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A descriptive analysis of alexithymia among patients with chronic back pain

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A DESCRIPTIVE ANALYSIS OF ALEXITHYMIA AMONG PATIENTS WITH CHRONIC BACK PAIN

by

Derek Geoffrey Turesky

An Abstract

Of a thesis submitted in partial fulfillment of the
requirements for the Doctor of Philosophy degree in
Psychological and Quantitative Foundations
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The University of Iowa

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Thesis Supervisors: Professor William Ming Liu
Adjunct Professor Valerie Keffala

ABSTRACT

Chronic back pain is a pervasive and debilitating phenomenon contributing to staggering health costs and a host of psychological, medical, vocational, and social consequences. The etiology of chronic back pain remains unclear and traditional biomedical, psychological, and interdisciplinary treatments have not been completely effective at eliminating pain or restoring long-term functionality. Psychodynamic models of chronic back pain have not been fully explored due to methodological difficulties. Explorations of psychodynamic-related constructs such as alexithymia (i.e., lack of emotional awareness) may offer vital clues to help increase the understanding of chronic back pain.

The purpose of this study was to serve as a preliminary descriptive analysis of alexithymia among patients seeking interdisciplinary treatment for chronic back pain. First, the prevalence of alexithymia in an interdisciplinary treatment seeking sample of patients with chronic back pain and comparisons to other chronic pain and psychosomatic samples were addressed. Second, the relationship between alexithymia and somatic complaints, pain, anxiety, depression, and health-related quality of life was explored. Finally, a meditational analysis was conducted to examine if the relationship between alexithymia and somatic complaints was mediated by negative affect.

Eighty-one patients seeking interdisciplinary treatment for chronic back pain participated in the study. Analyses revealed that 14.8% patients met criteria for alexithymia, which was similar to other chronic pain samples but not significantly different from general medical samples. Higher alexithymia scores were found to be associated with higher levels of somatic complaints, negative affect, and mental-health

related quality of life. Unexpectedly, higher alexithymia scores were also associated with better physical-related quality of life. There were no significant relationships between alexithymia and pain. The relationship between alexithymia and somatic complaints was found to be mediated by negative affect, which was consistent with psychodynamic models of chronic back pain. Findings were discussed in relation to clinical implications and future research.

Abstract Approved: _____
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CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

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has been approved by the Examining Committee
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To my loving family

Feelings, whether of compassion or irritation, should be welcomed, recognized, and treated on an absolutely equal basis; because both are ourselves.

Thich Nhat Hanh, The Miracle of Mindfulness

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Back pain is estimated to affect up to 85% of individuals in the United States at some point in their lives (Andersson, 1999). Given the widespread portion of the population affected by back pain, it is not surprising that back pain is the second most frequent reason for physician visit and the third most likely cause for surgical procedures (Andersson, 1999). The socioeconomic impact of this pervasive problem is staggering with total costs associated with back pain annually in the United States exceeding 100 billion dollars (Katz, 2006). Since back pain is the most common cause for work related disability among individuals younger than 45 years, a large proportion of these total costs are the result of lost wages and reduced workforce productivity. Surprisingly, only 5% of back pain sufferers are responsible for more than 75% of all costs (Katz, 2006). This is attributed to the small proportion of patients who develop chronic back pain symptoms. Most people who develop back pain suffer from acute episodes that usually heal on their own within approximately three months (Claiborne, Vandenburgh, Krause, & Leung, 2002). Accordingly, 90% of workers with back pain return to work and experience relief from symptoms within the three month time span (Andersson, 1999; Katz, 2006). However, symptoms are much more intractable for the small minority of patients who experience persistent and chronic back pain. Chronic back pain is most frequently defined as back pain that persists for longer than three months, which is also the time frame associated with the expected healing rate of tissue (Merskey, 1986).

Chronic back pain has been associated with a host of psychological factors such as depression, anxiety, and lower quality of life (Covington, 2007). Etiologic

explanations remain unclear, which has made treatment difficult. Up to 85% of patients with back pain lack a clear anatomical diagnosis (Deyo & Weinstein, 2001). Additionally, structural abnormalities (e.g., disc degeneration, spinal stenosis, disc herniations) identified by magnetic resonance imaging are reported to be as high as 50% among the general asymptomatic population (Jensen, Brantzawadzki, Obuchowski, Modic, Malkasian, & Ross, 1994). Thus, abnormal structural findings do not provide direct causal evidence to explain chronic back pain symptoms. Subsequently, biomedical approaches such as surgeries and medication management have been largely unsuccessful as interventions (Covington, 2007). There is moderate evidence supporting the efficacy of psychological treatments (e.g., cognitive-behavioral therapy and biofeedback); however, they are not always successful at reducing pain and may only have short-term effectiveness (Hoffman, Papas, Chatkoff, & Kerns, 2007). Referral to interdisciplinary rehabilitation programs has emerged as the treatment of choice to address the myriad of psychological, biological, and vocational factors involved in the chronic back pain experience (Guzmán, Esmail, Karjalainen, Malmivaara, Irvin, & Bombardier, 2001). However, it is unclear which aspects of interdisciplinary treatments are the "active ingredients" responsible for positive outcomes and results are conflicted regarding long-term efficacy (Guzmán et al., 2001).

Psychodynamic Models of Chronic Back Pain

Given the shortcomings of biomedical treatments and the trend toward inclusion of psychological factors within multidimensional pain models (e.g., biopsychosocial and gate control theory), it appears that the psychological domain may hold vital information that could be central to the understanding of chronic back pain. For instance, a host of

emotional factors (e.g., anger, depression, anxiety) have been indicated as risk factors for onset, chronification of symptoms, and responsiveness to treatment for patients with chronic back pain (Linton, 2000). Psychodynamic models take into consideration potential relationships between emotions and their somatic consequences, which may be particularly useful in explaining chronic back pain. Current psychodynamic theory regarding the genesis of psychosomatic illness emerged from Breuer and Freud's (1955) "conversion hysteria," which posited that individuals may unconsciously repress distressing emotions in an effort to lower anxiety by transforming psychological distress into physical somatic symptoms such as chronic back pain. Unfortunately, empirical exploration of psychodynamic models is limited due to the difficulties associated with measuring psychodynamic phenomenon (e.g., repressed emotions). Because this psychodynamic framework has not been fully explored and exposed to rigorous scientific methodology, it may be a fruitful area to explore for future investigations of chronic back pain. Much of the existing psychologically-oriented work on chronic back pain focuses on cognitive-behavioral interventions (e.g., relaxation, cognitive restructuring, guided imagery), biofeedback, and operant conditioning paradigms. However, these interventions and conceptualizations appear to fall short in terms of fully explaining and effectively treating chronic back pain. Based on the preliminary work conducted with psychodynamic models and chronic back pain, there seems to be good reason to pursue further empirical investigation.

Sarno (1974, 1976, 1977, 1991) has been one of the main investigators exploring and treating chronic back pain using psychodynamic conceptualizations. Sarno (1976) postulated that up to 90% of back pain syndromes may be due to a benign and reversible

psychosomatic process he coined *Tension Myositis Syndrome* (TMS). Similar to Freud's earlier work, Sarno (1976) posited that psychosomatic symptoms are unconsciously created in an attempt to avoid conscious awareness of troubling repressed emotions (e.g., anger, anxiety, sadness, grief) and serve to distract attention away from distressing emotional states. Rashbaum & Sarno (2003) explained that these psychosomatic symptoms may be mediated via autonomic pathways, whereby repressed emotionality initiates the autonomic stress response (i.e., hypothalamic-pituitary-adrenal-axis activation), restricts blood flow to affected muscles and nerves, leads to the buildup of harmful metabolites in affected areas, produces sub-clinical decreases in oxygenation, and causes pain. Sarno's (1991) treatment for TMS is psycho-educational in nature and centered on increasing patients' awareness and understanding of how their repressed emotions contribute to the expression of pain. Components of treatment include physician office visits, educational materials, immediate resumption of physical activities, and short-term dynamically-oriented psychotherapy (for approximately 20% of patients). Sarno (1991) reported treatment success rates (i.e., significant reductions in pain and resumption of normal life activities) as high as 88% among TMS patients with CT scan confirmed herniated discs. Sarno's work is intriguing but most of his results are derived from case reports as part of his clinical practice and therefore lack the scientific rigor and methodological quality to draw any strong conclusions. However, preliminary results derived from this work gives direction to future research and warrants further investigations of the relationship between lack of emotional awareness and chronic back pain.

Alexithymia

The construct of alexithymia most closely relates to the lack of emotional awareness mentioned in psychodynamic theory. Sifneos (1973) originally developed the construct of alexithymia (i.e., Greek translation for lack of words for emotions) in response to his observations of psychosomatic patients to represent a set of features characterized by the following: (a) a lack of emotional awareness, (b) difficulty identifying and describing emotions, (c) a poverty of a fantasy life, and (d) an excessive externally-oriented occupation with physical symptoms and external events. Alexithymia is a continuous variable, which is normally distributed in the general population (Taylor, Bagby, & Parker, 1997). Prevalence estimates of alexithymia among the general adult population are approximately 14-19% and between 30-40% among the general population of psychiatric out-patients (Taylor, Bagby, & Parker, 1991; Taylor, Parker, Bagby, & Acklin, 1992; Todarello, Taylor, Parker, & Fanelli, 1995). Among mixed chronic pain samples, alexithymia prevalence rates ranged from 34% to 100%; however, when means are weighted and pooled across several studies rates are estimated at 50% (Kreitler & Niv, 2001).

Although there has been considerable work exploring alexithymia among chronic pain samples, many of the studies report results on mixed patient samples with a variety of pain diagnoses and some of the investigations use alexithymia measures lacking appropriate reliability and validity (e.g., Thematic Apperception Test and Rorschach). Consequently, limited studies explore alexithymia using psychometrically sound measures among samples with a primary diagnosis of chronic spine (back and/or neck) pain. However, existing work provides preliminary support for a relationship between

alexithymia and chronic back pain. For example, Mehling and Krause (2005) examined the relationship between alexithymia and the 12 month prevalence of low-back pain in a sample of 1180 San Francisco municipal transit operators. The authors reported that those participants who rated themselves in the uppermost quartile on an alexithymia characteristic (i.e., difficulty identifying feelings) had a twofold odds increase for having low back pain.

With the potential for such high rates of alexithymic characteristics in chronic back pain samples, it is essential that research begins to address the potential implications this may have on intervention outcomes and subsequent health costs. Although it may be a vitally important consideration, most of the extant chronic back pain investigations neglect to consider the potential impact of alexithymia.

Alexithymia also appears to be associated with depression but the extent of this relationship is unclear. Honkalampi, Hintikka, Tanskanen, Lehtonen, and Viinamaki (2000) found that the prevalence of alexithymia was 8 times higher (32%) in individuals reporting to be depressed on the Beck Depression Inventory (BDI) compared to those individuals that were not depressed (4%). Alternatively, other factor analytic investigations report that alexithymia and depression are separate factors. Using the BDI and the Toronto Alexithymia Scale (TAS), Parker, Bagby, and Taylor (1991) reported these scales were mostly identified to be separate non-overlapping constructs, whereby the BDI only cross-loaded on 1 of the 4 factors of the TAS (i.e., factor 2—awareness of feelings). Based on conflicting findings of previous work, further investigation is indicated exploring the relationship between alexithymia and depression. In particular,

the literature is unclear regarding the extent to which depression contributes to the relationship between alexithymia and somatic symptoms.

The purpose of this study is to further the investigation of the psychodynamic conceptualization of chronic back pain (e.g., TMS). Previous work is largely based on clinical case reports, which point to the lack of emotional awareness as the central contributing factor to the manifestation of chronic back pain. Development of reliable and valid measures related to the lack of emotional awareness (e.g., Toronto Alexithymia Scale) provide a starting point to begin a more systematic and empirically-based means of investigating previous psychodynamic concepts among patients with chronic back pain. There is limited work using psychometrically sound alexithymia measures among patient samples with primary complaints of chronic back pain and there is no known previous investigation of alexithymia among patient samples seeking interdisciplinary treatment for chronic back pain. The literature is also unclear regarding the influence of negative affect on the relationship between alexithymia and physical symptoms. In response, this study will serve as a preliminary descriptive analysis of alexithymia exclusively among patients seeking interdisciplinary treatment for chronic back pain. Particularly, this study will address the following goals: (a) compare the prevalence rates of alexithymia among an interdisciplinary treatment seeking sample of patients with chronic back pain to other chronic pain and psychosomatic samples, (b) examine the relationship between alexithymia and somatic complaints, pain, anxiety, depression, and health-related quality of life, and (c) explore the influence of negative affect (e.g., depression and anxiety) on the relationship between alexithymia and physically-related symptom measures (e.g., somatic complaints and pain).

Potential implications of this study include that it would be the first investigation of its type to explore the alexithymia construct among a sample of patients seeking interdisciplinary treatment for primary complaints of chronic back pain. Subsequently, this investigation may foster a better understanding of alexithymia prevalence rates among patients presenting to interdisciplinary treatment clinics with chronic back pain and also clarify the potential relationships between alexithymia and other physically-related (e.g., somatic complaints and pain) and psychologically-related (e.g., depression, anxiety, health-related quality of life) variables. In addition, this study will help to address the potential influence that negative affect may exert on the association between alexithymia and physical symptoms, which may help to support or refute Sarno's (1976) psychodynamic conceptualization of TMS (i.e., If negative affect mediates the relationship between alexithymia and physical symptoms, then results will be consistent with psychodynamic theory).

Increasing our knowledge regarding the role of negative affect may have major implications for how future interventions are targeted. For example, if research evidence supports the lack of emotional awareness (e.g., low awareness of depression) as an underlying causative factor for a subset of patients seeking interdisciplinary treatment for chronic back pain, then interventions can be modified to focus on processes related to increasing emotional awareness and identification. Thus, the present study may provide a basis for future investigations to explore the influence of alexithymia on chronic back pain treatment outcomes. Ultimately, the hope is that this research will help build the groundwork necessary to improve the effectiveness of chronic back pain interventions,

unravel the etiology of chronic back pain syndromes, and reduce the health-care costs associated with chronic back pain symptoms and treatment.

Hypotheses Studied

This study examined the following hypotheses:

Hypothesis 1a and 1b

(1a) It was expected that patients seeking interdisciplinary treatment for chronic back pain would have higher alexithymia scores (TAS-20) than other medical patient samples (e.g., Kooiman, Bolk, Brand, Trijsburg, & Rooijmans, 2000) and (1b) similar scores to other chronic pain samples (e.g., Kosturek, Gregory, Sousou, & Trief, 1998).

Hypothesis 2a and 2b

(2a) It was expected that alexithymia would be negatively related to health-related quality of life and (2b) positively related to somatic complaints, pain complaints, depression, and anxiety

Hypothesis 3

(3) It was expected that if there was a significant relationship between alexithymia and physically-related symptoms (e.g., somatic complains, pain complaints), this relationship would be mediated by negative affect (e.g., depression and anxiety) (e.g., Lundh & Simonsson-Sarnecki, 2001).

CHAPTER II

LITERATURE REVIEW

Background

Chronic back pain is a pervasive and debilitating phenomenon contributing to a host of psychological, medical, vocational, and social consequences. It is estimated that up to 85% of all people will encounter some form of back pain at some point in their lives (Andersson, 1999). The impact of back pain in the U.S. is reflected in it being the most frequent cause for limitations in activity for individuals younger than 45 years and the third most common cause for physical limitation and disability among the entire population (Andersson, 1999; Flor & Turk, 1984). In addition, back pain is the second most common reason for physician visits and the third most frequent cause of surgical interventions (Hart, Deyo, & Cherkin, 1995; Taylor, Deyo, & Cherkin, 1994). From an economic perspective, back pain has led to staggering lost wages and health costs exceeding 100 billion dollars annually (Katz, 2006).

The classifications of what qualifies back pain as "chronic" are not consistent in the literature. Whereas some investigators define chronic back pain as a nonmalignant pain lasting at least 3 months (Guzmán, Esmail, Karjalainen, Malmivaara, Irvin, & Bombardier, 2001), other researchers require the pain to persist a minimum of 6 months (Flor & Turk, 1984). In most cases, chronic pain refers to pain that persists beyond the expected rate of healing tissue, which is estimated to be approximately 3 months (Merskey, 1986). Thus, for the purposes of this review all back pain that persists for greater than 3 months will be referred to as chronic.

Etiology

The difficulty in accurately defining the construct of chronic back pain is also reflected in the lack of clarity in identifying a unifying etiological mechanism. Several biomedical and psychological etiological models have been proposed.

Biomedical

Flor and Turk (1984) posited several potential biomedical etiologic models for chronic back pain and categorized them according to their suspected pathogenesis: inflammatory (e.g., nerve root inflammation), degenerative (e.g., disc herniations), structural (e.g., congenital spinal deformities), traumatic (e.g., specific injury to the back/spine), and muscular (e.g., muscle spasm). Of these potential pathways, Flor and Turk (1984) articulated that the most commonly cited biomedical explanation for chronic back pain is degeneration of the intervertebral disc. Particularly, previous work points to disc bulges and/or ruptures leading to increased pressure to the adjacent nerve roots as the cause of disc degeneration-related chronic back pain.

Interestingly, although this process has been well documented by radiologic procedures and magnetic resonance imaging (MRI), there is no existing explanation for how this causes pain. More specifically, disc degeneration has been found to be a normal part of the aging process and abnormal imaging has been reported among healthy asymptomatic controls (Covington, 2007; Flor & Turk, 1984). For example, Jensen, Brantzawadzki, Obuchowski, Modic, Malkasian, and Ross (1994) examined MRI scans among 98 asymptomatic "healthy" participants and found that 64% of participants had abnormal intervertebral discs, 52% of participants had a least one disc bulge, and the number of disc bulges was positively correlated to age. Borenstein, and colleagues (2001)

showed that not only were structural abnormalities shown on MRI a normal part of the aging process and not always related to pain, but also that abnormal MRI findings (e.g., herniated discs, stenosis, bulging discs, disc degeneration) among asymptomatic individuals were not predictive of back pain 7 years later. Thus, these results are consistent with other findings in that there is no clear relationship between structural abnormalities and chronic back pain. In fact, the relationship among all of the previously mentioned biomedical explanations and chronic back pain remains unclear.

Psychological

Due to the many shortcomings of biomedical explanations for chronic back pain, several psychological theories have been proposed as potential contributory mechanisms.

Behavioral

Fordyce, Fowler, Lehmann, and DeLateur's (1968) seminal work introduced the idea of "pain behaviors," which include the specific auditory and visual signals of pain as expressed by the pain patient to their surrounding environment (e.g., grimacing, complaining, altered gait, decrease in activity, requesting medications). The authors indicated that if these pain behaviors are positively reinforced in the patient's environment (e.g., patient's spouse responds in nurturing manner in response to the patient's cries of pain), they will increase in frequency and increase the likeliness that the pain, disability, and suffering will persist. In this sense, chronic pain is conceptualized as a consequence of the operant conditioning process and treatment (see below) is focused on decreasing reinforcement of "pain behaviors" while simultaneously increasing reinforcement of "well behaviors" (e.g., increasing activity and decreasing pain medications; Fordyce, Fowler, Lehmann, DeLateur, Sand, & Trieschmann, 1973).

As evident with the operant model, chronic pain sufferers may also derive secondary benefits for their elicitation of pain behaviors. Examples of these secondary benefits that may come to carry reinforcing qualities are commonly referred to as "secondary gain," which includes responses to pain behaviors such as eliciting caretaking, evoking empathy from others, and avoiding unpleasant jobs (Covington, 2007). Thus, individuals may be more likely to maintain pain behaviors chronically over time if they are receiving these motivating reinforcements from their environment.

Another potential behavioral explanation for chronic back pain is the "fear avoidance model of exaggerated pain perceptions," which explains how physical deconditioning (e.g., muscle atrophy and decrease in cardiovascular conditioning) results from the avoidance of activities that have become classically conditioned with pain as the unconditioned stimulus (Lethem, Slade, Troup, & Bentley, 1983). For example, an individual may develop a fear of injury if he or she encounters pain during a workout at the gym. Consequently, this individual may associate the pain with the workout and fear further injury of his or her back. Thus, the individual may choose to engage in phobic avoidance of subsequent physical exercise (conditioned response), which may lead to tangible physical deconditioning effects that may ultimately lead to increases in pain and the chronification of his or her pain experience (Roelofs, Boissevain, Peters, Jong, & Vlaeyen, 2002).

Cognitive

Cognitive models of chronic pain include a focus on appraisals and beliefs related to the pain experience. In particular, appraisals of pain are separated into the primary appraisal, which is the subjective perception of whether the pain is harmful or benign,

and the secondary appraisal, which is an internal evaluation of one's potential to control and cope with the pain based on their available coping resources (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Beliefs are defined in the context of the meaning that one ascribes to the pain and subsequent ability to maintain functioning despite being in pain (Turk & Rudy, 1986). If individuals' beliefs about their pain are distorted (e.g., "Because I am in so much pain, I can't be productive in any way."), cognitive models explain how this could lead to decreases in sense of competence and increase feelings of helplessness (Novy, 2002). Both maladaptive pain appraisals and beliefs (e.g., pain signifies bodily damage and pain is uncontrollable) have been shown to be associated with poorer adjustment to chronic pain (Turner, Jenson, & Romano, 2000).

Of the several types of cognitive distortions (e.g., all-or-nothing thinking, overgeneralization, catastrophizing), catastrophizing has emerged as a prominent feature of many chronic pain sufferers (Beck, Rush, Shaw, & Emery, 1979; Gatchel et al., 2007). There is substantial evidence to support the role of decreased catastrophizing as a mediating factor of improved adjustment to chronic back pain (e.g., decreased pain intensity; Smeets, Vlaeyen, Kester, & Knottnerus, 2006). In addition, catastrophizing has also been found to be a predictor of chronic pain onset among prospectively studied samples of the general population (Severenijns, Vlaeyen, van den Hout, & Picavet, 2005).

Affective

Emotions and chronic back pain will be discussed in detail in the next section.

Multidimensional

As evidenced by the lack of consistency among the array of biomedical and psychological explanations, chronic back pain remains an elusive phenomenon. However, developments in the field have led to the convergence and acceptance of both psychological and biological factors within multidimensional pain models such as the gate control theory of pain (Melzack & Wall, 1965). Melzack and Wall (1965) recognized the deficiencies of earlier biomedical models of nociception and extended them to include psychological factors. More specifically, the gate control theory posits that psychological factors such as past experience, emotion, and attention can function to modulate the pain experience via non-nociceptive inhibitory pathways in the brain and spinal cord (e.g., substantia gelatinosa). Thus, psychological factors may be directly involved in either exacerbating or mitigating the pain experience.

More recently, the biopsychosocial model has gained widespread acceptance in its application to the understanding and treatment of chronic pain disorders (Gatchel et al., 2007). The biopsychosocial approach considers not only nociception but also individuals' perception and response to pain given their unique set of biological, psychological, and social factors. Moreover, these three dimensions are conceptualized to be dynamically interrelated in the manner in which they contribute to chronic pain. Accordingly, interdisciplinary chronic pain treatment programs have been developed to treat all of the aspects represented by the biopsychosocial model (e.g., emotional disorders, maladaptive cognitions, physical deconditioning, vocational/environmental concerns, nociceptive

dysregulation). Thus, the effects of this paradigm shift in conceptualizing chronic pain are reflected in the subsequent development of new treatment modalities.

Treatment

Biomedical

A full review of biomedical treatments for chronic back pain is beyond the scope of this review. However, in order to provide the reader with a sufficient context of the shortcomings of biomedical interventions, this paper will briefly outline several of the more commonly utilized biomedical approaches.

Examples of biomedical treatment approaches for chronic back pain include pharmacotherapy (e.g., opioids, non-steroidal anti-inflammatory drugs, antidepressants), interventional pain management strategies (e.g., nerve blocks, steroid injections, surgeries), and reconditioning therapies (e.g., physical therapy; Covington, 2007). At best, these treatments have only shown to provide temporary pain relief. In addition, biomedical treatment approaches present a myriad of potential complications and risks for patients. For example, opioid therapy for chronic pain carries substantial risks such as opioid addiction and respiratory depression.

Furthermore, the effectiveness of surgeries (e.g., fusions and laminectomies) among chronic back pain sufferers is questionable and has been shown to be associated with poor outcomes in several studies (e.g., Leclaire, Fortin, Lambert, Bergeron, & Rossignol, 2002). In fact, some studies have found that approximately 70% of patients undergoing lumbar fusion surgery reported that their pain was worse after surgery and that they continue to be unable to work (Franklin, Haug, Heyer, McKeefrey, & Picciano, 1994). Consistently, in Krismer's (2002) review of the literature of lumbar spine fusion

surgeries, he found overwhelmingly that there was no clear evidence to support the efficacy of surgery for back pain. In a randomized clinical trial among 64 patients with chronic back pain with radiographic evidence of disc degeneration, Brox and colleagues (2003) reported that there was no significant difference in improvement between patients receiving lumbar fusion surgery or cognitive intervention with physical exercises. Because of their limited efficaciousness, there is also evidence to suggest that surgeries are not a cost effective use of healthcare resources compared to less expensive and equally efficacious interdisciplinary treatments (Rivero-Arias, Campbell, Gray, Fairbank, Frost, & Wilson-MacDonald, 2005). Thus, given the apparent shortcomings of various biomedical approaches, traditional medical interventions have not been sufficient to account for the range of potential factors associated with chronic back pain and other treatment modalities must be considered.

Psychological

As evident from the brief survey of various biomedical approaches to chronic back pain, strictly biomedical models of chronic pain treatment have been largely unsuccessful in providing relief to back pain sufferers. Given the limitations of biomedical approaches and the apparent inconsistencies in structural/biomedical explanations of chronic pain, these findings are suggestive that additional factors need to be considered in the chronic back pain experience. The evolution of multidimensional models of chronic pain, such as the gate control theory, call for the consideration of psychological factors in addition to biomedical pathways in treating chronic pain. Chronic back pain treatments have responded accordingly with the inclusion of several psychological modalities.

Operant conditioning

Fordyce's (1968) seminal work integrated the operant conditioning model into early pain rehabilitations programs. Treatment focused on extinguishing reinforcement of pain behaviors and increasing reinforcement of well behaviors. These early interventions usually took place in well-controlled hospital settings and required the active participation of both staff and family members. Several studies have demonstrated the efficacy of operant-behavioral treatment for chronic pain; however, the mechanism of change is unclear (Novy, 2004). Overall, studies have shown that operant-behavioral treatment has been associated with significant reductions in medication use, increases in activity level, and return to work (Anderson, Cole, Gullickson, Hudgens, & Roberts, 1977; Fordyce, Fowler, Lehmann, DeLateur, Sand, & Treischman, 1973). However, other investigators caution that treatment gains subsided in the absence of continuation of reinforcements and that reinforcements do not generalize outside the context of treatment (Turk & Flor, 1984).

Cognitive-behavioral therapy

Cognitive-behavioral therapy (CBT) treatment for chronic pain focuses on altering maladaptive thoughts, behaviors, and emotions related to the experience of pain and includes multiple treatment components (e.g., psycho-education, relaxation, cognitive restructuring; Turk & Flor, 1984). Several randomized-controlled studies have been conducted comparing CBT to other treatment modalities and no-treatment control groups and there is moderate evidence for its efficacy among chronic pain samples. In a meta-analysis of 25 randomized controlled trials exploring the effectiveness of CBT treatments among chronic pain patients, Morley, Eccleston, and Williams (1999) found

that CBT treatments were superior to waitlist control groups on all outcomes such as pain experience, mood/affect, cognitive coping and appraisal, and behavioral activity. The authors also reported that CBT treatments were associated with more positive changes and larger effect sizes on measures of pain experience, cognitive coping and appraisal, and reduced behavioral expression of pain compared to alternative active treatments (e.g., physiotherapy, bibliotherapy, standard medical care). In a more recent meta-analysis, Hoffman, Papas, Chatkoff, and Kerns (2007) examined the efficacy of psychological interventions, including CBT, among adults with chronic low back pain. Analyses revealed that CBT treatments were associated with moderate to large effect sizes on measures of pain intensity but no significant effects were found for CBT on depression outcomes. In fact, the authors' analyses suggest that treatments such as biofeedback may be superior to CBT in improving depression outcome measures among chronic back pain sufferers.

Biofeedback

Biofeedback training typically involves increasing an individual's awareness and voluntary control over physiologic processes usually reserved for autonomic management (e.g., temperature regulation, muscle tension, sweating, vasoconstriction; Covington, 2007). Few quality controlled studies exist supporting the efficacy of biofeedback for chronic back pain and results are mixed among extant work. For example, Flor and Birbaumer (1993) explored the effectiveness of electromyographic biofeedback compared to CBT and conservative medical treatment among chronic musculoskeletal pain sufferers (i.e., back and temporomandibular joint pain). Results revealed that biofeedback treatment was superior to CBT and conservative medical treatment. More

specifically, of those individuals receiving biofeedback, 40% displayed an improvement of at least 2 standard deviations on a measure of pain severity at a 6-month follow-up compared to only 17% in the CBT group and 8% in the medical treatment group. Biofeedback group members also sustained these improvements on pain severity at a 24-month follow-up compared to other groups. Alternatively, in a systematic review of 5 randomized clinical trials exploring the effectiveness of electromyographic biofeedback on chronic back pain, van Tulder, Maurits, Koes, and Bouter (1997) found that 4 of the 5 studies reviewed reported negative results and concluded that this provides limited and preliminary evidence that biofeedback is not effective for chronic low back pain.

Psychodynamic

Psychodynamic treatment approaches will be discussed in detail in the next section of this review.

Interdisciplinary/Multidisciplinary

Due to the equivocal results of unimodal treatments and the indication for psychological, biomedical, social, and vocational factors in chronic pain, interdisciplinary rehabilitation programs have become an increasingly popular intervention. Moreover, interdisciplinary treatments are also consistent with multidimensional pain models such as the gate control theory (Melzack & Wall, 1965). It is important to note that interdisciplinary interventions reflect a team-based approach to patient care, which is characterized by active communication and collaboration between various treatment modalities (e.g., psychologists, physicians, physical therapists, vocational counselors). Alternatively, multidisciplinary interventions refer to patient care via multiple treatment modalities in the absence of intercommunication between disciplines. However, since

they are discussed interchangeably in the literature, for ease of this review this paper will refer to both interdisciplinary and multidisciplinary interventions as interdisciplinary.

Flor, Fydrich, and Turk (1992) conducted a meta-analysis exploring the efficacy of interdisciplinary pain treatment among 65 controlled and non-controlled studies. Thus, the quality of the studies included in this meta-analytic review is questionable and results should be interpreted with caution. The authors reported that 75% of those patients treated by interdisciplinary programs reported better functioning compared to patients undergoing conventional or unimodal treatment even at long-term follow-ups. In objective functional measures such as return to work, interdisciplinary patients were approximately twice as likely to return to work compared with patients that were untreated or undergoing unimodal treatment. In an examination of effect sizes, the mean percentage change among all outcome variables (e.g., somatic, psychophysiological, behavioral, pain) at short-term follow-up (< 6 months) was 40% for interdisciplinary patients versus 6% for the control groups. At long-term follow-up (> 6 months), mean percentage changes were 48% for interdisciplinary patients and 24% for the control groups.

More recently, Guzmán and colleagues (2001) conducted the only extant systematic review of interdisciplinary rehabilitation treatments for chronic back pain that included only randomized controlled trials. This study focused on the results of 10 such trials (12 randomized controlled comparisons), which was composed of a total of 1964 participants with chronic back pain. The authors concluded that there is strong evidence to support the claim that intensive interdisciplinary rehabilitation treatment improves functioning compared with non-interdisciplinary treatments. The authors indicated that

there was only moderate evidence that interdisciplinary treatment improves pain compared to non-interdisciplinary treatment and usual care. Results regarding vocational outcomes were unclear. Finally, this review indicated that less intensive interdisciplinary treatments (i.e., < 30 hours) may not be as effective as more intensive interdisciplinary treatment (i.e., > 100 hours) for pain, function, and vocational outcomes.

Although studies have provided support for the short-term efficacy of interdisciplinary chronic pain treatments, few studies have explored long-term results. In an examination of extended long-term outcomes of interdisciplinary treatments, Patrick, Altmaier, and Found (2004) conducted a 13-year follow-up among 26 chronic back pain patient completers of an interdisciplinary rehabilitation program. Results revealed that participants maintained or improved on several outcome measures (e.g.., negative mood, pain rating, present pain intensity) over a span of 13 years post-treatment. From a functional standpoint, 50% of the sample had returned to work at 13-year follow-up and of those non-employed participants, most reported that chronic back pain was not related to their non-employment.

Taken together, these results support the efficacy of interdisciplinary pain rehabilitation programs in several areas including reducing pain and improving functioning. Treatment gains also appear to be sustained over time. However, due to the over-inclusive approach of interdisciplinary treatment, we are still unsure about what works. Thus, it would be helpful for future research to elucidate more clear targets for intervention and to unravel the "active ingredients" of existing interdisciplinary interventions

Emotion and Chronic Pain

Emotion and Somatic Changes

Although most of the advances in understanding the dynamic interconnection between the mind and body have been made in the past century, and even more specifically within the past few decades, the philosophy is unoriginal. Over 2000 years ago, Hippocrates suggested considering psychological factors in addition to physiological aspects of health. In fact, most historical cultures adopted mind-body conceptualizations of health and illness up until the time of the Renaissance when Rene Descartes argued in favor for a dualistic view of the mind and body (Lloyd & Dunn, 2007). Cannon's (1932) discovery of the neuroendocrine response to stressful stimuli in animals (i.e., "fight or flight") catalyzed a flurry of mind-body research. Most notably in the progression of the field, Selye (1956) extended Cannon's work on stress with his recognition of the deleterious effects of prolonged stress on the body via the hypothalamic-pituitary-adrenal axis (HPA axis).

There has since been a paradigm shift occurring in modern medicine represented by an explosion of research exploring the effects of psychological factors on biological health. Engel (1977) recognized this paradigm shift when he called for a new model in medicine to more holistically consider biological, psychological, and sociological aspects of health within the framework of his "biopsychosocial" model. Concurrent with this shift in medicine, Benson (1975) popularized the "relaxation response" and explained how transcendental meditative practices could be utilized to activate the parasympathetic nervous system to effectively lower blood pressure and prevent heart disease. Similarly, scientific evidence supporting linkages between psychological, neuroendocrine, and

immunological systems engendered the development of the field of psychoneuroimmunology. In particular, Ader and Cohen (1975) first demonstrated that the immune system was amenable to behavioral conditioning with their classic experiment showing that rats given saccharine infused water plus an immunosuppressant would eventually show immunosuppressant effects in response to the inert conditioned stimulus (i.e., saccharine water without immunosuppressant). More recently, psychoneuroimmunology research has continued to demonstrate the powerful effects of psychological factors on biological health in a vast array of disease/healing processes such as cancer, AIDS, and wound healing (Antoni, 2003; Antoni et al., 2006; Kiecolt-Glaser, Marucha, Mercado, & Glaser, 1995).

Emotion and Chronic Back Pain

A host of emotional factors have been indicated as risk factors for onset, chronification of symptoms, and responsiveness to treatment for patients with chronic back pain (Linton, 2000). For example, studies have addressed such psychological phenomenon as depression, anxiety, and anger in an attempt to unravel the complex etiology of chronic back pain. Although associations between psychological factors and chronic back pain have been established, there is still uncertainty about the direction of causality. For example, it is difficult to determine if depression may be a precipitating variable that causes chronic back pain when depression may also occur as a result of the suffering, physical limitations, and changes in lifestyle subsequent to having chronic pain. Although the literature reflects the struggle in disentangling the intricate relationship between psychological factors and chronic back pain, a better understanding

of these relationships would be helpful to illuminate potential keys areas for further exploration and future interventions.

Depression

Bank and Kerns (1996) estimated that between 30-54% of chronic pain sufferers meet criteria for a diagnosis of major depression and depression has also been consistently associated with chronic back pain in several studies. In Linton's (2000) review of prospective studies exploring mood and depression with chronic back pain, he reported that depression was consistently found to increase the risk for pain in 14 out of 16 studies. Although a link between depression and chronic back pain has been clearly established, it is unclear which diagnosis precedes the other. The literature is divided on this issue and presents suggestive evidence on both sides of the argument. The consequence hypothesis argues that depression is a consequence of chronic pain and the antecedent hypothesis contends that depression precedes chronic pain. Fishbain, Cutler, Rosomoff, and Rosomoff (1997) reviewed 40 studies surrounding this debate and concluded that the evidence was more supportive of the consequence hypothesis (i.e., pain precedes depression).

Alternatively, several longitudinal population studies have reported results consistent with the antecedent hypothesis (i.e., depression precedes pain; Fishbain et al., 1997). For example, Caroll, Cassidy, and Cote (2004) found that in a random population-based sample, those participants in the uppermost quartile of depression scores had a four-fold increase in risk of troublesome neck or back pain compared to those participants in the lowermost quartile of depression scores. In a more recent study, Currie and Wang (2005) explored the relationship between depression and chronic back pain in

a sample of 9909 pain-free individuals that were part of a national health survey and followed them over a period of 24 months. Results revealed that pain-free individuals diagnosed with major depression at baseline were approximately 3 times as likely to develop chronic back pain at the next time point compared to other non-depressed participants. Thus, findings of several studies are indicative of a clear relationship between depression and chronic back pain but the direction of causation remains unclear.

Anxiety and Anger

In addition to depression, psychological factors such as stress, anxiety, and anger have also been associated with chronic back pain (Burns, Quartana, & Bruehl, 2008; Linton, 2000). For example, Linton (2000) reported in his review that of the 11 prospective empirical studies that reported results on stress, distress, or anxiety, all 11 studies found significant relationships between these psychological factors and chronic neck and/or back pain. In the area of anger research, Kerns, Rosenberg, and Jacobs (1994) supported the argument for the role of anger and difficulty in anger expression as a potential etiologic contributor in chronic pain. In particular, the authors explored anger intensity and expression among 142 chronic pain patients. Results revealed that inhibition of anger expression was the most robust predictor of pain intensity and pain behaviors among a host of other variables such as depression and pain history.

In summary, chronic back pain has been shown to be associated with several psychological factors including depression, anxiety, and anger. Although these associations appear to be consistent and robust in the literature, the direction of causality remains unclear. However, this evidence is extremely important for several reasons. First, associations of psychological factors in chronic back pain are consistent with

multidimensional models of chronic pain and indicate the importance of understanding this phenomenon with consideration of the mind-body connection. Second, indications that inhibition of negative emotions may be related to chronic pain onset, set the stage for the application of psychodynamic conceptualizations of the chronic pain experience as will be discussed below.

Psychodynamic Models of Chronic Back Pain

Consistent with the literature supporting the linkage between psychological factors and chronic back pain, current psychosomatic models explain back pain as being intimately connected to emotions and stress. These psychosomatic models have their roots in psychodynamic theory dating back to Freud and point to the psychological process of emotional repression as the major culprit responsible for chronic back pain. In their theory of "conversion hysteria," Breuer and Freud (1955) popularized the notion that individuals may unconsciously repress distressing emotions in an effort to lower anxiety by transforming psychological distress into physical somatic symptoms (e.g., chronic back pain).

Such psychodynamic conceptualizations of chronic pain pose many measurement difficulties which have made empirical studies difficult. Despite this, psychodynamic features are evident in several theories of chronic pain. For example, psychodynamic explanations for chronic back pain have been discussed since the 1940's. Sargent (1946) was one of the first to recognize the pattern and influence of psychological factors among his military veteran patients complaining of backache. Based on his clinical work, he postulated that his patients with back pain could be categorized into three groups: (a) organic disease alone, (b) hysterical conversion symptoms, and (c) muscular tension.

Remarkably, Sargent reported that only 4% of his patients fit into the designation of the first group (i.e., back pain due to organic disease alone). Sargent observed that the largest proportion of his patients were classified as having back pain due to the somatic manifestation of anxiety, stress, and other emotional states into muscle tension. Interestingly, he noted several case examples whereby back pain symptoms were relieved with psychotherapy. Consistent with Sargent's realizations, Blazer (1948) also recognized back pain as a psychosomatic problem in his presentation of the case of a 40 year-old man with disabling back pain. Blazer reported that this man's symptoms occurred close to the time of his wife's death and were psychosomatically manifested. Engel (1959) described the "pain-prone" patient as being more likely to enact strategies such as the manifestation of pain in order to maintain the unconscious inhibition of emotion and to satisfy psychological states such as guilt or loss via physically-centered outlets.

In the mid-1970's, John Sarno furthered the psychodynamic conceptualization of chronic back pain by building off of the previous work of his colleagues. He recognized similar patterns among his patients as described in the reports above, which eventually led him toward the development of a new diagnostic conceptualization and treatment approach for chronic back pain (Sarno, 1974). In response to his realization that many of his patients' structural abnormalities (e.g., bulging discs, degenerative disc disease, scoliosis) were found to be equally prevalent in the asymptomatic general population, paired with evidence to suggest that chronic back pain may correlate more closely with psychological factors, he formulated a psychosomatic approach to treatment (Sarno, 1976).

In particular, Sarno's (1976) psychodynamically-based theory posited that psychosomatic symptoms (i.e., chronic back pain) are unconsciously created in an attempt to avoid conscious awareness of distressing repressed emotions (e.g., anger, anxiety, sadness, grief). Thus, the pain serves to distract attention away from distressing emotional states. However, it is important to note that this psychosomatic manifestation produces "real" physical symptoms and is not considered to be a conversion disorder, malingering, or hypochondriasis (Schechter, Smith, Beck, Roach, Karim, & Azen, 2007). Rashbaum and Sarno (2003) explained that these psychosomatic symptoms are mediated via autonomic pathways. Specifically, repressed emotionality is said to initiate the autonomic stress response (i.e., hypothalamic activation), which ultimately restricts blood flow to affected muscles and nerves. This restriction of blood flow is hypothesized to lead to ischemia (i.e., sub-clinical decrease in oxygenation) and a build-up of harmful lactic acid metabolites, which subsequently results in soft tissue pain, muscle spasm, and even sciatica (Sarno, 1991).

Sarno (1976) postulated that up to 90% of back pain syndromes may be due to this benign and reversible psychosomatic process, which he originally referred to as "Tension Myositis Syndrome" (TMS). Diagnosis of TMS relies on clinical examination along with consideration of several other diagnostic criteria rather than on one definitive measure. First, structural explanations for pain (e.g., tumors, nerve impingement, fractures) are ruled out. However, not all abnormal structural findings (e.g., disc degeneration) prohibit a TMS diagnosis. In addition, the physician assesses other diagnostic criteria such as a history of other psychosomatic disorders (e.g., irritable bowel syndrome, tension headaches), indications of relief with distraction, timing of symptom

onset, symptom substitution/migration of symptoms, and certain personality characteristics (e.g., perfectionism, self-critical, need to be pleasant and nice).

Sarno's (1991) treatment for TMS is psycho-educational in nature and centered on increasing patients' awareness and understanding of how their repressed emotions contribute to the expression of pain. Components of treatment include physician office visits, educational materials, and short-term dynamically-oriented psychotherapy (for approximately 20% of patients). In particular, Sarno (1991) stressed the importance of accepting the chronic pain as purely psychological/emotional rather than physiological. This includes rejecting structural explanations for pain and giving up on searching for other physically-based treatments (e.g., physical therapy, surgeries, medications). Patients are also encouraged to resume physical activity and acknowledge that their pain is not "dangerous" and therefore should not be restrictive. This is an essential part of TMS treatment, in part because it helps patients avoid the harmful effects of physical deconditioning and muscle atrophy due to fear conditioning of normal activities.

Rashbaum and Sarno (2003) have since relabeled TMS as musculoskeletal mind-body syndrome (MMS) due to modifications in the original theory to consider peripheral nerves and tendons in addition to muscles. Other work refers to TMS as distraction pain syndrome (DPS) to more accurately describe the psychosomatic process, whereby vasoconstriction and painful muscle tension are created in order to "distract" attention away from distressing emotions (e.g., anger, anxiety, grief; Schechter et. al, 2007). However, for the purposes of this review, both MMS and DPS will discussed as TMS to preserve consistency with prior literature.

Empirical studies exploring the construct and treatment of TMS are limited. The construct of TMS first emerged following the results of Sarno's (1976) examination of a psycho-educational treatment program among 28 severely disabled and hospitalized patients with chronic back pain (1 patient not hospitalized) included based upon their presentation of psychosomatic symptomatology (i.e., 22 patients had psychogenic regional pain, 4 with myogenic pain, 2 had both). Treatment consisted of physical therapy, an exercise regimen, occupational therapy, and daily meetings with a physician to explain the psychological factors involved in pain. Results revealed that 68% of patients were clinically rated as pain free or nearly pain free by physician rating upon discharge. Follow-up data confirmed that these reductions in pain were maintained by 64% of all patients for at least 6 months after discharge. Although these results seem promising, they should be interpreted with caution due to the lack of a control group. Also, the original article does not report the length of treatment and it is unclear if the duration of treatment was standardized across all participants. Thus, the passage of time cannot be ruled out as a confounding factor in the reported reductions in pain.

Sarno (1977) extended previous work to explore evidence for a psychosomatic etiology (TMS) among 65 chronic pain patients (52 with tension myositis, 12 with psychogenic regional pain, and 1 with somatic process). Patients were treated with a combinational of physician counseling and physical therapy over a 2 month period and were reassessed approximately 1 year later. Results revealed that of the patients diagnosed with TMS, over 50% were either pain free or had at least some improvement in pain 1 year after treatment.

In a subsequent study, Sarno (1981) examined TMS among a sample of 100 consecutive patients seen in his clinical practice with some combination of neck, shoulder, and/or back pain. This study explored the phenomenon that patients diagnosed with TMS often report a high incidence of other psychosomatic disorders. In this sample, 88% of patients reported at least 1 other associated psychosomatic disorder (e.g., heartburn, tension headache, idiopathic palpitations, skin allergies) in addition to the presenting complaint of chronic pain. In addition, data also indicated that 65% of patients reported pain in one or both legs, which was interpreted as sciatic nerve involvement in TMS. Both of these studies are helpful in providing preliminary evidence for some of the concepts posited by TMS; however, these data were collected non-randomly as part of a physician's private clinical practice.

Most recently, Schechter and colleagues (2007) reported outcomes of TMS treatment among a series of 51 chronic back pain cases seen in clinical medical practice. Patients were assessed at baseline (before treatment) and at a follow-up (at least 3 months after treatment) to control for brief/temporary responses to treatment. Compared to baseline measures, patients reported significant reductions in pain and medication use along with significant increases in health-related quality of life and activity levels. In particular, patients' reported pain levels at follow-up corresponded to a 52% reduction in their average pain levels compared to baseline. Notably, patients did not report improvement on a measure of mental health. This is consistent with the TMS conceptualization of chronic back pain, which speculates that when somatic symptoms retreat one is left with more conscious awareness and experience of underlying emotions. The authors encouraged future work to consider the measurement of emotional repression

via alexithymia assessment instruments such as the Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994).

Although reported results of TMS related studies appear promising, the extant work lacks empirical rigor and is mostly based on clinical observation. However, this model may hold important clues as to why other treatment modalities have not been completely effective in alleviating chronic back pain symptoms. Thus, it is important to consider psychodynamic conceptualizations of chronic pain such as TMS and explore these theories in a more scientifically-guided manner. The main research questions left unanswered by previous work are: (a) is repression of emotions directly related to the cause of chronic back pain syndromes? and (b) if they are repressed, how are they assessed? The answer to these questions may rest in the construct of alexithymia or lack of emotional awareness.

Emotional Awareness

Alexithymia

Sifneos (1973) originally introduced the construct of alexithymia (i.e., Greek translation for lack of words for emotions) to represent a set of features characterized by a lack of emotional awareness, difficulty identifying and describing emotions, a poverty of a fantasy life, and an excessive externally-oriented occupation with physical symptoms and external events. Sifneos first noted this lack of emotional awareness or "alexithymia" among his psychosomatic patients presenting with symptoms such as ulcerative colitis, peptic ulcer, and rheumatoid arthritis. In order to delve more deeply into this new construct, Sifneos conducted a preliminary study to explore the prevalence of an alexithymic presentation in a randomly selected group of psychosomatic patients

compared to a control group of patients with a variety of diagnoses (e.g., depression, alcoholism, borderline personality). He concluded that the psychosomatic patients demonstrated more of his specified alexithymic criteria than the control group. It is estimated that prevalence rates of alexithymia among the general adult population are approximately 14-19% and between 30-40% among the general population of psychiatric out-patients (Taylor, Bagby, & Parker, 1991; Taylor, Parker, Bagby, & Acklin, 1992; Todarello, Taylor, Parker, & Fanelli, 1995).

The construct of alexithymia is a continuous variable and is normally distributed in the general population (Taylor, Bagby, & Parker, 1997). However, there is limited and conflicting evidence regarding the question of whether the construct of alexithymia is a stable trait versus a state dependent phenomenon. In particular, Salminen, Saarijärvi, Aäirelä, and Tamminen (1996) found that alexithymia as measured by the Toronto Alexithymia Scale (TAS) among psychiatric out-patients was stable at a 1-year follow-up despite the fact that psychological distress significantly decreased. Alternatively, Hendryx, Haviland, and Shaw (1991) conducted a factor analysis on alexithymia (TAS) along with the Beck Depression Inventory and State-Trait Anxiety Inventory among a sample of 110 medical students and reported results consistent with both a state and trait explanation of alexithymia. Results revealed that depression was only related to the identifying and communicating feeling components of alexithymia and that state alexithymia may develop in an attempt to counteract negative emotions from stressful events. These results are consistent with previous differentiations of "primary" versus "secondary" alexithymia, whereas primary alexithymia refers to a dispositional feature of an individual's personality and has even been described as a neurobiological deficit

(Freyberger, 1977; Sifneos, 1988). Alternatively, secondary alexithymia refers to a temporary response to psychological trauma whereby an individual suppresses negative emotions as a coping strategy (Freyberger, 1977; Lesser, 1981; Sifneos, 1988). However, this distinction is mostly anecdotal and not well-supported empirically.

From a neuroscience perspective, functional magnetic resonance imaging studies show that alexithymia appears to be associated with dysregulations in phenomenal awareness (i.e., direct experience of emotions) and reflexive awareness (i.e., reflection of the emotion's content; Lane, 2000). Specific brain regions including the rostral anterior cingulated cortex (ACC) have been identified as having decreased activation in alexithymics in neuroimaging studies, and deficits in the ACC have been associated with decreased reflexive emotional awareness (Lane, 2000). Other investigators have posited that alexithymia may represent dysregulations in communication networks between limbic brain regions and neo-cortical structures (Taylor et al., 1997).

Alexithymia and Depression

Since alexithymia is characterized by the lack of emotional awareness, it is a rather paradoxical finding that it has been shown to be associated with depression in various studies. Some investigators speculate that individuals with alexithymia may still have a diffuse awareness of negative emotional states such as depression, but when they are asked to describe their subjective feelings they respond in an overly vague manner and focus on somatic sensations (Taylor et al., 1997). Accordingly, Honkalampi, Hintikka, Tanskanen, Lehtonen, and Viinamaki (2000) found that alexithymia was strongly related to depression in a general population sample of 2018 Finnish adults. Particularly, the authors found that the prevalence of alexithymia was 8 times higher

(32%) in individuals reporting to be depressed on the Beck Depression Inventory compared to those individuals that were not depressed (4%). Another study examined the relationship between alexithymia and depression in sample of 116 out-patients with major depressive disorder (MDD) prospectively over 12 months and found that the severity of depression was significantly related to alexithymia (Honkalampi, Hintikka, Laukkanen, Lehtonen, & Viinamaki, 2001). Moreover, the authors reported that baseline alexithymia prevalence was 45% in the MDD group compared to 9% in a control sample from the general population. At a 12-month follow-up, alexithymia prevalence rates dropped to 22% for the MDD group and remained stable at 9% in the control group. Thus, these results suggest that not only is depression strongly related to alexithymia but that alexithymia may also be a state-dependent phenomenon of MDD, which is consistent with secondary alexithymia.

Parker, Bagby, and Taylor (1991) attempted to clarify the relationship and suspected overlap between alexithymia and depression by utilizing factor analytic procedures. The investigators reported results in both general population and psychiatric out-patients samples. Significant moderate correlations between the TAS and the BDI were found in the general population sample ($r = .28$) and the psychiatric out-patient sample ($r = .47$). Despite these correlations, the BDI and TAS were mostly identified to be separate non-overlapping constructs based on factor analytic results. In fact, the BDI only cross-loaded on 1 of the 4 factors of the TAS (i.e., factor 2—awareness of feelings). Taken together, these results suggest that the relationship between depression and alexithymia remains unclear.

Alexithymia and Quality of Life

The relationship between alexithymia and quality of life is less clear than that with depression and investigations exploring this relationship are very limited. Verissimo, Mota-Cardoso, and Taylor (1998) conducted one of the first studies examining the relationship between alexithymia and health-related quality of life among 74 patients with inflammatory bowel disease. Results revealed that there was a significant negative correlation with alexithymia (TAS-20) and a measure of health-related quality of life (Inflammatory Bowel Disease Questionnaire; IBDQ). In addition, hierarchical multiple regression procedures revealed that alexithymia significantly predicts health-related quality of life among patients with inflammatory bowel disease. In another study, predictors of secondary alexithymia (i.e., state-dependent response to severe stress or medical illness) were explored among medically ill patients and a healthy control group (Wise, Mann, Mitchell, Hryvniak, & Hill, 1990). Results revealed that lower quality of life was a significant predictor of alexithymia. More research is needed to help understand the relationship between alexithymia and quality of life and few if any investigations have explored this relationship within the context of chronic pain populations

Alexithymia and Somatization

Taylor, Bagby, and Parker (1997) proposed a framework for conceptualizing the relationship between alexithymia and somatic symptoms whereby alexithymia is thought to be represented by the following: (a) impairment in constructing mental representations of affect leading to deficits in cognitive processing and communication of emotions, (b) hypersensitivity to somatic sensations leading to misinterpretations of emotional arousal

as medical disorders, and (c) autonomic and neuroendocrine hyper-responsiveness. Consistent with this model, previous work has established that psychosomatic populations have higher rates of alexithymia than healthy controls and other medical groups; however, the relationship between alexithymia and somatic complaints remains unclear. Some investigations have found that those patients identified as alexithymic on measures such as the TAS, also report more somatic symptoms and bodily complaints. For example, Taylor, Parker, Bagby, and Acklin (1992) explored this relationship among 118 psychiatric out-patients and found that the 40% of patients identified as alexithymic also scored significantly higher on several MMPI scales related to somatic symptoms (e.g., hypochondriasis, somatic complains, poor health) and reported higher depression and anxiety than those not meeting criteria for alexithymia. In a critical review of the literature examining the potential pathways between alexithymia and physical illness, Lumley, Stettner, and Wehmer (1996) reported that alexithymia appears to be associated with tonic sympathetic hyperarousal, unhealthy behaviors (e.g., substance abuse, disordered eating), and an increased biased in perceiving and reporting somatic sensations. Alternatively, Kosturek, Gregory, Sousou, and Trief (1998) reported that a group of 50 chronic pain out-patients scored lower on alexithymia and somatic amplification (i.e., misinterpretation of somatic sensations as pathological processes) than the control group of randomly selected general psychiatric out-patients. Additionally, Lundh & Simonsson-Sarnecki (2001) corroborated the previous results in their study among 137 individuals from the Swedish health registry. Specifically, the authors found that after controlling for depression and anxiety, there was no relationship between alexithymia and somatic complaints. In summary, these results do not confirm or rule out

a relationship between alexithymia and somatic complaints, but rather they call for further investigations to explain potential relationships.

Alexithymia and Chronic Pain

Since the inception of Sifneos' (1973) construct of alexithymia, there has been considerable work exploring its relationship with chronic pain. However, many of the studies report results on mixed patient samples with a variety of pain diagnoses and some of the investigations use questionable measures of alexithymia (e.g., Thematic Apperception Test and Rorschach). Lumley, Asselin, and Norman (1997) attempted to improve upon previous methodological limitations by using a well-validated measure of alexithymia (TAS) and including treatment-seeking control groups. In particular, the authors measured alexithymia with multiple instruments (Toronto Alexithymia Scale, Alexithymia Provoked Response Questionnaire, and Minnesota Multiphasic Personality Inventory-2) and compared results between 30 chronic pain patients (e.g., back, joint, headache, myofascial, gastrointestinal pain) seeking out-patient pain management, 32 patients enrolled in an out-patient smoking cessation program, and 25 patients seeking out-patient weight-management therapy. Results revealed that chronic pain patients were significantly more alexithymic than both smoking cessation and obesity patients. These findings relate to 83% of chronic pain patients meeting criteria for at least the likely presence of alexithymia on the TAS compared to only 50% and 44% in smoking cessation and obesity groups respectively. These results were also interpreted to suggest that the increases in alexithymia found among chronic pain patients are not confounded by treatment-seeking behavior and patient status.

A more recent investigation conducted a focused review of the available literature to help answer several questions about the nature of the relationship between alexithymia and chronic pain (Kreitler & Niv, 2001). In terms of prevalence, the authors reported that the weighted mean percent of alexithymia across the samples reviewed was 49.88% and that the prevalence ranged from a minimum of 34.36% to a maximum of 100%. In addition, the authors found that chronic pain patients scored significantly higher on alexithymia than other medical patients in 8 out of 11 comparisons. This provides evidence to suggest that higher alexithymia scores cannot be fully explained by treatment-seeking and medical patient status, which is consistent with findings from Lumley and colleagues (1997). Notably, chronic pain patients also had higher scores on alexithymia measures than psychiatric patients in 3 out of 4 studies, which helps to support that alexithymia is not fully explained by being a psychiatric patient. On demographic variables, the authors reported that alexithymia among chronic pain patients was not related to gender, education, social class, occupational level, or intelligence. However, relationships between alexithymia and age, mental status, financial compensation status, and country of origin remain undetermined. Interestingly, alexithymia was found to be unrelated to many pain-related characteristics such as pain duration, chronicity, pain onset, intensity, severity, and pain-related disability. Results regarding emotions suggest that alexithymia is related to higher anxiety and less outward expressions of anger; however, relationships with depression were unclear.

Another study examined alexithymia among fibromyalgia patients and found that fibromyalgia patients reported significantly more deficits in identifying feelings than healthy controls (Sayar, Gulee, & Topbas, 2004). In addition, this study also revealed that

fibromyalgia patients were significantly more alexithymic than a group of rheumatoid arthritis patients. Alexithymia has also been found to have an association to pain tolerance in a sample of 41 healthy participants (Nyklicek & Vingerhoets, 2000). In particular, alexithymia significantly predicted pain tolerance levels to experimentally induced pain in a multiple stepwise regression analysis. This study concluded that alexithymia may be related to an increased sensitivity to unpleasant sensations including both internal somatic and external painful stimuli.

Alexithymia and Chronic Back Pain

Although a considerable amount of work exist exploring alexithymia within psychosomatic illness in general, studies specifically addressing alexithymia in the context of chronic back pain are far more limited. Of the handful of studies that have delved into the complex relationship between lack of emotional awareness/alexithymia and chronic back pain, most are either descriptive or cross-sectional in design and lack psychometric quality. Studies using controversial projective tests such as Thematic Apperception Test (TAT) or Rorschach found that alexithymia characteristics were among the main features of samples of patients with chronic back pain (Acklin & Alexander, 1988; Sivik & Hosterey, 1992)

A recent more psychometrically sound study examined the relationship between alexithymia and the 12 month prevalence of low-back pain in a sample of 1180 San Francisco municipal transit operators (Mehling & Krause, 2005). Results revealed that those participants who rated themselves in the uppermost quartile of having difficulty identifying feelings had a twofold increase in odds to have low back pain. The

association of alexithymia with prevalence of low back pain was also higher in woman than men and in Caucasians compared to other ethnicities.

Based on the positive association they found between emotional awareness and back pain, Mehling and Krause (2007) recently conducted a prospective follow-up study exploring the association of alexithymia with the 7.5 year incidence of low back pain workers' compensation claims among 1207 San Francisco public transit workers. Surprisingly, results revealed that the likelihood of filing a workers' compensation claim for low back pain decreased among those transit operators who reported having more difficulties describing their feelings. These findings are inconsistent with the authors' previous study and contradict other findings associating alexithymia with higher incidence of psychosomatic symptoms. The authors speculated that these results may be more representative of some of the specific deficits associated with having alexithymia. For example, if an individual has more difficulty describing their emotional states, they may by less adept at navigating the complex claim filing process and convincing a physician of their situation.

To the author's knowledge, no studies have been conducted exploring the prevalence of alexithymia among patients with primary complaints of chronic back pain. Given the connection of alexithymia characteristics with chronic back pain sufferers and other psychosomatic patients, it follows that a further investigation of this personality dimension would help shed light on more salient areas to focus future interventions.

CHAPTER III

METHODS

Participants

Participants were recruited from the pool of all patients with chronic spine pain (back and/or neck) being evaluated to participate in the two-week interdisciplinary rehabilitation program at the University of Iowa Hospital and Clinics' Spine Center. Individuals are typically referred to the two-week interdisciplinary program by orthopedic surgeons and local physicians when they are unlikely to benefit from further medical treatments (e.g., surgery). Before joining the two-week interdisciplinary rehabilitation program, patients must undergo a day-long evaluation. There was no specific eligibility criteria for patients to obtain initial evaluations; however, inclusion/exclusion criteria for the present study required patients to meet the following requirements: (a) primary complaints of chronic spine pain (back and/or neck), (b) pain duration for greater than three months, (c) no specific biomedical explanation or pathogenesis for pain, (d) no evidence of malingering per clinical interview, (e) greater than 18 years of age, and (f) speak and read English fluently. Eligibility for inclusion in the two-week rehabilitation program is determined by the Spine Team after the one-day interdisciplinary evaluation and required patients to meet the following criteria: (a) greater than 18 years of age, (b) speak English, (c) demonstrate motivation to make lifestyle changes, (d) have the ability to participate in at least minimal physical exercises, (e) have chronic spine pain persisting for greater than three months, and (f) further medical interventions are not deemed beneficial. Patients with substance abuse problems,

severe psychopathology (e.g., severe depression, anorexia), and/or other medical issues that would interfere with their ability to participate in the program are ineligible.

During the regularly scheduled initial evaluations, 86 patients were approached to participate in the study. Of the 86 patients approached, 82 gave their consent to participate and 4 declined to be included in the study. No reasons were given regarding patients' decisions to decline. One additional patient was excluded from the study because they were not able to speak or read English fluently. Thus, 81 patients or 94% of participants approached for consent provided data for this study.

Procedure

Patients were approached during their initial evaluation for entry into the two-week interdisciplinary rehabilitation program to seek their consent for the present study. Patients were asked to specify the primary location and duration of their pain. As part of standard clinical protocol, all patients (regardless of consent status) completed the Medical Outcomes Study Short Form-36 Version 2 (SF-36v2) on a computer kiosk and received paper and pencil versions of the Brief Battery for Health Improvement-2 (BBHI-2), Center for Epidemiologic Studies Depression Scale (CES-D), and Toronto Alexithymia Scale-20 (TAS-20). After giving informed consent, participants were not required to complete any additional questionnaires and were not assessed at any additional time points.

Measures

Toronto Alexithymia Scale-20 (TAS-20)

The Toronto Alexithymia Scale-20 was used to assess participants' levels of alexithymia during their initial evaluation to participate in the two-week rehabilitation

program. The TAS-20 is a 20-item self-report measure with a 5-point Likert-type response format from 1 (strongly disagree) to 5 (strongly agree) that measures alexithymia in adults (Bagby, Parker, & Taylor, 1994). The construct of alexithymia has been characterized by difficulty identifying feelings, difficulty in distinguishing feelings from physical sensations, difficulty describing feelings to others, impoverished fantasy life, and external focus (Kreitler & Niv, 2001). Alexithymia as measured by the TAS-20 has been found to have a three factor structure which is represented by three subscales including: (a) difficulty identifying feelings (e.g., "I am often confused about what emotion I am feeling"), (b) difficulty describing feelings (e.g., "It is difficult for me to find the right words for my feelings"), and (c) external-oriented thinking (e.g., "I prefer to talk to people about their daily activities rather than their feelings"). Total scores range from 20 to 100 and higher scores indicate a greater degree of alexithymia. Cutoff scores have been empirically established, whereby scores ≥ 61 indicate the presence of alexithymia, scores ranging from 52-60 indicate possible alexithymia, and scores ≤ 51 indicate non-alexithymia (Taylor, Bagby, & Parker, 1997). The present study conducted analyses with total TAS-20 scores as well as with each of the three subscales scores.

The TAS-20 has also been used in multiple chronic pain samples (Kreitler & Niv, 2001). Reliability estimates indicate that internal consistency is adequate across multiple samples including a psychiatric group (Cronbach's alpha = .80-.86; Bagby, Parker, & Taylor, 1994; Kooiman, Spinhoven, & Trijsburg, 2002). The TAS-20 has also shown convergent validity with several factors of the Neo-Personality Inventory (Neo-PI) including positive relationships with neuroticism and negative relationships with positive emotions subscale of extraversion. In addition, the TAS-20 demonstrated strong negative

relationships with other established measures such as the Psychological Mindedness Scale (PMS) and the Need for Cognition Scale-Short Form (NCS; Bagby, Taylor, & Parker, 1994). Concurrent validity with other measures of the alexithymia construct such as the Beth Israel Hospital Psychosomatic Questionnaire has also been shown for the TAS-20 (Bagby, Taylor, & Parker, 1994). Using the study sample (N = 81), estimates of internal consistency were examined for the $\text{TAS-20}_{\text{Total}}$ and each of its subscales. The alpha coefficients were as follows: .82 for $\text{TAS-20}_{\text{Total}}$, .66 for $\text{TAS-20}_{\text{Difficulty Describing Feelings Subscale}}$, .82 for $\text{TAS-20}_{\text{Difficulty Identifying Feelings Subscale}}$, and .41 for $\text{TAS-20}_{\text{Externally-Oriented Thinking Subscale.}}$ These initial estimates of reliability suggest that the TAS-20 and its corresponding subscales demonstrated acceptable levels of internal consistency in the present sample with the exception of the external-oriented thinking subscale (see Table 1).

Center for Epidemiologic Studies Depression Scale (CES-D)

The Center for Epidemiologic Studies Depression Scale was used to assess participants' levels of depression during their initial evaluation. The CES-D is a 20-item self-report measure of the frequency and duration of depressive symptoms in the preceding week, which was primarily developed for research applications and epidemiological surveys (Radloff, 1997). Item selection for the CES-D was based on previously established and validated depression scales along with factor analytic studies measuring depressive symptoms (Radloff, 1977). Factor analysis using the principal components method revealed four CES-D factors: depressed affect, positive affect, somatic and retarded activity, and interpersonal (Radloff, 1977). The main depressive components chosen for inclusion in the item representation of the CES-D include

depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance (Radloff, 1977). Positive affect items are also included to help minimize response biases.

Test responders indicate the frequency of specific symptoms on a 0 to 3 scale: 0 indicates that symptoms are reported "rarely or none of the time" and 3 indicates that symptoms are reported "most or all of the time" (Devins & Orme, 1985). Scores range from 0 to 60 with higher scores being reflective of more symptom reporting (Radloff, 1977). The measure is free of costs and has no manual. The CES-D may be administered in either paper-and-pencil or online computer format. Scores can be used to give quick preliminary classifications, whereby 0-15 suggests the individual is "not depressed," 16-20 suggests "mild depression," 21-30 suggests "moderate depression," and 31 and higher suggests "severe depression" (Barnes & Prosen, 1984).

Because the CES-D does not emphasize the somatic components of depression as much as other measures (e.g., Beck Depression Inventory-II), it makes the measure particularly valuable with medical populations (Devins & Orme, 1985). Thus, the CES-D has been used among a variety of medically-related research populations including chronic pain, cancer, diabetes, and heart disease patients (Keawe'aimoku Kaholokula, Haynes, Grandinetti, & Chang, 2006; Martin & Degner, 2006; Walsh, Homa, Hanscom, Lurie, Sepulveda, & Abdu, 2006; & Wulsin, Evans, Vasan, Murabito, Kelly-Hayes, & Benjamin, 2005).

The psychometric properties of the CES-D including reliability data suggest an adequately sound measure (Devins & Orme, 1985). Test-retest reliabilities yielded the following correlations: 2-weeks (r=.51), 4-weeks (r=.67), 6-weeks (r=.59), and 8-weeks

(*r*=.59; Radloff, 1977). These test-retest reliabilities are slightly low; however, this may reflect the situational focus of the CES-D (Devins & Orme, 1985). Internal consistency measures for the CES-D as reported in Radloff's (1977) original study were satisfactory at .84, .85, and .90. Convergent validity has also been reported to be acceptable (*r*=.50 to .80) with the Hamilton rating scale (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). The alpha coefficient for the CES-D in the present sample was .92, which indicates good levels of internal consistency (see Table 1).

Medical Outcomes Study Short Form-36 Version 2 (SF-36v2)

The 36-item self report measure, Medical Outcomes Study Short Form-36 Version 2, was used to assess participants' health-related quality of life (Ware, Kosinski, & Dewey, 2000). Factor analysis using the principal components methods revealed two factors in the 36 item SF-36v2: physical and mental health dimensions. Items are subsequently classified into 8 scales. The physical component summary score (PCS) includes four subscales: physical functioning (PF), role-physical (RP), bodily pain (BP), and general health (GH). The mental health component summary score (MCS) includes the other four subscales: vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH; Kagee, 2001). The present study will explore data based on the more psychometrically-investigated physical and mental health component summary scores (PCS and MCS).

Of the eight scale scores on the SF-36v2, five of the scales (PF, RP, BP, SF, and RE) reflect health status as the absence of disability. These scales have a range of 1 to 100 with 100 indicating that no disabilities are observed. The remaining three scales (GH,

VT, and MH) are “bipolar” in structure, such that they measure positive and negative health states on a range of 1 to 100. For example, a midrange score of 50 on these scales would reflect reporting of no disability, whereas a high range score of 100 would reflect positive health states and a low range score of 0 would reflect negative health states (Ware, Kosinski, & Dewey, 2000; Ware, Snow, Kosinski, & Gandek, 1993).

Norm-based scoring has been implemented to facilitate comparison of PCS and MCS (Ware, Kosinski, & Dewey, 2000). Accordingly, both summary scales use T-score transformations whereby standardized scores are generated with a mean of 50 and standard deviation of 10. With both summary scales, higher scores are indicative of better quality of life and functioning. The present study will use PCS and MCS scores to assess physical and mental health-related quality of life.

The SF-36v2 has been used on a variety of medical patient samples including chronic pain (e.g., Elliott, Renier, & Palcher, 2003). Reliability as measured by internal consistency has been shown to range in alpha levels from .80-.95 in several studies (McHorney, Ware, Lu, & Sherbourne, 1994; Ware, Snow, Kosinski, & Gandek, 1993; Ware et al., 2000). Additionally, PCS and MCS summary scales have been shown to exceed alpha levels of .90 (Ware et al., 1993). Construct validity has also been established for SF-36v2 including both PCS and MCS summary scales. For example, on the SF-36, PCS scores were found to be lower in medical patients and MCS scores were shown to be lower among psychiatric patients (Ware & Gandek, 1994).

Brief Battery for Health Improvement-2 (BBHI-2)

The BBHI-2 is a 63-item self-report measure specially adapted for medical patients, which was used with participants to assess various factors associated with

rehabilitation and the recovery process (Disorbio & Bruns, 2002). In particular, the BBHI-2 consists of six subscales across three content areas: (a) validity scale (8-item defensiveness subscale), (b) physical symptom scales (10-item somatic complaints, 10-item pain complaints, and10-item functional complaints subscales), and (c) affective scales (6-item depression and 6-item anxiety subscales). Scales were normalized on both a large community sample and a national sample of physical rehabilitation patients. The defensiveness scale is intended as a validity check in order to determine if a patient is attempting to magnify or minimize symptoms (e.g., "My health problems really aren't that serious"). The somatic complaints scale is used to detect somatizing or expressing psychological distress as physical symptoms (e.g., "In the past month, how much of a problem have you had with: Feeling exhausted but being unable to sleep?"). The pain complaints scale is used to assess a patient's perception of pain across 10 body areas. There are four additional pain-related items that assess highest level of pain in the past month, lowest level of pain in the last month, overall current pain level, and level of pain tolerance. The functional complaints scale is used to assess the impact that physical impairment has on a patient's life (e.g., "I am barely able to keep up with my work"). The depression scale is used to measure the central aspects of depression including feeling helpless and hopeless about the future (e.g., "With my kind of problem, there's little hope of getting better"). Finally, the anxiety scale measures excessive worrying and restriction of lifestyle due to somatic fears (e.g., "There are many things I won't do for fear of hurting myself").

All scales (excluding some items from somatic complaints, pain complaints, and five critical items) include forward-keyed items that are scored on a 4-point Likert scale

from 0 (strongly disagree) to 3 (strongly agree) and reverse-keyed items scored from 3 (strongly disagree) to 0 (strongly agree). Items from the somatic complaints subscale and the critical items are scored on a 4-point Likert scale from 0 (no problem) to 3 (big problems). On the pain complaints scale, patients are asked to rate their pain from 0 (no pain) to 10 (the worst pain you could imagine) in 10 different body regions (e.g., head, jaw or face, neck or shoulders, arms or hands, chest, abdomen or stomach, middle back, lower back, genital area, and legs or feet), whereby high scores represent more severe pain in many body areas. The 0 to 10 scoring also applies to the four additional pain items. Raw scores from each subscale are transformed into T-scores normed on community and patient samples with a mean of 50 and a standard deviation of 10. The present study will use patient-normed T-scores and analyze only the somatic complaints, pain complaints, and anxiety subscales at the subscale level.

The BBHI-2 has demonstrated strong psychometric properties in both community and patient samples. Cronbach's alphas of subscales ranged from .69 to .87 for the patients sample, .72 to .86 for community sample, and .72 to .86 for both groups combined. In addition, test-retest correlations were computed in a separate sample of 87 patients with an average of approximately 7 days between test administrations. Test-retest correlations of subscales ranged from .88 to .96 (Disorbio & Bruns, 2002). Cronbach's alphas for the somatic complaints, pain complaints, and anxiety subscales in patient samples were .87, .81, & .69 and test-retest correlations were .96, .95, & .88 respectively. These BBHI-2 subscales have also shown convergent validity with other commonly used instruments: somatic complaints (r=.75 with Minnesota Multiphasic Personality Inventory-2 Hysteria-Obvious subscale), pain complaints (r=.61 with McGill Pain

Questionnaire), and anxiety (*r*=.54 with MMPI-2 ANX scale; Disorbio & Bruns, 2002). The alpha coefficients for the BBHI-2 subscales included in the present study were as follows: .69 for the BBHI-$2_{\text{Anxiety Subscale}}$, .75 for the BBHI-$2_{\text{Somatic Complaints Subscale}}$, .75 for the BBHI-$2_{\text{Functional Complaints Subscale}}$, and .63 for the BBHI-$2_{\text{Pain Complaints Subscale.}}$ These initial estimates of reliability suggest that the BBHI-2 subscales used in the study demonstrated acceptable levels of internal consistency with the exception of the Pain Complaints subscale being slightly low (see Table 1).

Research Questions/Data Analysis

Prior to data analysis, an a priori power analysis estimated that 81 participants were necessary to achieve a power level of .80 assuming a moderate effect size of .30. Based on the multiple regression equation included in the meditational analysis portion of the study, a post-hoc power analysis indicated that the power was .99 with an alpha level of .05. Additionally, the normality of the data was examined. The absolute values for the skewness and kurtosis were not in excess of 2 for all study variables (see Table 2). The following statistical analyses were conducted in accordance with the following hypotheses:

Hypothesis 1a and 1b

(1a) Patients seeking interdisciplinary treatment for chronic back pain will have higher alexithymia scores (TAS-20) than other medical patient samples (e.g., Kooiman et al., 2000) and (1b) similar scores to other chronic pain samples (e.g., Kosturek et al., 1998).

Statistical Analysis for Hypothesis 1a and 1b

T-tests were conducted to compare alexithymia (TAS-20) means from the present study to previous investigations with medical patient samples (e.g., Kooiman et al., 2000)

and chronic pain samples (e.g., Kosturek et al., 1998). Frequency analyses were performed to determine the percentage of patients in the present investigation that have TAS-20 scores ≥ 61 (i.e., indicates the presence of alexithymia; Taylor, Bagby, & Parker, 1997).

Hypothesis 2a and 2b

(2a) Alexithymia will be negatively related to health-related quality of life and (2b) positively related to somatic complaints, pain complaints, depression, and anxiety.

Statistical Analysis for Hypothesis 2a and 2b

Correlations were conducted between total TAS-20 scores and CES-D, SF-36v2: PCS & MCS, and BBHI-2: SC, PC, & A. In addition, correlations were repeated for each of the three TAS-20 subscales.

Hypothesis 3

(3) If there is a significant relationship between alexithymia and physically-related symptoms (e.g., somatic complains, pain complaints), this relationship will be mediated by negative affect (e.g., depression and anxiety) (e.g., Lundh & Simonsson-Sarnecki, 2001).

Statistical Analysis for Hypothesis 3

Mediational analysis were performed using hierarchical multiple regressions models among alexithymia (TAS-20), somatic complaints (BBHI-2: SC), pain complaints (BBHI-2:PC), depression (CES-D) and anxiety (BBHI-2:A) variables.

CHAPTER IV

RESULTS

This chapter is organized in the following manner. First, the demographic characteristics of the sample are presented. Second, descriptive data, frequency analysis, and group comparisons are presented for alexithymia outcome measures. Third, correlations between dependent variables are examined. Finally, a meditational analysis is delineated exploring the relationship between alexithymia, physical symptoms, and negative affect measures.

Demographic Characteristics

Eighty one patients with chronic back pain participated in this study. The sample was comprised of 56.8% women and 43.2% men. Patients' ages ranged from 18 to 73 years with a mean of 42.07 years. Approximately 75% of patients were younger than 50 years. In terms of ethnicity, 88.9% of patients identified as white, 4.9% as African American, 2.5% as Hispanic, 1.2% as Asian or Pacific Islander, 1.2% as Native American, and 1.2% as "Other." Most patients (56.8%) reported their marital status as married, whereas 18.5% reported as divorced, 14.8% as never married, 4.9% as cohabitating, 3.7% as "other," and 1.2% as widowed. In terms of education, most patients (59.3%) reported that they completed at least some college or technical training and only 8.6% of patients reported they did not graduate from high school. With the exception of the percentage of men and women, the demographic characteristics from this sample are similar to the typical patient population for the Spine Center based on the clinic's demographic data collected from 2006 to 2010 (N = 419). The larger clinic sample was composed of 52% men and 48% women compared to 43% men and 57% women in the

present sample. There is no known explanation for this difference. All demographic characteristics for patients in the study sample are summarized in Table 3.

Descriptive Statistics, Frequency Analysis, and Group Comparisons for Toronto Alexithymia Scale-20 (TAS-20)

Descriptive statistics for all major study variables appeared to be in the range of those reported in other comparable investigations (see Table 4). Descriptive statistics for the TAS-20 and all subscales are given in Table 2. Participants completed the TAS-20 as part of their initial evaluation in order to be considered for the UIHC Spine Center's 2-week interdisciplinary rehabilitation program. The range of possible scores for the TAS-20 is from 20 to 100 and higher scores indicate a greater degree of alexithymia. Cutoff scores have been empirically established, whereby total TAS-20 scores ≥ 61 indicate the presence of alexithymia, scores between 52-60 indicate possible alexithymia, and scores ≤ 51 indicate non-alexithymia (Taylor, Bagby, & Parker, 1997). In the present study, TAS-20 scores ranged from 20 to 73 (M = 46.79, SD = 11.64, see Table 2). According to established cutoffs, 14.8% of patients in the present sample met qualification criteria for alexithymia and 22% met criteria for possible alexithymia. Thus, 37% of the sample met criteria for the possible or likely presence of alexithymia. Using the more conservative estimate of 14.8% likely alexithymics, the frequency of alexithymia in present study was similar to the frequencies observed among chronic pain outpatients (22%; Kosturek et al., 1998) and general medical outpatients (13%; Kooiman, Bolk, Brand, Trijsburg, & Rooijmans, 2000). However, the present study had higher frequencies of alexithymia than a community sample (3%; Lundh & Simonsson-Sarnecki, 2001). Alexithymia frequency data are outlined in Table 5.

Group comparisons were conducted to determine if alexithymia means (TAS-20 total) in the present chronic back pain sample were significantly different than means in other general medical, chronic pain, and community samples. Results revealed that alexithymia means in the present study were not significantly different than means observed in a general medical outpatient sample ($t = .18$, NS; Kooiman et al., 2000) or a chronic pain outpatient sample ($t = .31$, NS; Kosturek et al., 1998). However, alexithymia means in the present study were significantly higher than those observed in a group of general community members ($t = 4.52$, $p < .0001$; Lundh & Simonsson-Sarnecki, 2001). The results suggest that alexithymia is similarly prevalent among outpatients with chronic back pain and outpatients with general medical conditions. Results of group comparisons are shown in Table 6.

Correlations among Alexithymia, Health-Related Quality of Life, Negative Affect, and Somatic Symptoms

Pearson correlations were calculated to explore the relationships between measures of alexithymia (TAS-20 total and subscales) with health-related quality of life (SF-36v2:PCS & MCS), negative affect (CES-D, BBHI-2 Anxiety subscale), and somatic symptoms (BBHI-2 Pain Complaints, Somatic Complaints, and Functional Complaints subscales).

In regards to quality of life measures, higher alexithymia scores (TAS-20 total) were associated with lower levels of mental-health related quality of life (SF-36v2:MCS; $r = -.44$, $p < .001$). Alternatively, higher alexithymia scores were associated with higher levels of physical related quality of life (SF-36v2:PCS; $r = .24$, $p < .05$). When examining relationships between TAS-20 subscales with MCS and PCS, findings indicated that the

TAS-20 Externally Oriented Thinking subscale was not significantly related to either measure of quality of life. The TAS-20 Difficulty Identifying Feelings subscale was most strongly related to MCS ($r = -.53$, $p < .001$) and PCS ($r = .27$, $p < .05$). Results suggest that higher levels of alexithymia were associated with poorer mental health-related quality of life and better physical-related quality of life. Intercorrelations for these measures are presented in Table 7.

Several significant relationships emerged between the TAS-20 and negative affect measures (CES-D, BBHI-2:Anxiety subscale). Patients with higher levels of alexithymia (TAS-20 total) tended to report significantly higher levels of depression (CES-D, $r = .49$, $p <.001$). When examined from a subscale level, CES-D was most highly correlated with the TAS-20 Difficulty Identifying Feelings subscale ($r = .61$, $p < .001$) and least related to the TAS-20 Externally Oriented Thinking subscale ($r = .09$, NS). Relationships between alexithymia and anxiety were similar in direction and magnitude. More specifically, patients with higher levels of alexithymia also reported significantly higher levels of anxiety (BBHI-2:Anxiety subscale; $r = .55$, $p < .001$). Similar to relationships with the CES-D, the BBHI-2:Anxiety subscale was most highly related to the TAS-20:Difficulty Identifying Feelings subscale ($r = .66$, $p < .001$) and least related to the TAS-20:Externally Oriented Thinking subscale ($r = .20$, NS; see Tables 8 and 9). Thus, results suggest that higher levels of alexithymia are associated with higher levels of negative affect.

Relationships between alexithymia (TAS-20) and somatic symptoms (BBHI-2 Pain Complaints, Somatic Complaints, and Functional Complaints subscales) also yielded several significant results. First, patient with higher levels of alexithymia tended

to have significantly higher reports of Somatic Complaints (BBHI-2:Somatic Complaints; $r = .32$, $p < .01$). Relationships between alexithymia and Functional Complaints approached significance in the positive direction (BBHI-2:Functional Complaints; $r = .20$, $p = .07$); however, the relationship between alexithymia and Pain Complaints was not significant. The results suggest that among outpatients with chronic back pain, higher alexithymia levels are associated with higher reporting of somatic complaints but are unrelated to reporting of pain complaints. Detailed information regarding these correlations is presented on Table 8.

Mediational Analysis

In order to assess if the relationship between alexithymia (TAS-20) and somatic symptoms (BBHI-2:Somatic Complaints subscale) is mediated by negative affect (CES-D and BBHI-2:Anxiety subscale), a meditational analysis was conducted according to the protocol established by Baron and Kenny (1986). Z-scores of constituent measures of depression (CES-D) and anxiety (BBHI-2:Anxiety subscale) were combined to form a composite measure of negative affect for use in the analysis, which is consistent with methodology used in other studies (e.g., Farmer, 1998; Weintraub et al., 2005). Results revealed that the requirements of this meditational analysis method were met as follows: (a) the initial variable (TAS-20) was significantly related to the outcome variable (BBHI-2:Somatic Complaints; $R^2 = .10$, $p < .01$, Cohen's $f^2 = .11$), (b) the initial variable (TAS-20) was significantly related with the mediator variable (negative affect composite; $R^2 = .36$, $p < .001$, Cohen's $f^2 = .56$), (c) the mediator variable (negative affect composite) affects the outcome variable (BBHI-2:Somatic Complaints) in a multiple regression equation that includes both the mediator and the initial variable ($R^2 = .27$, $p < .001$,

Cohen's f^2 = .38; see Table 10), and (d) the effect of TAS-20 on BBHI-2:Somatic Complaints after controlling for negative affect composite is non-significant (β = .005, NS). The Sobel Test for testing the mediator's role on the dependent variable (significance of the indirect effect or amount of meditation) was found to be highly significant ($p < .001$; Sobel, 1982; see Table 11). Thus, results suggest that among outpatients with chronic back pain, the relationship between alexithymia and somatic complaints is mediated by negative affect. Additionally, results revealed a medium effect size for the relationship between alexithymia and somatic complaints, a large effect size for the relationship between alexithymia and negative affect, and a large effect size when alexithymia and negative affect are used in a multiple regression model to predict somatic complaints. All steps of the mediation analysis are outlined in detail in Table 10 and Figure 1 provides a schematic illustration of the meditational effect.

Table 1. Internal Consistency Levels for TAS-20, BBHI-2, and CES-D in the Present Study

Measure	Coefficient α	# of Items	N
TAS-20			
$TAS\text{-}20_{Total}$	.82	20	78
$TAS\text{-}20_{Difficulty\ Describing\ Feelings\ Subscale}$	.66	5	81
$TAS\text{-}20_{Difficulty\ Identifying\ Feelings\ Subscale}$	.82	7	79
$TAS\text{-}20_{Externally\text{-}Oriented\ Thinking\ Subscale}$	.41	8	80
BBHI-2			
$BBHI\text{-}2_{Anxiety\ Subscale}$	.69	6	62
$BBHI\text{-}2_{Somatic\ Complaints\ Subscale}$	.75	11	62
$BBHI\text{-}2_{Functional\ Complaints\ Subscale}$	.75	10	61
$BBHI\text{-}2_{Pain\ Complaints\ Subscale}$	.63	10	62
CES-D			
$CES\text{-}D_{Total}$	.92	20	76

Note: TAS-20 = Toronto Alexithymia Scale-20, BBHI-2 = Brief Battery for Health Improvement-2, SF-36v2 = Medical Outcomes Study Short Form-36 Version 2, CES-D = Center for Epidemiologic Studies Depression Scale

The sample size varies in calculations due to missing item-level data.

Table 2. Descriptive Statistics for TAS-20, BBHI-2, SF-36v2, and CES-D Scores

Measure	Mean	SD	Skewness	Kurtosis
TAS-20				
$TAS\text{-}20_{Total}$	46.79	(11.64)	-.11	-.70
$TAS\text{-}20_{Difficulty\ Describing\ Feelings}$	12.42	(4.19)	.16	-.57
$TAS\text{-}20_{Difficulty\ Identifying\ Feelings\ Subscale}$	15.65	(5.72)	.27	-1.07
$TAS\text{-}20_{Externally\text{-}Oriented\ Thinking\ Subscale}$	19.11	(3.83)	-.06	-.69
BBHI-2				
$BBHI\text{-}2_{Anxiety\ Subscale}$	47.28	(9.83)	.37	.45
$BBHI\text{-}2_{Somatic\ Complaints\ Subscale}$	52.94	(8.20)	.20	-.70
$BBHI\text{-}2_{Functional\ Complaints\ Subscale}$	60.07	(9.26)	.02	-.76
$BBHI\text{-}2_{Pain\ Complaints\ Subscale}$	48.80	(7.08)	.43	-.44
SF-36v2				
PCS	26.85	(8.28)	.29	-.42
MCS	41.44	(14.21)	-.15	-1.21
CES-D				
$CES\text{-}D_{Total}$	18.94	(11.45)	.59	-.45

Note: TAS-20 = Toronto Alexithymia Scale-20, BBHI-2 = Brief Battery for Health Improvement-2, SF-36v2 = Medical Outcomes Study Short Form-36 Version 2, CES-D = Center for Epidemiologic Studies Depression Scale

SF-36v2 scores calculated with N = 74. All other data calculated with N = 81

Table 3. Demographic Characteristics of Participants

	Mean	SD	Range
Age	42.07	11.18	18 - 73
		Frequency	Percentage
Sex			
Female		46	57
Male		35	43
Ethnicity			
White		72	89
African American		4	5
Hispanic		2	3
Asian or Pacific Islander		1	1
Native American		1	1
Other		1	1
Relationship Status			
Never Married		12	15
Cohabiting		4	5
Married		46	57
Divorced		15	19
Separated		1	1
Widowed		3	4
Other		0	0
Educational Level			
Less than a high school graduate		7	9
High school graduate or GED		26	32
Some college or technical school		34	42
College graduate or post-college		14	17

Note: All frequencies are based on N = 81

Table 4. Descriptive Statistics for TAS-20, BBHI-2, SF-36v2, and CES-D in Comparable Investigations

Measure	**Similar Investigations**	**Present Study (N=81)**
	Mean (SD)	Mean (SD)
	(Kosturek et al., 1998; N=50)	
TAS-20 total	47.50 (13.90)	46.79 (11.64)
	(James, 2010; N=74)	
BBHI-2:A	48.04 (12.39)	47.28 (9.83)
BBHI-2:SC	51.80 (8.57)	52.94 (8.20)
BBHI-2:P	47.25 (9.62)	48.80 (7.08)
	(van der Hulst et al., 2008; N=74)	41.44 (14.21)
SF-36v2:MCS	49.00 (10.00)	
SF-36v2:PCS	31.00 (7.00)	26.85 (8.28)
	(Waxman et al., 2008; N=54)	
CES-D	24.21 (10.82)	18.94 (11.45)

Note: TAS-20 total = Toronto Alexithymia Scale-20 total score, BBHI-2 = Brief Battery for Health Improvement-2, BBHI-2:A = Anxiety Subscale, BBHI- 2 SC = Somatic Complaints Subscale, BBHI-2:P = Pain Complaints Subscale, SF-36v2 = Medical Outcomes Study Short Form-36 Version 2, SF-36v2 PCS = Physical Component Summary, SF-36v2 MCS = Mental Component Summary, CES-D = Center for Epidemiologic Studies Depression Scale

Table 5. Frequency of Alexithymia (TAS-20 total ≥ 61)

Sample Type	**Frequency**	**N**
Current Study **(Including possible alexithymics)*	14.8% *(37.0%)*	81
General Medical Outpatients with Explained Physical Symptoms (Kooiman et al., 2000)	13.0%	152
Chronic Pain Outpatients (Kosturek et al., 1998)	22.0%	50
Community Members (Lundh & Simonsson-Sarnecki, 2001)	2.2%	137

Note: TAS-20 = Toronto Alexithymia Scale-20

*When calculating the frequency percentage using all patients meeting criteria for either possible (TAS-20 from 52-60) and likely (TAS-20 ≥ 61) alexithymia, the alexithymia rate in the current sample increased to 37%

Table 6. Group Differences of Alexithymia Means (TAS-20)

Group #	**Sample Type**
1	Chronic Back Pain Outpatients (Present Study)
2	General Medical Outpatients (Kooiman et al., 2000)
3	Chronic Pain Outpatients (Kosturek et al., 1998)
4	Community Members (Lundh & Simonsson-Sarnecki, 2001)

Comparison 1 (Chronic Back Pain vs. General Medical)

	Group 1 (N=81)	Group 2 (N=152)			
Variable	**Mean(SD)**	**Mean(SD)**	**t**	**p**	**df**
TAS-20	46.79(11.64)	46.5(12.0)	.18	.86	231

Comparison 2 (Chronic Back Pain vs. Chronic Pain)

	Group 1 (N=81)	Group 3 (N=50)			
Variable	**Mean(SD)**	**Mean(SD)**	**t**	**p**	**df**
TAS-20	46.79(11.64)	47.5(13.9)	.31	.75	129

Comparison 3 (Chronic Back Pain vs. Community Members)

	Group 1 (N=81)	Group 4 (N=137)			
Variable	**Mean(SD)**	**Mean(SD)**	**t**	**p**	**df**
TAS-20	46.79(11.64)	40.2(9.6)	4.52	<.0001	216

Note: TAS-20 = Toronto Alexithymia Scale-20

Table 7. Intercorrelations Between TAS-20 and SF-36v2

	TAS-20				SF-36v2	
	Total	Desc	Ind	Ext	PCS	MCS
TAS-20						
Total	-	.86**	.84**	.54**	.24*	-.44**
Desc		-	.76**	.33**	.21	-.31**
Ind			-	.21	.27*	-.53**
Ext				-	.04	-.19
SF-36v2						
PCS					-	-.40**
MCS						-

Note: TAS-20 = Toronto Alexithymia Scale-20, TAS-20 Total = Total score, TAS-20 Desc = Difficulty Describing Feelings Subscale, TAS-20 Ind = Difficulty Identifying Feelings Subscale, TAS-20 Ext = Externally Oriented Thinking Subscale, SF-36v2 = Medical Outcomes Study Short Form-36 Version 2, SF-36v2 PCS = Physical Component Summary, SF-36v2 MCS = Mental Component Summary

SF-36v2 correlations calculated with N = 74. All other correlations calculated with N = 81

*p < .05, **p < .01

Table 8. Intercorrelations Between TAS-20 and BBHI-2

	TAS-20				BBHI-2			
	Total	Desc	Ind	Ext	Pain	Som	Func	Anx
TAS-20								
Total	-	.86**	.84**	.54**	.09	.32**	.20	.55**
Desc		-	.76**	.33**	.18	.24*	.11	.53**
Ind			-	.21	.08	.42**	.33**	.66**
Ext				-	.15	.09	.06	.20
BBHI-2								
Pain					-	.34**	.23*	-.05
Som						-	.36**	.25*
Func							-	.45**
Anx								-

Note: TAS-20 = Toronto Alexithymia Scale-20, TAS-20 Total = Total score, TAS-20 Desc = Difficulty Describing Feelings Subscale, TAS-20 Ind = Difficulty Identifying Feelings Subscale, TAS-20 Ext = Externally Oriented Thinking Subscale, BBHI-2 = Brief Battery of Health Improvement-2, BBHI-2 Pain = Pain Complaints Subscale, BBHI- 2 Som = Somatic Complaints Subscale, BBHI-2 Func = Functional Complaints Subscale, BBHI-2 Anx = Anxiety Subscale

All correlations calculated with N = 81

*p < .05, **p < .01

Table 9. Intercorrelations Between TAS-20 and CES-D

	TAS-20				CES-D
	Total	Desc	Ind	Ext	CES-D Total
TAS-20					
Total	-	.86**	.84**	.54**	.49**
Desc		-	.76**	.33**	.45**
Ind			-	.21	.61**
Ext				-	.09

Note: TAS-20 = Toronto Alexithymia Scale-20, TAS-20 Total = Total score, TAS-20 Desc = Difficulty Describing Feelings Subscale, TAS-20 Ind = Difficulty Identifying Feelings Subscale, TAS-20 Ext = Externally Oriented Thinking Subscale, CES-D = Center for Epidemiologic Studies Depression Scale

All correlations calculated with N = 81

*p < .05, **p < .01

Table 10. Baron and Kenny (1986) Mediational Analysis Steps for the Relationship Between Alexithymia, Somatic Complaints, and Negative Affect

Variables	**Model Labels**
TAS-20	Initial Variable (X)
NA Comp	Mediator Variable (M)
BBHI-2:SC	Outcome Variable (Y)

Step 1: Show that the initial variable (X) is correlated with the outcome variable (Y) using Y as the criterion and X as the predictor in a regression

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
BBHI-2:SC	Criterion					
TAS-20	Predictor	.224	.075	.317	.101	.004

Step 2: Show that the initial variable (X) is correlated with the mediator variable (M), using M as the criterion and X as the predictor in a regression

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
NA Comp	Criterion					
TAS-20	Predictor	.089	.013	.599	.358	.000

Step 3: Show that the mediator (M) affects the outcome variable (Y) using X and M as predictors and Y as the criterion in a regression

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
BBHI-2:SC	Criterion			.522	.273	.000
TAS-20	Predictor	.005	.085			.949
NA Comp	Predictor	2.442	.569			.000

Step 4: To establish that M completely mediates the X-Y relationship, show that the effect of X on Y (controlling for M) is zero

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
BBHI-2:SC	Criterion			.522	.273	.000
TAS-20	Predictor	.005	.085			.949
NA Comp	Predictor	2.442	.569			.000

Note: TAS-20 = Toronto Alexithymia Scale-20, BBHI-2:SC = Brief Battery for Health Improvement-2 Somatic Complaints subscale, NA Comp = Negative Affect Composite, SE = Standard Error

Negative Affect Composite was computed by adding standardized scores from Center for Epidemiologic Studies Depression Scale and Brief Battery for Health Improvement-2: Anxiety scale

All regressions calculated with N = 81

Table 11. Sobel (1982) Test of Indirect Effect for Mediational Analysis

Variables	**Model Labels**
TAS-20	Initial Variable (X)
NA Comp	Mediator Variable (M)
BBHI-2:SC	Outcome Variable (Y)

Step 1: Run a regression with X predicting M to get the raw regression coefficient and standard error for the association between X and M

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
NA Comp	Criterion					
TAS-20	Predictor	.089	.013	.599	.358	.000

Step 2: Run a regression with X and M predicting Y to get the raw coefficient and standard error for the association between M and Y (when X is also entered as a predictor)

Variables	**Model**	**β**	**SE**	**R**	**R^2**	**p**
BBHI-2:SC	Criterion			.522	.273	.000
TAS-20	Predictor	.005	.085			.949
NA Comp	Predictor	2.442	.569			.000

Step 3: Compute Sobel Test Statistics

Test Statistic	**SE**	**p**
3.63	.06	.0003

Note: TAS-20 = Toronto Alexithymia Scale-20, BBHI-2:SC = Brief Battery for Health Improvement-2: Somatic Complaints subscale, NA Comp = Negative Affect Composite, SE = Standard Error

Negative Affect Composite was computed by adding standardized scores from Center for Epidemiologic Studies Depression Scale and Brief Battery for Health Improvement-2: Anxiety scale

Underlined numbers indicate data used to calculate Sobel Test Statistics

All regressions calculated with N = 81

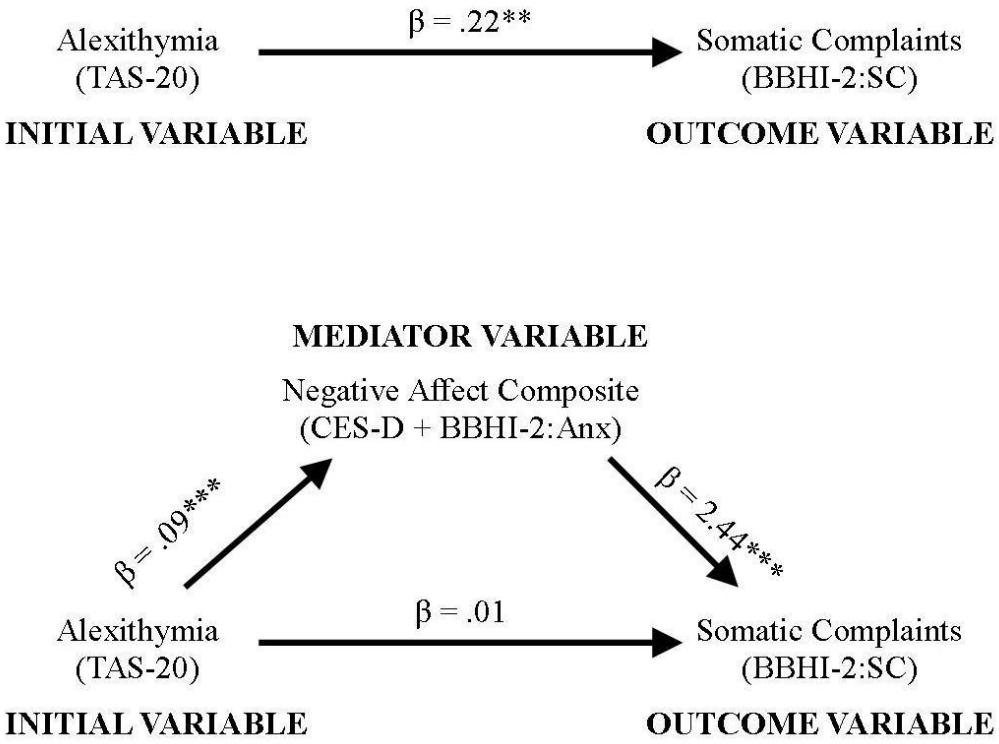

Figure 1. Illustration of the mediation effect between alexithymia, negative affect and somatic complaints.

Note: TAS-20 = Toronto Alexithymia Scale-20, BBHI-2:SC = Brief Battery for Health Improvement-2 Somatic Complaints subscale, CES-D = Center for Epidemiologic Studies Depression Scale

Negative Affect Composite was computed by adding standardized scores from Center for Epidemiologic Studies Depression Scale and Brief Battery for Health Improvement-2: Anxiety scale

**p < .01, ***p < .001

CHAPTER V

DISCUSSION

This chapter will discuss the implications of the results presented in Chapter IV. First, a brief summary of the research context will be provided. Second, findings will be discussed as they relate to the major themes among the research questions. Next, methodological limitations of the study will be addressed. Then, clinical and research implications will be offered. Finally, general conclusions will be summarized.

Prior investigations that explore the role of emotional awareness among patients with chronic back pain from a psychodynamic perspective consist largely of clinical case reports and fail to use well-validated and reliable measures. Previous research has explored the related construct of alexithymia (i.e., difficulty identifying and describing emotions) in the context of several psychosomatic disorders such as migraines, temporomandibular disorder, fibromyalgia, and chronic pain (Glaros & Lumley, 2005; Huber, Suman, Biasi, & Carli, 2009; Kosturek et al., 2001; Yalug et al., 2010). However, the literature is not well-developed for the role of alexithymia as it specifically relates to chronic back pain. Increasing understanding of alexithymia in chronic back pain using psychometrically sound measures and clarifying the relationship between alexithymia, somatic complaints, and negative affect is fundamental to expanding the empirical basis for applying psychodynamic concepts such as Sarno's (1991) Tension Myositis Syndrome (TMS). Thus, the purpose of this study is: (a) to offer a preliminary analysis of the prevalence rates of alexithymia among patients seeking interdisciplinary for chronic back pain and offer comparisons to similar populations, (b) to explore the relationship between alexithymia and somatic complaints, pain, anxiety, depression, and health-

related quality of life, and (c) to examine the potential role of negative affect (depression and anxiety) as a mediator in the relationship between alexithymia and somatic complaints.

Alexithymia Prevalence

It was hypothesized that patients seeking interdisciplinary treatment for chronic back pain would have higher alexithymia scores (Toronto Alexithymia Scale-20: TAS-20) than other medical patient samples and similar scores to other chronic pain samples. Analyses involved conducting group comparisons of alexithymia means in the current sample with samples of general medical outpatients, patients with chronic pain, and general community members. In addition, alexithymia was explored as a categorical variable based on the cutoff scores established in the literature (≥ 61; Taylor et al., 1997).

Surprisingly, and contrary to predictions, findings revealed that there were no significant group differences between alexithymia levels in outpatients seeking interdisciplinary treatment for chronic back pain and general medical outpatients. This finding is inconsistent with the literature and counters the supposition of psychodynamic theory in chronic pain disorders (i.e., somatic symptoms related to psychological factors are related to repressed emotions/lack of emotional awareness; Sarno, 1991). For example, in Kreitler and Niv's (2001) review of 20 studies addressing the relationship of alexithymia in chronic pain disorders, they found that the majority of studies explored reported higher rates of alexithymia in chronic pain samples compared to other medical or psychiatric patient control groups. Despite the unexpected finding in the present study, it should be noted that this was only a preliminary exploration of alexithymia group differences. In order to more systematically assess group differences, meta-analytic

methodology should be applied. Also, the selection of the general medical outpatient group used in this comparison was somewhat arbitrary due to the dearth of studies using the TAS-20 with general medical outpatients.

Regarding the second component of this research question, findings revealed that the current sample of outpatients with chronic back pain did not significantly differ in alexithymia levels compared to a separate group of outpatients with chronic pain seeking pre-surgical evaluation for a dorsal-column stimulator (Kosturek et al., 1998). This finding was consistent with predictions and aligns with psychodynamic theoretical considerations that patients with similar types of psychosomatic disorders (e.g., chronic pain) would have similar elevations of alexithymia scores. In order to provide an increased frame of reference, alexithymia scores from the present sample were also compared to a sample of general community members. In this comparison, results were consistent with expectations in that symptomatic patients with chronic pain had significantly higher rates of alexithymia than general community members.

In addition to group comparisons, alexithymia was also explored as a categorical variable. Frequencies were calculated based on established cutoffs (≥ 61; Taylor et al., 1997). In the present sample of patients with chronic back pain, 14.8% met criteria for alexithymia. This was somewhat lower than expectations based on the relevant literature. Notably, when analyses included those participants that met criteria for either possible or likely alexithymia, the frequency rates increased from 14.8% to 37% and were more in line with expectations. For example, in a review of several studies examining alexithymia in chronic pain samples, alexithymia rates ranged from 34.36% to 100% (Kreitler & Niv, 2001). However, it should be noted that there was considerable variation in terms of how

alexithymia was assessed across these studies. Very few of the studies included in the review used the TAS-20 to measure alexithymia. Alternatively, a similar investigation that used the TAS-20 to measure alexithymia in a sample of outpatients with predominant complaints of chronic back pain (e.g., Kosturek et al., 1998), reported alexithymia prevalence rates to be 22%, which is similar to the 14.8% of likely alexithymia observed in the present study.

Alexithymia and Pain

Contrary to predictions, findings revealed that the scores on the TAS-20 were not significantly related to pain. This particular finding was not overwhelmingly surprising. The literature is somewhat divided regarding the relationship between alexithymia and pain. While some studies report positive associations between alexithymia levels and pain (e.g., Hosoi et al., 2010), several studies report no significant associations (e.g., Kreitler & Niv, 2001). Despite the present study's non-significant findings between alexithymia and pain, when current findings are interpreted in the context of the significant positive relationship between alexithymia and somatic complaints, the non-significant relationship between alexithymia and pain may still be consistent with a psychodynamic model of chronic back pain. For example, if Sarno's (1991) TMS is utilized to explain chronic back pain symptoms (i.e., repressed emotions lead to abnormal activation of the stress response, which exacerbates muscle tension), it is possible that alexithymia may be more salient to the vague somatic symptoms as assessed by the somatic complaints measure rather than a more specified measure of pain.

Alexithymia and Quality of Life

Findings were consistent with expectations in that the scores on the TAS-20 were significantly negatively related to mental-health related quality of life (SF-36v2:MCS). Thus, higher levels of alexithymia were associated with worse mental health, which is consistent with similar reports in the literature (e.g., Hosoi et al., 2010). This also parallels the significant positive relationship observed between alexithymia and depression and anxiety. Alternatively, the relationship between scores on the TAS-20 and physical-related quality of life (SF-36v2:PCS) was significant in the opposing direction than predictions. Specifically, scores on the TAS-20 were found to be significantly positively related to scores on the PCS. Thus, higher levels of alexithymia were associated with better physical-related quality of life, which seems counter-intuitive and inconsistent with previous findings (e.g., Evren, Dalbudak, Durkaya, & Cetin, 2010; Hosoi et al., 2010). However, it is important to note that the mean PCS in this sample was equivalent to a t-score of 26.85, which is more than 2 standard deviations lower than the normative means for the SF-36v2:PCS. Thus, physical health-related quality of life in this sample was significantly impaired. This may have also introduced a restriction of range problem when trying to assess correlations with other measures. Other possible explanations for this unexpected finding include that perhaps individuals with higher levels of alexithymia have a skewed sense of self, which may lead to inaccurate self-assessments of physical-related quality of life status. This is discussed in the literature as a potential response bias among alexithymic individuals (Lane, Lee, Reidel, Weldon, Kaszniak, & Schwartz, 1996). Additionally, it may be possible that alexithymia serves

some type of adaptive role in terms of individuals' subjective interpretation of their well-being.

Alexithymia and Negative Affect

The relationship between alexithymia and negative affect is seemingly paradoxical based on the definition of alexithymia (e.g., inability to identify or describe emotions; Taylor et al., 1997). This brings into question the alexithymic patient's ability to accurately self-report emotional content including negative affect. For example, if an individual rates high on alexithymia and is unable to identify and/or describe his or her emotions, how then is it possible to obtain an accurate self-report of negative affect or any type of emotion? Lundh and Simonsson-Sarnecki (2001) offered some possible explanations to this paradox, which included: (a) that it may be possible that alexithymia tends to cause general distress which is experienced not only in terms of somatic symptoms but also as diffuse and undifferentiated psychological distress and (b) the degree of alexithymia varies among individuals and is typically not so extreme to the point that the individual is completely unable to use emotional language in reference to emotional distress.

According to previous investigations, it was predicted that the scores on the TAS-20 would be positively related to measures of negative affect such as depression and anxiety (e.g., Lundh & Simonsson-Sarnecki, 2001); however, no prior studies have explored these relationships among patients seeking interdisciplinary treatment for chronic back pain.

Consistent with research hypotheses, findings indicated that scores on the TAS-20 total were significantly positively related to measures of depression (CES-D) and anxiety

(BBHI-2:A). Specifically, current findings indicated that scores on the TAS-20 demonstrated Pearson correlations of r = .49 with CES-D and r = .55 with BBHI-2:A. The magnitude and valence of the relationships observed between the TAS-20 and measures of negative affect in the present study were similar to those reported in other investigations (e.g., Huber et al., 2009; Lundh & Simonsson-Sarnecki, 2001). It was also notable, that the magnitude of these relationships increased when examined with the TAS-20 difficulty identifying feelings subscale and decreased to non-significant levels when analyzed using the TAS-20 external-oriented thinking subscale. This may indicate that the most salient and clinically relevant aspects of the alexithymia construct, as it applies to the chronic back pain population, are centered on one's inability to identify emotions. This corresponds to the theory posited by Sarno's (1991) TMS, in that he speculates patients with chronic back pain maintain a diffuse awareness of negative emotions such as depression and anxiety, but are more inclined to have difficulties when it comes to discriminating bodily sensations as emotions rather than physical disorders. Alternatively, the external-oriented thinking subscale may be a less clinically relevant aspect of alexithymia within the chronic back pain population. This may also be related to inadequate internal consistency, which will be discussed further in the limitations section.

Alexithymia and Somatization

In the relevant literature, the relationship between alexithymia and somatization is unclear when negative affect is considered. Understanding this relationship is central to the purpose of this study. For example, to support Sarno's (1991) psychodynamic conceptualization of chronic back pain as being a "psychosomatic" phenomenon, one

would expect higher levels of alexithymia to be positively related to higher levels of somatic complaints. Results were consistent with expectations in that scores on the TAS-20 were found to be significantly positively related to BBHI-2:SC (r = .32). These results were also consistent with findings from previous investigations (Bagby et al., 1986; Lumley et al., 1996). Additionally, Sarno's (1991) understanding of TMS postulates that suppression of underlying negative affect is the main culprit that contributes to somatic symptoms. Thus, one would expect that negative affect would mediate the observed relationship between alexithymia and somatic complaints. Findings in the present study were consistent with expectations in that negative affect was found to completely mediate the relationship between alexithymia and somatic complaints. Thus, results of the meditational analysis support the notion that patients with chronic back pain may have a tendency to experience psychological distress via somatic rather than emotional pathways.

Limitations

Despite efforts to ensure a strong study, there were several limitations due to its nature. Limitations included both measurement and design issues.

Measurement limitations included issues with self-report instruments, internal consistency concerns, and the questionable clinical utility for one of the assessment tools. Regarding self-report, all instruments utilized in the present study were self-report in nature. While this allowed the study to occur given the available resources, it presented some concerns. Most centrally, self-reporting accuracy may already be questionable due to the potential problems of an alexithymic patient's difficulties assessing emotional and somatic states. There were also concerns about the internal consistency levels of the

TAS-20 external-oriented thinking subscale with a coefficient alpha level of .41. Similar concerns with this subscale are reported in other studies (e.g., Hosoi et al., 2010). This may be reflective of inherent factor structure problems. Notably, the TAS-20 did demonstrate good levels of internal consistency when it was analyzed as a total score; however, the clinical utility of the measure was brought into question by one of the psychologists involved with the study. The psychologist noted that patients' TAS-20 scores did not always correspond with the clinical impressions regarding patients' ability to identify and describe emotions. Although this is somewhat discouraging, it may not be a critical issue because the TAS-20 was designed more as a research tool than as a clinical aid.

Design limitations included issues with sampling, generalizability, cross-sectional research, and control groups. Regarding sampling, it should be noted that he present study acquired participants in a non-randomized fashion. Patients were approached for consent as they presented to the clinic. This may increase concerns of the generalizability of results. It is possible that the present sample was fundamentally different in particular systematic ways than the actual population of all patients seeking interdisciplinary treatment for chronic back pain. Additionally, it is important to recognize that this sample included treatment-seekers for the interdisciplinary program, which typically implies that the patient has already been to multiple medical providers and that interdisciplinary modalities are a last resort. Thus, it is possible that this sample reflects a segment of the chronic back pain population with more intractable and perhaps more psychologically-related disturbances. Regarding the cross-sectional design of the study, data was only collected at one time point, which may substantially limit the conclusions drawn from

results. Finally, there was no control group used in this exploration. Group comparisons were made with other investigations. This introduces many potential confounds in the interpretations of results.

Clinical Implications

The findings of this study have significant clinical implications in treating patients experiencing chronic back pain. First, results suggest that emotional awareness and the ability to identify and describe emotional content may be compromised in this population. Additionally, negative affect was found to mediate the relationship between one's difficulty in identifying and describing emotions and somatic symptoms. Thus, it is vitally important to target interventions to address underlying depression and anxiety despite a patient's focus on somatic complaints. It may also require the clinician to note that negative affect may manifest differently in these patients and be more difficult to detect than in other groups. Patients with higher degrees of alexithymia may require more assistance in learning to access, identify, and describe emotions. Focusing on helping individuals better discriminate emotion-related bodily sensations from physical-related sensations may also be helpful. Mindfulness meditation interventions may also allow individuals with higher levels of alexithymia to increase present-moment body awareness and facilitate the identification and description of emotions.

From a counseling psychology perspective, clinicians are likely to approach treatment from a more holistic and strengths-based perspective than other related disciplines. Accordingly, when interpreted from this framework, the results of the present study offer several unique implications. First, it is vitally important to consider multicultural factors in the presentation of chronic back pain symptoms. For example, in

some cultures it may be more "acceptable" for individuals to express distress from a medical/physical basis than psychologically. Thus, the large mediation effect of negative affect observed within the relationship between alexithymia and somatic complaints may bear some relation to multicultural factors. If the counseling psychologist is aware of these potential cultural influences, he or she may be more prepared to have sensitive conversations related to patients' symptoms in the context of their cultural perspectives. Second, due to this population's potentially low levels of emotional awareness and difficulty understanding how psychological factors may relate to somatic symptoms, it may require the counseling psychologist to engage in a significant amount of psycho-education at the onset of therapy. Taking the time to provide patients with a better understanding of the mind-body connection may better prepare them to become more engaged in taking a psychological approach for a perceived "physical" problem. Third, despite the high levels of negative affect and lower mental health related quality of life reported among patients with chronic back pain, the counseling psychologist may focus less on psychopathology and more on building off of patients' inherent strengths. Moreover, based on the results of the current study, some patients may have difficulty working from an emotional level in therapy. Thus, when patients present largely focused on physical symptoms and functional deficits, it may be helpful for the counselor to first conceptualize the individual as a whole and vital person capable of achieving a rewarding and valued life. The role of the psychologist may include helping patients to find new ways to pursue valued patterns of living despite pain and other functional limitations. Similarly and related to the strengths-based approach inherent in the foundations of counseling psychology, counseling psychologists may be inclined to consider the

importance of career-related interventions. Vocational issues were not directly assessed as part of the present investigation; however, given the high levels of functional deficits observed among this population, it may be important to consider. For those patients less equipped to discuss issues from an emotional context, discussing career-related pursuits may offer an alternative pathway to help patients restore functioning and increase positive behavioral activation. Finally, the more holistic counseling psychology perspective may include a focus on behavioral factors emerging within the therapeutic relationship. For example, as first articulated by the work of Fordyce and colleagues (1968), "pain behaviors" (e.g., grimacing, complaining, altered gait, decrease in activity, requesting medications) are likely to increase if they are reinforced. Thus, it is important for counseling psychologists to pay close attention to not reinforce "pain behaviors" while simultaneously looking for opportunities to reinforce "well behaviors" (e.g., increasing activity and decreasing pain medications; Fordyce et al., 1973). Working on a behavioral level may be especially helpful among those patients with higher levels of alexithymia that are less psychologically minded.

Future Research Implications

While this investigation served as a preliminary exploration of alexithymia among the population of outpatients seeking interdisciplinary treatment for chronic back pain, future research is needed to address some of the shortcomings of the present study and the relevant literature. First, based on the results of this study along with previous investigations, it is apparent that the psychodynamic perspective has important insights to offer in the explanation and treatment of chronic back pain. One of the main reasons that empirical work in this area is so limited is due to the difficulty in measuring the repressed

emotionality and/or lack of emotional awareness that is postulated to be associated with somatic symptoms. While alexithymia may be a closely related construct, perhaps the TAS-20 did not completely overlap with the emotional awareness deficits explained in psychodynamic models of chronic back pain (e.g., Sarno, 1991). Other constructs that could potentially be applied to this area of investigation include experiential avoidance, which is assessed by the Acceptance and Action Questionnaire (AAQ) from the Acceptance and Commitment Therapy (ACT) literature (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Experiential avoidance is defined as the attempt to alter the form, frequency, or situational sensitivity of aversive thoughts, feelings, and physiological sensations even when doing this leads to behavioral difficulties (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996).

From a mechanistic standpoint, it would be particularly helpful to increase the understanding of the psychophysiological processes involved with chronic back pain. For instance, several models point to hypothalamic-pituitary-adrenal-axis dysregulations as being related to chronic pain, which includes increased heart rate, blood pressure, muscle tension, breathing rates, cortisol levels, and decreased immune functioning. However, the literature lacks clarity on specifying an exact mechanism. Increased empirical support in this area would make it easier for psychologists to emphasize the importance of psychological factors among patients with chronic back pain that might be otherwise resistant to consider pain from a psychological perspective.

From an interventional perspective, future studies employing randomized controlled designs would be helpful to determine whether treatments targeted to address lack of emotional awareness and/or experiential avoidance are effective in resolving

somatic symptoms. Acceptance based interventions may be particularly important to study, especially with the increased empirical support of ACT treatments for chronic pain (e.g., Johnston, Foster, Shennan, Starkey, & Johnson, 2010). Future studies may also consider employing longitudinal designs to help elucidate how fluctuations in alexithymia (or similar constructs) relate to the manifestation of somatic symptoms.

Conclusions

Based on the findings presented above, several conclusions were drawn from this study. First, difficulties identifying and describing emotions is a significant problem among patients seeking interdisciplinary treatment for chronic back pain. Second, results supported that alexithymia is strongly related to depression, anxiety, and poorer mental-health related quality of life, which indicates that patients with alexithymia continue to maintain a diffuse awareness of negative emotional states. Third, the study also provides empirical support for psychodynamic explanations of chronic back pain such as Sarno's (1991) Tension Myositis Syndrome (TMS). This was achieved through showing that the relationship between alexithymia and somatic symptoms is mediated by negative affect. The present study also marks the first exploration known to the author that examines alexithymia in a sample of patients seeking interdisciplinary treatment for chronic back pain. Taken together, further investigation of chronic back pain symptoms from a psychodynamic and/or emotional level is warranted.

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