.038 (p = .718)	-.066 (p = .428)
Anger Control-Out (AC-O)	-.155 (p = .276)	-.150 (p = .146)	-.153 (p = .066)
Anger Expression-In (AX-I)	.170 (p = .232)	.049 (p = .639)	.083 (p = .319)
Anger Expression-Out (AX-O)	.324 (p = .021)*	.190 (p = .065)	.238 (p = .004)**
Anger Expression Index (AXI)	.240 (p = .090)	.139 (p = .179)	.174 (p = .036)*
Anger Rumination (ARS)	.245 (p = .084)	.155 (p = .134)	.181 (p = .029)*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Correlations with Pain Behavior (total PBC). In the total sample, weak to moderate correlations were computed with the research variables and total PBC. As seen in Table 8, these were highly significant ($p < .01$) among all positive correlations which included SA, TA, AX-I, AX-O, AXI and ARS. High statistical significance was also seen

with AC-I ($p = .005$) and AC-O ($p < .01$), which also had a negative correlation with pain behavior.

Among women, weak to moderate correlations with pain behavior that had strong statistical significance ($p < .01$) continued among the positive relationships that included SA, TA, AX-I, AX-O, AXI and ARS. Of the two negative relationships, AC-O was statistically significant ($p = .003$) but AC-I was not.

The positive, weak to moderate correlations with pain behavior were also seen with the men. SA, TA, AX-O, AXI, and ARS were positively and significantly correlated ($p < .01$). AX-I was positively but not significantly correlated with pain behavior. The negative correlations of PBC with AC-I ($p = .043$) and AC-O ($p = .009$) were statistically significant.

Table 8.

Pearson Correlations of Pain Behavior (PBC) with Research Variables by Gender and Overall (N = 146)

Item	Men (n = 51) (p value)	Women (n = 95) (p value)	Total (n = 146) (p value)
Pain Perception (VAS score)	.588 (p = .000)**	.495 (p = .000)**	.518 (p = .000)**
Pain Perception (MPG-SF Total)	.518 (p = .000)**	.433 (p = .000)**	.584 (p = .000)**
PBC Affective Subscale (ADSS)	.818 (p = .000)**	.834 (p = .000)**	.776 (p = .000)**
State Anger (SA)	.461 (p = .001)**	.527 (p = .000)**	.495 (p = .000)**
Trait Anger (TA)	.427 (p = .002)**	.454 (p = .000)**	.429 (p = .000)**
Anger Control-In (AC-I)	-.285 (p = .043)*	-.187 (p = .070)	-.230 (p = .005)**
Anger Control-Out (AC-O)	-.361 (p = .009)**	-.302 (p = .003)**	-.325 (p = .000)**
Anger Expression-In (AX-I)	.252 (p = .075)	.324 (p = .001)**	.299 (p = .000)**
Anger Expression-Out (AX-O)	.546 (.000)**	.441 (p = .000)**	.481 (p = .000)**
Anger Expression Index (AXI)	.456 (p = .001)**	.415 (p = .000)**	.434 (p = .000)**
Anger Rumination (ARS)	.376 (p = .007)**	.561 (p = .000)**	.463 (p = .000)**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Research Question Three

The third research question asked if pain perception, pain intensity and pain behavior scores can be explained by AR, SA, TA, AC, AX, and gender. Multiple regression was used to test the relationship of the specified independent variables with the dependent variables of pain perception, pain intensity and pain behavior scores. These

pain variables were tested individually. Since this exploratory question asked if any of the independent variables could explain any of the pain variables, in each regression, all independent variables were initially entered with no priority given to any individual variable. When indicated by the initial regression results, a stepwise regression was then done.

Pain Perception Measured by the SF-MPQ Total Score. In the first regression, with pain perception as the dependent variable, the model accounted for 21% ($R^2 = .207$) of the variance in pain perception as measured by the SF-MPQ scores. AXI was the only variable that was excluded from the model. Only SA was statistically significant ($p = .002$). No other variables contributed to the model. Since there was only one variable that contributed to explaining the variance in the dependent variable, additional exploration through stepwise regression was not done.

Pain Intensity Measured by the VAS. In the second regression, with pain intensity as the dependent variable, the model accounted for 20% ($R^2 = .195$) of the variance in VAS scores. Again, only State-Anger (SA) was statistically significant ($p < .01$) as a predictor. No other variables contributed to the model. Again, since only one variable contributed to explaining the variance in the dependent variable, additional exploration through stepwise regression was not done.

Pain Behavior Measured by Total PBC Scores. In the third regression, with PBC total score as the dependent variable, the model accounted for 37% ($R^2 = .373$) of the variance in PBC scores ($p < .01$). While AXI had a significant ($p = .009$) correlation (.481) with PBC, it was excluded from the model. Of the remaining variables, only SA (p

< .01), gender ($p = .012$), and ARS ($p = .025$) contributed significantly to the model, thus contributing to explaining the variance in the dependent variable pain behavior (PBC). Each of these contributed positively to the total pain behavior score. The remaining variables were not significant in being predictive of pain behavior, when the other variables were included.

To determine the degree to which each independent variable added to the prediction of pain behavior, a step-wise regression was done (Jaeger, 1983). This resulted with SA, AX-O, ARS, and gender as predictors of pain behavior. SA alone accounted for 25% ($R^2 = .245$, $p < .01$); SA with AX-O accounted for 30% ($R^2 = .305$, $p < .01$); SA with AX-O and ARS accounted for 33% ($R^2 = .325$, $p = .039$) and those three with gender accounted for 36% ($R^2 = .355$, $p = .012$) of the variance in the PBC scores.

The only independent variable that was a predictor in all of the models was State-Anger (SA). Gender, AX-O, and anger rumination were predictive only of pain behavior, but not of pain perception or pain intensity.

In checking for assumptions of multiple regression, gender is a nominal dichotomous variable while all the pain and anger variables are measured at the interval level. The collinearity statistics showed that AXI was removed from each of the regressions because tolerance was .000 in each case. From a variance inflation factor perspective, no variables were greater than 10.

Additional Findings

Anger Rumination (ARS)

The ARS total score showed a strong positive correlation, which was highly significant ($p < .01$) with TA (.738). The positive correlations that were found between ARS and SA (.544), AX-I (.545), AX-O (.590), the AXI (.584) and PBC total score (.518), were moderate and significant. While the negative relationships between ARS with the anger control variables (AC-I and AC-O) were significant, they were showed weak relationships.

These correlations continued when the genders were considered separately. While the correlations were not as strong among women in the sample, moderate, positive and statistically significant ($p < .01$) relationships were noted between ARS and TA, SA, and AXI in both gender groups.

Affective-Distress Subscale (ADSS)

On the Affective-Distress Subscale (ADSS) of the PBC (Appendix F), one statement “Ask myself, ‘why did this happen to me?’” is consistent with rumination. The other ADSS statements “Become irritable,” “Become angry,” “Tell others not to bother me,” and “Appear upset or sad” either are, or may be considered reflective of anger.

Considering these statements, this subscale seemed particularly germane to analysis of anger and rumination. Once this was realized it was analyzed separately.

The distribution of scores for the ADSS which has a range of 0 to 30, was skewed with a mode of 12, median of 8, and mean of 9.76 (SD 7.30). Student’s t-tests were used to

assess the differences by gender. As with the other variables there was no statistical difference among men and women (see Table 5).

In the total sample, not unexpectedly, similar weak to moderate correlations were found with the same variables and this subscale, as were found with the total PBC score (see table 8). These were all highly significant ($p < .01$). When the genders were assessed independently, weak to moderate correlations with strong significance were again seen among all of these variables (see table 8).

When a regression was done with ADSS score as the dependent variable, the analysis accounted for 48% ($R^2 = .475$) of the variance ($p < .01$) in the dependent variable. Of the variables entered, only SA ($p = .015$), and ARS ($p < .01$) contributed significantly to the variance in ADSS. Each of these also contributed positively to the total pain behavior score. The remaining variables were not significant in being predictive of ADSS.

To determine the degree to which each of the anger variables and gender added to prediction of the ADSS scores a step-wise regression using the same independent variables was calculated. When the stepwise regression was done, SA, AXI, VAS and ARS were predictive of ADSS. SA alone accounted for 33% ($R^2 = .326$, $p < .01$); the SA with the AXI accounted for 41% ($R^2 = .414$, $p < .01$); and the SA with the AXI and ARS accounted for 44% ($R^2 = .437$, $p < .01$) of the variance in the ADSS scores.

Narrative Comments

Narrative comments were predominantly written to describe the cause of the CLBP and the characteristics of the pain. These comments are summarized in Tables 9 and 10.

In addition to the causes of back pain reported in the specific categories on the demographic form (Appendix C), many respondents wrote additional, often detailed, information about what caused their back pain see Table 9. The most common detail reported, by 21 (14%) of the respondents who wrote a specific cause, was that the pain was related to a work situation. That is consistent with the literature (Gua, Tanaka, Halperin, & Cameron, 1999; Wegman & Fine, 1996).

Table 9.

Causes of Back Pain

Cause of Back Pain	Men (N = 51)	Women (N = 95)	Total (N = 146)
MVC	8	19*	27
Other accident	26	26	52
Illness	4	13	17
Assault	0	1	1
Unknown etiology	12	33	45
No Response	1	3	4

* One respondent reported both MVC and other accident.

Lifting something was the next most common cause specified by 12 (15%) of those who listed a specific cause. Other causes specified included falls (6), arthritis (4), gymnastics (3), and participation in sports (2). Interestingly 34.7% of women and 23.5% of the men did not know what caused their CLBP.

Participants wrote words to describe their pain and many used more than one word as a descriptor. As seen in Table 10, some words were frequently used to describe the CLBP. The single most common word was “ache” or “aching.” This is of interest because “aching” is not necessarily associated with moderate to severe pain. It is commonly associated with muscular pain. Other common words used to describe the CLBP include sharp, burning, radiating and shooting. These are pain descriptors that are associated with neuropathic pain (McCaffery & Pasero, 1999). As a group these words are indicative of neuropathic pain were the most frequently used to describe the CLBP.

Table 10.

Word Descriptors of CLB

Word Descriptor	Frequency Used
Ache/Aching	43
Sharp	31
Constant/continuous	22
Burning	20
Stabbing	16
Dull	12
Radiating	11
Shooting	11
Throbbing	10

Summary

The purpose of this study was to explore whether chronic pain is a symptom accompanied by anger, and if the anger is characterized by rumination, and affected by gender. The results did not support a gender difference regarding anger and pain experiences with regard to any of the anger variables, pain perception, or pain intensity.

The results did support that there is a gender difference regarding pain behavior as measured by the total PBC score.

Positive, moderate, and significant correlations were found between State-Anger (SA) with pain perception, intensity, and behavior. These were similar in the total sample and when considered separately for men and women, however the relationship of SA did differ between the genders. The relationship between SA and pain intensity was slightly higher for men, while the relationship between SA and pain behavior was slightly higher among women. SA was also the common predictor in all of the regressions with pain perception, intensity and behavior.

The results did not support that anger rumination significantly affects the perception or intensity of CLBP, however there were statistically significant moderate correlations between anger rumination and pain behavior. Anger rumination was strongly correlated with TA and moderately correlated with the other anger variables. Anger rumination was also predictive of pain behavior.

There were common characteristics among the relationships of the independent variables (SA, TA, AC-I, AC-O, AX-I, AX-O, AXI, AR) with the dependent variables of pain perception (SF-MPQ), pain intensity (VAS), and pain behavior (PBC) in the total sample and separately for men and women. While the majority of the correlations were highly significant, most showed weak to moderate intensity. With each of the pain variables, the correlations were positive with the exception of AC-I and AC-O. These anger control variables (AC-I and AC-O) consistently showed negative correlations with

each of the dependent pain variables in the gender specific samples as well as in the total sample.

Pain was considered from the viewpoints of perception, intensity, and behavior. While it could be expected that these variables would show high correlations, they did not. In the total sample, the relationships between pain behavior (total PBC), with both pain perception (SF-MPQ) and pain intensity (VAS) were positive and highly significant but only moderately correlated. Pain behavior was only highly correlated with the pain behavior subscale, which was expected since the subscale was part of the total PBC. Pain perception was moderately correlated with pain behaviors and with pain intensity. Finally, pain intensity was moderately correlated with pain perception and pain behavior as tested with the total PBC but there was only a weak correlation between pain intensity and the Affective-Distress Subscale.

In all the regression models, the only consistent predictor of any measure of pain was SA. Gender was not a factor in the regression models to predict pain perception or pain intensity. Gender and anger rumination were factors to predict pain behavior in the model using the PBC total score. The AXI and ARS were predictive of pain behavior when using the ADSS but not with the other dependent variables.

CHAPTER V

DISCUSSION

Synopsis of Significant Findings

Through a power analysis that was done prior to the study, it was determined that 80 participants were needed to detect gender differences. The original goal was to recruit 55 men and 55 women to compensate for data that would not be usable. The total number recruited were 61 men and 112 women. The final sample consisted of 51 men and 95 women which exceeded the minimum needed for power to detect gender differences.

The sample size determinations were made to allow sufficient power to detect differences between men and women in the research variables of the magnitude seen in pilot work, and to conduct multiple regression. The differences actually seen between men and women in this study were much smaller than anticipated from the pilot work or professional literature, and the sample was not large enough for these differences to be deemed statistically significant. In fact, concluding that the gender differences seen in State-Anger or Trait-Anger found in this study were statistically significant would require a sample in excess of 3,000 participants. As can be seen from the results, this sample had ample power to detect the correlations between most of the research variables.

In this study, 65% of the participants were women, which is consistent with the literature that reports more CLBP among women than men (Carr, Lemanek, & Armstrong, 1998; IASP, 2007; Tousignant-Laflamme, Rainville, & Marchand, 2005).

When considering this, it must be remembered that while this was a sample of community dwelling adults, it was not an epidemiological study and participants were primarily from one geographic region. It was noted that among the participants, pain was accompanied by anger, SA in particular, but there was no gender effect found.

The findings of this study failed to support the often held belief that men and women experience pain and anger differently. The findings do support a gender difference in pain behavior. With the exception of pain behavior, there was no significant difference by gender, in the distribution of the variables. This is similar to reports by Raak and Wahren (2006); Rustøen and colleagues (Rustøen, Wahl, Hanestad, Lerdal, Paul, & Miaskowski, 2004). This is also consistent with Thomas' (1989) research which reported that women and men seem to suppress anger with similar frequency. Consistent with Thomas (1989) and others (Diffenbacher, Oetting, Thwaites, Lynch, Baker, & Stark, 1996), who reported little gender difference in the suppression of anger, there were no statistically significant differences in the way men and women controlled anger in this sample. While the data were not necessarily contrary to Thomas' (1989) conclusion that women were more likely to discuss and exhibit their angry feelings somatically, it also did not support that belief.

With the exception of State-Anger, the participants in this study were very similar to the normative sample described by Spielberger (1999). The sample means were generally in the 40th to 50th percentile of raw and *T* score ranges of the normative sample. State-Anger did appear to be more prevalent among the participants in this study than was seen in the raw scores of the normative adult sample (Spielberger, 1999).

The purpose of this study was to explore whether chronic pain is a symptom accompanied by anger and if the anger is characterized by rumination and affected by gender. The first research question asked the distribution of pain perception, intensity and behavior as well as the distribution of the independent anger variables (SA, TA, AC-I, AC-O, AXI, ARS) and how each of these differ by gender in PLWCLBP.

As noted, with the exception of pain behavior (PBC), the results did not support a gender difference regarding anger or pain experiences. That a gender difference was found in pain behavior is consistent with the literature that reports men and women respond differently to pain (Raak & Wahren, 2006; Rustøen, Wahl, Hanestad, Lerdal, Paul, & Miaskowski, 2004; Vallerand & Polomano, 2000). This difference in behavior may be related to culture and gender roles that are culturally learned. That no gender difference was found in pain perception or pain intensity, may be more closely related to CLBP being experienced as a unique, and highly individual experience for each person (McCaffery & Pasero, 1999) than any similarity among men and women. That concept is consistent with the theories of Melzack and Watson.

A high positive correlation was found between anger rumination (ARS) and Trait-Anger (TA) and moderate positive correlations between ARS with SA, AX-I, AX-O and the AXI. Considering that others (c.f. Burns, Quartana, & Bruehl, 2008; Sukhodolsky, Golub, & Cromwell, 2001) have questioned the relationship of anger rumination with AX-I, it is interesting that, while both were moderate and significant, the correlation between ARS with AX-O (.590) was slightly stronger than with AX-I (.545). Weak and negative correlations were found with ARS and AC-I and AC-O. This may indicate that

anger rumination may contribute to the experience and expression of anger more than to the control of anger. A moderate and positive relationship was found between anger rumination and pain behavior but only a weak relationship was found between anger rumination and pain intensity. This suggests that anger rumination may affect the way PLWCLBP behave related to their pain but does not necessarily have much influence on the way they understand or rate their pain.

The second research question inquired about the relationship between pain perception, intensity and behavior with the independent anger variables (SA, TA, AC-I, AC-O, AXI, ARS) and how those relationships differed by gender. In the entire sample, weak but highly significant positive relationships were seen among pain perception (total SF-MPQ) with SA, TA, AX-O, AXI, and ARS. Weak, positive and significant relationships were found among TA, AXI and ARS with pain intensity (VAS). A moderate and highly significant positive relationship was found between pain behavior (total PBC) and State-Anger, while weaker but highly significant positive relationships were found with TA, AX-I, AX-O, AXI, ARS and pain behavior.

The one consistent positive correlation with pain perception, intensity, and behavior was with State-Anger (SA). That aspect of anger was positively, moderately and significantly correlated with each pain variable, in the total sample and both genders. This indicates that, the PLWCLBP in this study, had some relationship with pain and State-Anger (SA), feelings of anger felt in specific situations. Caution is needed in interpreting this. Spielberger defined SA as being “a measure of angry feelings and the extent to which a person feels like expressing anger at a particular time” (1999, p.2).

While the SA scale of the STAXI-2 assessed the degree of anger the person felt at the time they completed the questionnaire, it is not known if that anger was specifically related to the CLBP the person was experiencing. The SA could have been related to other diagnoses, psychosocial factors, waiting in the office or an endless list of other possible triggers for the anger. It is also possible that for some respondents, their pain was aggravated by the SA but for others, the SA may have caused, or contributed to the cause of their pain. At the same time, it does call for attention since SA was the one common and statistically significant correlation among all groups and among all pain variables. The positive correlations indicate that State-Anger was in some way related to more intense perception, intensity and behaviors associated with pain among PLWCLBP in this sample.

In the total, mixed gender sample, positive, significant, and moderate correlations were found between Trait-Anger (TA) and pain perception, intensity and behavior. When the male and female specific groups were assessed, TA was significantly correlated with pain perception and pain behavior but not with pain intensity in either group. This may indicate that Trait-Anger, the angry feelings which individuals experience on a regular basis (Spielberger, 1999), is related to increased pain perception and pain behaviors among both men and women, and increased pain intensity among some PLWCLBP in the total sample. It could indicate that chronic pain may lead to increased TA scores or that people with more TA experience more chronic pain. Again, the relationship was stronger in regard to pain perception and pain behavior than with pain intensity.

Among both men and women, the anger expression inventory (AXI) which gives a general index of how people express anger, was significantly correlated with pain perception and pain behavior, but not with pain intensity. This may indicate that the intensity of expression of angry feelings is positively associated with the way men and women perceive pain and how they behave in response to pain, but not in how they rate the intensity.

Anger rumination (ARS) was found to have weak to moderate, positive and highly significant correlations with pain perception and pain behavior among PLWCLBP in the total sample, as well as separately among men and women. The relationship between pain perception (SF-MPQ) and anger rumination was strongest among men (.321) compared to women (.227) and the total sample (.262). The relationships with anger rumination were positive but not strong or significant when considering pain intensity (VAS) and again the correlation was greater among men. When correlated with pain behavior (PBC) anger rumination showed a moderate positive relationship that was significant in men, women and the total sample. In that situation anger rumination had the strongest correlation with pain behavior in women (.561) compared to men (.376) and the total sample (.463). These correlations indicate, that among the men and women in this sample, there was a stronger relationship of anger rumination (ARS) with regard to pain perception and pain behavior than with pain intensity. It also seemed to be more closely related to the perception and intensity of pain among the men, and more closely related to pain behavior among the women. This indicates that anger rumination may have a greater

connection with how men perceive and rate the intensity of their pain, while it may have a greater association with the pain behaviors manifested by women.

In the total sample and in each gender group, Anger Control-In (AC-I) and Anger Control-Out (AC-O) had weak to moderate negative correlations with each of the pain variables. In the total sample AC-I was significant only with pain behavior. Among women, AC-I was not significant with any of the pain variables and among men AC-I was significant only with pain behavior (PBC). AC-O was significant with pain perception (SF-MPQ), intensity (VAS) and behavior (PBC) in the total sample. AC-O was significant with pain perception and pain behavior with both men and women but it was not significant with pain intensity with either gender group. The correlations indicate that in this sample, working to manage or reduce anger and calm down (AC-I) (Spielberger, 1999) is somewhat related to pain behavior but not related to the perception or intensity of pain. Interestingly, this relationship is significant only with men, not with women. The correlations with AC-O indicate, not only that controlling the outward expression of anger is negatively related to pain perception and behavior among both genders, but that the relationships are similar by gender with both pain variables but significant only among men (see Table 6).

In the total sample, the Anger Expression Index (AXI) that scores the intensity of feelings of anger, (Spielberger, 1999) was found to be positively, moderately and statistically correlated with pain perception (SF-MPQ), pain intensity (VAS), and pain behavior (PBC).

The third research question asked if pain intensity, pain perception and pain behavior scores can be explained by AR, SA, TA, AC, AX, and gender. In each of the regressions SA was the variable that was predictive of pain perception, intensity and behavior. While it is not known what specifically contributed to the State-Anger when the participants were answering the questions, these regressions suggest that regardless of the cause of the anger, it is related to and predictive of the way a person perceives their CLBP, and the amount of CLBP they are reporting. It also suggests that it is related to the way they behave in relation to the CLBP. When the regression was done with pain behavior (PBC), in addition to SA, gender and anger rumination along with AX-O were predictive. This indicates that gender and anger rumination are also predictive of pain behaviors but not of pain perception or intensity.

Discussion of Unexpected Findings

The first unexpected finding was the ease with recruiting PLWCLBP. On several occasions, at both the spine clinic and the orthopedist office, the staff called the researcher, prior to the arranged follow up date, to request additional packets of questionnaires. The health care provider in the pain clinic offered that site after hearing the researcher discuss the pilot study. The response and return rates were impressive. Interestingly, most of the sites were willing to continue recruitment when the study ended.

While social nomination had been identified during the pilot study as a desirable recruitment method, it was much more successful than anticipated. On at least four

occasions, people who completed the questionnaires requested packets to share with family or friends who they told about the study. On two occasions, the cashiers at the department store where the gift cards were purchased asked to complete the questionnaires. Since, after completing the questionnaires, seven people returned the gift cards; it did not seem that the gift cards were a particular inducement for participation. It is more likely that PLWCLBP have a message to tell. This could be further addressed through a phenomenological study.

Another unexpected finding was that some people who participated in the study became more aware of their anger. One person, who nominated her husband for participation, later shared that since completing the questionnaires, he was more aware of his emotional responses to the CLBP, particularly those involving anger. This suggests that interventions to help PLWCLBP to better manage their anger are potentially valuable.

Very few of the participants had help in completing the questionnaires. Only six participants (0.03%) reported being assisted by anyone in completing the tools. In light of the high rate of returned and usable questionnaires, this attests to the MPQ-SF, STAXI-2, ARS, and PBC being reasonable tools for data collection through self-report, among community dwelling adults who live with chronic low back pain.

On the zero to 100 VAS, for this sample of PLWCLBP, the mean was 54.61 which indicated moderate pain while the median 61.05 and the mode was 67.37 indicating moderate to severe pain. Interestingly, among this same sample, when describing present pain intensity (PPI) in words with corresponding numbers of zero to

five (see Appendix D), the mean, median and mode were all 2. In fact the majority of the sample (71%) reported current pain intensity as “none”, “mild” or “discomforting”. This seems to indicate a disparity between the way the respondents described the intensity of their pain in words compared to numbers.

Additional Limitations

As with all research, this study had limitations. It was identified in the pilot/feasibility study that the sample was predominantly Caucasian. To address the need to diversify participation, recruitment and the sample size were expanded. Despite those efforts, the participants continued to be predominantly Caucasian. The lack of non-Caucasian participants limited sub-analyses and is a limitation to generalizability. Future research could include recruitment that specifically targets non-Caucasian communities, health care providers and religious organizations.

A second possible limitation is that a small percentage of participants did not complete the STAXI-2. This persisted even after a note was attached to the STAXI-2 requesting that all questions be answered. The developer of the STAXI-2 believes that it “is unusual for so many participants to fail to complete the STAXI” (personal communication Spielberg, March 19, 2010). It is possible that some of the participants did not realize that there were questions on the reverse side of the STAXI-2, or they did not understand the need to complete them. It is also possible that participants chose not to answer the questions on the reverse side either because they were tired of answering questions about feeling angry or, in some manner, those questions were emotionally

difficult to answer. The latter option could imply that those individuals who had the most profound issues with anger were not included in the study. In either situation, it could be a potential source of bias or a confounding factor.

Finally, the order of the questionnaires in the packets was not randomized. This may have influenced the results if participants became fatigued. Interestingly, while a number of participants did not complete the STAXI-2 that was the second questionnaire while all but two respondents completed the subsequent questionnaires.

Recommendations for Future Research

The discrepancy between the scores of the VAS, which is a numeric description of pain, and the PPI which predominantly uses words to describe pain, is important to consider. This discrepancy may contribute to inaccurate assessment and management of pain among PLWCLBP when too great a focus is placed on “the number”. It is possible that PLWCLBP have learned that often the numeric value given to pain is directly related to the amount of analgesia prescribed. This is an area in which further research is warranted to better understand the meaning of pain intensity scores among people living with chronic pain and the meaning of words as well as numbers used to describe the intensity of pain.

Further expansion of recruitment of non-Caucasians is needed to assess these findings in a more diverse population. Additional strategies that may be considered are working to recruit from ethnic cultural and religious centers and clinical practices in minority neighborhoods. While several people who recommended individuals for social

nomination were not Caucasian, specific efforts could focus on increasing social nomination among non-Caucasians. Race and ethnicity did not seem to be a factor in completing the questionnaires only three (12%) of those who did not complete all of the forms were non-Caucasian. This is comparable to the total non Caucasian representation (10.27%) in the sample.

State-Anger (SA) was significant in correlations with the pain variables and was statistically significant as being predictive of pain perception, intensity and behavior. It is not clear from this study whether the SA scores are reflective of the CLBP being experienced when the questionnaires were being completed or if the SA was related to a cause unrelated to the CLBP. Additional research is needed to make that determination, and to investigate the role of SA among people living with chronic pain. Additional research is needed to more fully understand the role of anger rumination in the experiences of anger and chronic pain. Of particular interest is to learn more about the relationship between anger rumination and the expression and control of pain in this population.

A longitudinal study designed to capture the frequency and intensity of physical pain and anger as well as the emotional, cognitive, spiritual and contextual aspects of chronic pain, is a logical follow up to this study. This could be conducted using pain and anger diaries or using tape recorders through which participants would record their experiences. Pain diaries have been used successfully by researchers investigating chronic pain (c.f. Aubin, Vezina, Parent, Fillion, Allard, Bergeron, et al., 2006; Bruehl, Chung, Burns, & Biridepalli, 2003; Gil, Porter, Ready, Workman, Sedway, & Anthony,

2000). It would be necessary that the participants be healthy enough to use the pain diary on a regular basis without experiencing fatigue (Aubin, Vezina, Parent, Fillion, Allard, Bergeron, et al., 2006). Using small tape recorders would be a modification of the pen and pencil diary that could be used by individuals for whom writing is not a good option.

Considering State-Anger was a predictor in each of the regressions, and was at least moderately correlated with all the dependent pain variables, additional research to test an intervention to manage anger with PLWCLBP is warranted. Since the findings do not lead to one particular intervention, there are a variety of options for this. A replication and expansion of the Loving Kindness Meditation study done Carson and colleagues (2005) is reasonable as well as mindfulness meditation (Kingston, Dooley, Bates, Lawlor & Malone, 2007; Kostanski & Hassed, 2008). Cognitive behavioral group therapy specifically addressing anger management could be beneficial.

Since quantitative methods may overlook context or important factors, the interest generated in this topic indicates that a phenomenological study to learn about the lived experience of PLWCLBP is warranted. One interpretation, of the number of people who were recruited through social nomination and the number of people at the orthopedic and spine clinic site who requested to participate, is that PLWCLBP want to tell their story. It was anticipated that PLWCLBP may manifest anger related to a variety of anger triggers that could include the cause of pain; ambiguity of the diagnosis; inadequate relief from analgesia; subsequent alterations in lifestyle; changes in relationships; blaming oneself blame; perceived skepticism by health care professionals; and lack of effective

treatments. Future research investigating these triggers and correlation with the anger and pain variables would be of interest.

Twenty-one of the participants specified that the cause of their CLBP was work related which is consistent with the literature (Gua, Tanaka, Halperin, & Cameron, 1999; Wegman & Fine, 1996). While measurement of specific work related factors was not part of this study, the fact that 14% (21) of the participants attributed the pain to work, indicates that future research to learn more about this is warranted.

Considering the number and percentage of completed questionnaires, the STAXI-2, SF-MPQ, ARS and PBC seem to be appropriate and easy for PLWCLBP to use in office or home settings. The only unforeseen problem that was identified with participants using the forms was that a small percentage did not complete the STAXI-2. Since the majority of the questionnaires that were not completed did not have the questions on the back answered, it may be helpful to print this on two pages rather than front to back on one sheet of paper. The questionnaires were effective in obtaining the information needed to answer the research questions posed in this study. No unforeseen problems were encountered during data entry or data analysis. Future research could include a replication study using other pain and anger assessment tools and compare the findings. Development of a tool that specifically quantifies anger related to chronic pain could be beneficial.

Implications for Nursing and Health Care Practice

The relationships between pain behavior (total PBC) with both pain perception (SF-MPQ) and pain intensity (VAS) were positive and highly significant but only moderately correlated. Pain behavior was only highly correlated with the pain behavior subscale, which is expected since the subscale is included in the total PBC. Pain perception was moderately correlated with pain behaviors and with pain intensity. Finally, pain intensity was moderately correlated with pain perception and pain behavior as tested with the total PBC but there was only a weak correlation between pain intensity and the Affective-Distress Subscale. None of the variables was strongly correlated with pain intensity. Since in most clinical settings, considerable emphasis is placed on pain intensity determined by the numeric pain score, it is important for Health Care Professionals (HCPs) to appreciate the complexity of how chronic pain is experienced and described. The findings underscore the importance of understanding that chronic pain is more than simply a number. By appreciating the complexity of experiencing and describing chronic pain, nurses and other HCPs can be in a better position to understand and then to help PLWCLBP better manage their pain.

Results of this study suggest that nurses and other HCPs need to be aware that women and men who live with CLBP do not necessarily experience pain and anger differently because of gender. Contrary to cultural expectations, overall, the women and men in this study experienced pain and anger with similar characteristics, intensity, and frequency. Despite cultural expectations, the findings indicate that men and women should be considered equally. One important clinical implication of this is that

interventions do not necessarily need to be gender specific and mixed gender group interventions can appropriately be conducted.

Gender differences were noted among the reports of pain behavior. An important message is that the men and women who are living with CLBP in this study, exhibit different behaviors related to the chronic pain. This is important because pain behavior is one way people communicate their pain to others (Keefe & Dunsmore, 1992).

It is essential for all HCPs to understand that State-Anger was found to be a correlate and predictor of CLBP. HCPs may be the focus of the SA that is being experienced. HCPs can learn techniques to help the PLWCLBP to better manage their anger. In addition, it is important for nurses to know techniques for effectively working with patients who are angry; to know how to manage their own responses to angry patients; and to teach families how to manage their responses to anger.

Many of the participants used words to describe their pain that do not necessarily have a connotation of moderate to severe pain, yet the respondents who used those words also reported moderate to severe pain. Words such as “ache” or “throbbing” often are associated with mild pain not the moderate or severe pain that was indicated by the VAS scores. The PLWCLBP also chose word descriptors on the SF-MPQ that were reflective of less pain than was their choice on the VAS which translates to a number. It is important for HCPs to understand that PLWCLBP may use words to describe moderate to severe pain that have a connotation different than what might be expected. While this reinforces the need for pain assessment to be done with standardized tools, it also

reinforces the need to make every effort to holistically understand the full pain experience of the individual person.

Conclusion

The results of this study indicate that the amount of State-Anger that PLWCLBP experience is correlated with, and predictive of their pain perception, intensity and behavior. State-Anger, the situation related angry feelings that PLWCLBP experience, was significantly related to pain perception, intensity and behavior, and in fact was predictive of them. Significant gender differences were found with pain behaviors, which may be culturally determined. The findings did not support a gender difference in how PLWCLBP perceive or rate the intensity of CLBP or anger. While there was no clear support that anger rumination is a characteristic of anger among PLWCLBP, the findings do support that it is closely related to both State-Anger and pain behavior among PLWCLBP. The findings underscore the importance of holistic pain assessment and management that is sensitive to the unique perception, intensity and behaviors related to the chronic pain and anger being experienced by the individual.

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Appendix A

Table of Anger Pain Studies

Authors	Year	Article Title	Journal	Aim	Sample	Intervention
Bruehl, al'Absi, France, Harju, Burns, Chung	22007	Anger management style and endogenous opioid function: Is gender a moderator?	J Behav Med (2007) 30:209–219	“explored possible gender moderation of previously reported associations between elevated Trait-Anger-out and reduced endogenous opioid analgesia.”	145 healthy participants (University students)	Naltrexone administered then tests
Bruehl, Chung, Burns, Diedrich	22007	Trait-Anger expressiveness and pain-induced beta-endorphin release: Support for the opioid dysfunction hypothesis	Pain 130 (2007) 208–215	“tested the opioid dysfunction hypothesis of anger-out using an alternative index of opioid function: pain-induced changes in plasma endogenous opioids.”	14 healthy controls and 13 chronic low back pain (LBP) subjects	Plasma beta-endorphin assessed at rest & again following exposure to 3 laboratory acute pain tasks (finger pressure, ischemic, and thermal)
Bruehl, Chung, Burns	22006	Anger Expression and Pain: An Overview of Findings and Possible Mechanisms	Journal of Behavioral Medicine, Vol. 29, No. 6, 2006	“Elevated Trait-Anger-out is associated with increased responsiveness to acute experimental and clinical pain stimuli, and is generally related to elevated chronic pain intensity in individuals with diverse pain conditions. Possible mechanisms for these links are explored.”	none	None ROL
Bruehl, Chung, Burns	22006	Trait-Anger and blood pressure recovery following acute pain: Evidence for opioid-mediated effects	International Journal of Behavioral Medicine 2006, Vol. 13, No. 2, 138–146	“we examined whether TRANG is associated with impaired opioid modulation of blood pressure (BP) recovery”	46 pain-free normotensive controls and 69 normotensive chronic low back pain (LBP) sufferers	In randomized, counterbalanced order received opioid blockade or placebo during separate sessions and underwent ischemic forearm pain task after a finger pressure pain task
Bruehl, Chung, Burns, Biridepalli	22003	The association between anger expression and chronic pain intensity: evidence for partial mediation by endogenous opioid dysfunction	Pain 106 (2003) 317–324	“Recent work suggests that an expressive anger management style (anger-out) is associated with elevated acute pain sensitivity due to endogenous opioid antinociceptive dysfunction. We tested the hypothesis that this opioid dysfunction mediates the previously reported positive association between anger-out and chronic pain intensity”	71 individuals with chronic noncancer-related low back pain.	In randomized, counterbalanced order received opioid blockade or placebo during separate sessions and underwent ischemic forearm pain task after a finger pressure pain task

Authors	Year	Article Title	Journal	Aim	Sample	Intervention
Bruehl, Chung, Burns	22003	Differential effects of expressive anger regulation on chronic pain intensity in CRPS and non-CRPS limb pain patients	Pain 104 (2003) 647–654	“Given the catecholamine-sensitive nature of pain mechanisms in complex regional pain syndrome(CRPS), it was hypothesized that anger-out, but not anger-in, would demonstrate a stronger relationship with chronic pain intensity in CRPS patients than in non-CRPS chronic pain patients.”	34 chronic pain patients meeting IASP criteria for CRPS and 50 non-CRPS limb pain patients	None
Bruehl, Burns, Chung, Ward, Johnson	22002	Anger and pain sensitivity in chronic low back pain patients and pain-free controls: the role of endogenous opioids	Pain 99 (2002) 223–233	“This study tested whether anger variables are associated with impaired endogenous opioid antinociceptive activity, and whether these relationships differed between chronic pain patients and healthy normals.”	43 chronic benign LBP sufferers and 45 healthy pain-free controls	Placebo or opioid Administered
Burns, Quartana, Bruehl	22008	Anger inhibition and pain: conceptualizations, evidence & new directions	Journal of Behavioral Medicine, Vol. 31, 259-279	“Examination of theoretical accounts and suggest and argue points of view”	none	N/A
Burns, Quartana, Gilliam, Gray, Matsuura, Nappi, Wolfe	22008	Effects of anger suppression on pain severity and pain behaviors among chronic pain patients: evaluation of an ironic process model	Health Psychology	“Proposed that attempts to suppress angry thoughts during provocation would increase subsequent pain intensity among CLBP patients”	58 CLBP patients	Suppression & nonsuppression conditions with computer maze test
Burns, Quartana, Bruehl	22007	Anger management style moderates effects of emotion suppression during initial stress on pain and cardiovascular responses during subsequent pain-induction	Ann Behav Med 2007, 34(2):154–165	“To determine whether (a) Trait-Anger-out and/or Trait-Anger-in moderate effects of Emotion-Induction (anger, anxiety) _Emotion Suppression (nonsuppression, experiential, expressive) manipulations during mental arithmetic on pain intensity and cardiovascular responses during and following a cold pressor pain task, such that “mismatch” relationships emerge (preferred anger management style is discrepant from situation demands), and (b) general emotional expressivity accounts for these effects.”	187 Healthy nonpatients	Mental arithmetic and cold pressor stimulation
Burns	22006	Arousal of negative emotions and symptom-specific reactivity in CLBP patients	Emotion, 6, (2), 309-319	“For patients with CLBP relevant muscles are lower paraspinals. Anger may have greater effects on chronic pain severity than other negative emotions and may do so by increasing muscle tension near the site of injury.”	94 with CLBP And 79 controls	

Authors	Year	Article Title	Journal	Aim	Sample	Intervention
Burns, Bruehl, Quartana,	22006	Anger management style & hostility among patients with chronic pain: Effects on symptom-specific physiological reactivity during anger- and sadness-recall interview	Psychosomatic Medicine 68: 786-793	“Examined whether anger-in, anger-out, and hostility predicted symptom specific muscle tension reactivity during anger induction among patients w CLBP”	94 patients with CLBP	Underwent anger re-call and sadness recall interviews
Burns, Bruehl	22005	Anger management style, opioid analgesic use, and chronic pain severity: A test of the opioid-deficit hypothesis	Journal of Behavioral Medicine, Vol. 28, No. 6, December 2005	“If exogenous opioids serve to remediate opioid deficits, we predicted that regular use of opioid analgesics by chronic pain patients would alter these relationships such that anger-out would be related to chronic pain severity only among opioid-free patients.”	136 chronic pain patients	
Burns, Bruehl, Caceres	22004	Anger Management Style, blood pressure reactivity and acute pain sensitivity: evidence for trait x situations models	Annals of Behavioral Medicine, 27, 3, 195-204	“Trait x situation models examined to determine whether relationships between anger-out & pain & anger-in and pain depend on anger provocation’s preceding pain induction & whether pain sensitivity variance explained by anger mgmt style overlapped with variance in harassment induced b/p reactivity”	Healthy people	Mental harassment or cold pressor stimulation
Burns, Kubilus, S Bruehl	22003	Emotion induction moderates effects of anger management style on acute pain sensitivity	Pain 106 (2003) 109–118	“The present study examined whether AMS was related to subsequent pain sensitivity without regard to prior emotion induction, only when a strong negative emotion was evoked, or only when anger was provoked”	64 normal individuals	Cold pressor pain test
Burns, Kubilus, Bruehl and Harden	22001	A fourth empirically derived cluster of chronic pain patients based on the Multidimensional Pain Inventory: Evidence for repression within the dysfunctional group	Journal of Consulting and Clinical Psychology 2001, Vol. 69, No. 4, 663-673	“authors proposed that chronic pain patients with repressive defenses are not represented in current 3-cluster solutions of the Multidimensional Pain Inventory”	178 Pain clinic patients	None
Burns, Higdon, Mullen, Lanskey, Wei	11999	Relationships among patient hostility, anger expression, depression, and the working alliance in a work hardening program.	Ann Behav Med 21 (1): 77-82	“Hypothesized that patient hostility, depressed mood and/or tendency for patient to express anger would be associated negatively with the working alliance between patient and therapist in a work hardening program.”	71 Chronic pain	
Burns, Johnson, Devine, Mahoney, Pawl	11998	Anger management style and the prediction of treatment outcome among male and female chronic pain patients	Behaviour Research and Therapy 36 (1998) 1051±1062	“We expected that patient anger expression or suppression would predict poor outcome following a pain program and that gender differences would emerge.”	101 chronic pain pts	Intensive multidisciplinary program

Authors	Year	Article Title	Journal	Aim	Sample	Intervention
Burns	11997	Anger mgmt style & hostility: predicting symptom specific reactivity among CLBP pts	Journal of Behavioral Medicine, 20, 6, 505-522	“It was hypothesized that Anger mgmt style & hostility aggravated CLBP through symptom specific reactivity during stress”	103 CLBP	Mental arithmetic & Anger Recall Interview
Burns, Johnson , Mahoney , Devine, and Pawl	11996	Anger management style, hostility and spouse responses: gender differences in predictors of adjustment among chronic pain patients	Pain, 64 (1996) 445-453	“Examined whether relationships between anger mgmt styles & adjustment variables for patients with chronic pain depend on patient hostility or gender “	127 chronic pain pts and spouses	None
Carson, Keefe, Lowry, Porter, Goli, Fras	22007	Conflict about expressing emotions and chronic low back pain: Associations with pain and anger	The Journal of Pain, Vol 8, No 5 2007: pp 405-411	Examined the relation of AEE to pain and anger	61 patients with chronic low back pain	
Fernancez, Turk	11995	The scope & significance of anger in the experience of chronic pain	Pain, 61; 165-175	Clinical review	none	
Gelkpof	11997	Laboratory pain & styles of coping with anger	The Journal of Psychology, 131, 1, 121-123	“Hypothesized that the inhibition of the expression of anger as a trait would be correlated to more sensitivity to pain “	21 under grads	Cold pressor test
Greenwood Thurston, Rumble, Waters, Keefe	22003	Anger and persistent pain: current status and future directions	Pain, 103, 1-5	Topical review	none	N/A
Kerns, Rosenberg Jacob	11994	Anger expression and chronic pain	Journal of Behavioral Medicine, Vol. 17, 57-67	“designed to examine the relationship between the intensity of angry feelings and styles of expressing anger and reports of pain intensity, pain behavior frequency, and perceptions of disability and functioning.”	142 chronic pain patients.	
Kinder, Curtiss, Kalichman	11986	Anxiety and anger as predictors of MMPI elevations in chronic pain patients	Journal of Personality Assessment, 50, (4), 651-661	“investigated the relationship between anxiety, anger and anger expression and the elevations for the Hs, D, Hy scales among CBP patients”	77 CBP patients	
Lombardo, Tan, Jensen, Anderson	22005	Anger management style and associations with self-efficacy and pain in male veterans	The Journal of Pain, Vol 6, No 11: pp 765-770	“purpose of the current study was to investigate the relationship between pain and anger management style”	564 veterans with chronic pain	

Authors	Year	Article Title	Journal	Aim	Sample	Intervention
Quartana, Yoon & Burns	22007	Anger suppression, ironic processes and pain	J Behav Med (2007) 30:455–469	<p>“Study 1 was designed to address the basic hypothesis of our model that suppression of anger in the context of anger arousal would enhance subsequent pain experience to a greater degree than not suppressing in the context of anger arousal. We also examined whether pain intensity was related to perceptions of pain confined primarily to the anger-specific element of pain (per ironic process model), or whether pain intensity was related to anger-specific, sensory and general distress dimensions of pain to a similar degree</p> <p>Study 2 was to more thoroughly examine whether suppression-induced increases in the cognitive cognitive accessibility of anger indeed, in part, link anger suppression and pain intensity. Two modifications of Study 1”</p> <p>.....</p>	<p>Study 1 52 under-graduates</p> <p>Study 2 96 under-graduates</p>	Anger and pain induction

Appendix B

Information Letter Conferring Consent

Dear Person Suffering with Back Pain,

You are being asked to take part in this research study because you have back pain. Please read this consent form carefully and take your time making your decision. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

Ann Quinlan-Colwell, RN, is a Pain Clinical Nurse Specialist. She is doing this study as part of a doctoral program in nursing. The study is supervised by Anita Tesh, RN, PhD, Chair of the Department of Adult Health Nursing at the University of North Carolina at Greensboro.

The purpose of this study is to learn more about how people with back pain feel and what reactions they have to pain and other stresses in their lives. If you agree to take part in this study, you will complete 5 surveys. This will take less than 25 minutes. Participation is completely voluntary. You can stop answering the questions at any time, leave questions blank, or decline to participate entirely and it will not affect your health care. You will not put your name on the surveys, so no one will know whether you participated. Completing and returning the surveys in this packet indicates your consent to be in the study. You are not being asked to sign a consent form since no information about you as an individual, not even your name, will be recorded. Ann Quinlan-Caldwell will keep the survey forms for three years, then shred them.

The only risk of participating in this study is that you may not like some of the questions or they may make you feel uncomfortable. Of course, you do not have to answer any question that makes you uncomfortable. Since you will not put your name on the forms there is no risk to your privacy.

You will not get any direct benefits from being in this study. We hope the information learned from this study will help us assist other people with back pain in the future. To thank you for your time, you are being given a gift card to Kohl's worth \$5.

The University of North Carolina at Greensboro Institutional Review Board, which ensures that research involving people follows federal regulations, has approved the study and this consent letter. If you have any questions about the study, you can call Ann Quinlan-Colwell at 910-399-6320 or Anita Tesh at 336-334-4901 at any time. For questions about your rights as a research participant, you can contact Eric Allen, Research Compliance Officer at the University of North Carolina at Greensboro Institutional Review Board (IRB) Office at 336-256-1482. If you chose to participate, please keep this letter so you will have these telephone numbers.

If you are willing to participate, please complete the surveys and return them, in the envelope, to the return box at the receptionist's window. Tell the receptionist that you completed the forms and she will give you the gift card.

If you **do not** want to participate, please just return the blank survey packet (with this letter) to the receptionist so she can give it to someone else.

Thank you for your time,

Ann Quinlan-Colwell, RN, MSN
Anita Tesh, PhD, RN

Appendix C

Demographic Survey

Descriptive Data Form

Sample Number _____

1) Age: _____

2) Gender: _____ **Male** _____ **Female**

3) Race/Ethnicity: _____ **Caucasian** _____ **African American** _____ **Hispanic** _____ **Asian**
_____ **American Indian** _____ **Other, please specify** _____

4) Marital Status: _____ **Married** _____ **Widowed** _____ **Divorced** _____ **Single**
_____ **Committed Relationship**

5) Employment Status: _____ **Employed outside home** _____ **Self-employed** _____ **Retired**
_____ **Unemployed due to pain** _____ **Unemployed not related to pain**

Year pain began: _____

Pain resulted from: _____ **Motor Vehicle Accident** _____ **assault** _____ **unknown cause**
_____ **other type of accident please specify** _____
_____ **illness please specify** _____
_____ **other cause please specify** _____

Pain is like: _____

Any other thoughts about the pain: _____

Thank you.

Appendix E

Pain Behavior Checklist

Below are a list of thoughts, feelings, and behaviors that are common among people with chronic pain. Use the following scale to record how frequently you find yourself thinking, feeling, or doing each of the following. Circle the appropriate number on the scale.

1. Walk with a limp or distorted gait.
0 1 2 3 4 5 6
Never
Very often
2. Move extremely slowly.
0 1 2 3 4 5 6
Never
Very often
3. Walk in a protective fashion.
0 1 2 3 4 5 6
Never
Very often
4. Stoop while walking.
0 1 2 3 4 5 6
Never
Very often
5. Ask myself, "Why did this happen to me?"
0 1 2 3 4 5 6
Never
Very often
6. Become irritable.
0 1 2 3 4 5 6
Never
Very often
7. Ask for help when walking or changing position.
0 1 2 3 4 5 6
Never
Very often
8. Grimace.
0 1 2 3 4 5 6
Never
Very often
9. Clench my teeth.
0 1 2 3 4 5 6
Never
Very often
10. Moan.
0 1 2 3 4 5 6
Never
Very often
11. Take pain medication.
0 1 2 3 4 5 6
Never
Very often
12. Use a cane or some other prosthesis.
0 1 2 3 4 5 6
Never
Very often

13. Become angry.
 0 1 2 3 4 5 6
 Never Very often
14. Tell others not to bother me.
 0 1 2 3 4 5 6
 Never Very often
15. Talk about my pain problem.
 0 1 2 3 4 5 6
 Never Very often
16. Ask someone to do something to help my pain.
 0 1 2 3 4 5 6
 Never Very often
17. Appear upset or sad.
 0 1 2 3 4 5 6
 Never Very often

Appendix F

Anger Rumination Scale

Anger Rumination Scale (ARS) © Copyright 2001 Denis Sukhodolsky. All rights reserved.

Date _____ Name XXXXXXXXXXXXXXXXXXXX Occupation _____ Years of Education _____

Age _____ Gender _____ Ethnic/Racial background _____ Other Information _____

Directions: Everyone gets angry and frustrated occasionally but people differ in the ways that they think about their episodes of anger. Statements below describe different ways that people may be recalling or thinking about their anger experiences. Please, read each statement and then respond by circling the appropriate number for each statement. There are no right or wrong answers in this questionnaire, and your honest responses that best describe yourself are very important. Please, respond to all items.

always Almost Some- Often Almost never times

1. I ruminate about my past anger experiences. 1.....2.....3.....4

2. I ponder about the injustices that have been done to me. 1.....2.....3.....4

3. I keep thinking about events that angered me for a long time. 1.....2.....3.....4

4. I have long living fantasies of revenge after the conflict is over . 1.....2.....3.....4

5. I think about certain events from a long time ago and they still make me angry. 1.....2.....3.....4

6. I have difficulty forgiving people who have hurt me. 1.....2.....3.....4

7. After an argument is over, I keep fighting with this person in my imagination. 1.....2.....3.....4

8. Memories of being aggravated pop up into my mind before I fall asleep.2.....3.....4

9. Whenever I experience anger, I keep thinking about it for a while. 1.....2.....3.....4

10. I have times when I can not stop being preoccupied with a particular conflict. 1.....2.....3.....4

11. I analyze events that make me angry 1.....2.....3.....4

12. I think about the reasons people treat me badly

1.....2.....3.....4

13. I have daydreams and fantasies of violent nature

1.....2.....3.....4

14. I feel angry about certain things in my life

1.....2.....3.....4

15. When someone makes me angry, I can't stop thinking about how to get back at this person.

1.....2.....3.....4

16. When someone provokes me, I keep wondering why this should have happened to me.

1.....2.....3.....4

17. Memories of even minor annoyances bother me for a while.

1.....2.....3.....4

18. When something makes me angry, I turn this matter over and over again in my mind.

1.....2.....3.....4

19. I re-enact the anger episode in my mind after it has happened.

1.....2.....3.....4

Notes: _____

Appendix G
Recruitment Flyer



Are you willing to help us learn more about people living with pain?

Adults with back pain needed to fill out 6 anonymous surveys while waiting today.
Will take less than 30 minutes.

Must be at least 21 years old and able to read and write English.

Participants will receive a \$5 gift card.

Researchers: Ann Quinlan-Colwell, RN, MSN
Anita Tesh, RN, PhD

If interested, ask the office staff for a survey packet.

Appendix H

A Letter of Agreement

THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

Agency Agreement Form

Project Title: Prevalence of Anger in Persons with Back Pain

Project Director: Anita Tesh, MSN, PhD, RN
Ann Quinlan-Colwell, MSN, RN, PhDc

Thank you for taking time to talk to us about our project examining the relationship of anger and back pain. This study is part of doctoral research for Ann Quinlan-Colwell, who is a student in the PhD in Nursing program at the University of North Carolina at Greensboro. Anita Tesh is her dissertation chairperson and supervisor.

Your signature below documents for our Institutional Review Board that you are willing to distribute survey packets to adult patients with back pain, collect the anonymously completed packets in sealed envelopes. As we agreed, you will NOT release any Protected Health Information to us, and you will NOT be responsible for checking to see that surveys were actually completed. As we discussed, each survey packet includes a cover letter that contains the elements of informed consent, and returning the anonymous survey packet will constitute the patient's consent.

If you have any questions about this project, you can call Anita Tesh at (336) 334-4901 or Ann Quinlan-Colwell at (910) 399-6320.

The University of North Carolina at Greensboro Institutional Review Board, which ensures that research involving people follows federal guidelines, has approved this research. Questions about rights of participants in this project can be answered by calling Mr. Eric Allen at (336) 256-1482.

Keep a copy of this form in case you want the phone numbers later.
Thank you for taking time to discuss the project with us.

Signature: _____ Print name: _____

Title: _____

Agency name: _____ Phone #: _____

Address: _____ Date: _____