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Assessing Pain-related Factors as Predictors of Distress during Transitional Musculoskeletal Pain Experience

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This is to certify that the doctoral dissertation by

Gary Robert Ahlstrom

has been found to be complete and satisfactory in all respects,
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Walden University
2020

Abstract

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Musculoskeletal Pain Experience

By

Gary Robert Ahlstrom

MS, Walden University, 2008

BS, University of Oregon, 1974

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

General Psychology

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Abstract

During people's pain experience, certain difficulties may emerge within individuals' psychological and social domains that can confound and exacerbate the frequency of their pain-related distress episodes. Previous research has consistently found psychosocial factors evident during the first months of unresolved pain are reliable predictors of pain chronicity and disability at 12 months. This exploratory descriptive quantitative multivariate study included 2 nationwide online surveys that examined the frequency of moderate-to-severe symptoms of distress within the anxiety-depression spectrum, and the extent that 8 pain-related factors influenced and predicted episodes of anxiety and depressed mood, which included 2 demographic risk factors (age range and gender), 3 medical protocol-related factors (general musculoskeletal diagnosis, pain intensity, and pain interference), and 3 psychosocial issues (perceived rejection, quality of life, and satisfaction with life). Respondents were recruited online and screened for eligibility to participate in each survey. Participants were 18 years of age or older with either a recent musculoskeletal injury or recently diagnosed musculoskeletal condition lasting no more than 4 months since onset. The study found perceived rejection was the most reliable predictor and had the greatest effect on anxiety episodes, and that pain interference reliably predicted and had the greatest effect upon episodes of depressed mood. The findings from the present study suggest that to properly prevent chronic pain and minimize pain-related disability, greater attention needs to be directed toward the psychosocial issues that emerge during the course of individuals' transitional pain experience.

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Dedication

I am dedicating my dissertation research project to the loving memory of my late brother, Dennis Edward Ahlstrom. "Denny" as he was known to his family and friends, had a master's degree in healthcare administration and wanted to assist me in translating my research into our nation's healthcare system. Dennis died alone unexpectedly in his home in February 2013. Denny was my closest sibling, as we were only 18 months apart, and grew up together. We were inseparable as children and adolescents, and as adults we were always fond of one another's company. He is sorely missed.

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To begin with, I would like to thank a special faculty member, my family members, friends, supportive faculty, advisors, specialists, and professional acquaintances who have helped me reach this point in my academic career. First and foremost, I wish to thank my committee chair, Jay Greiner, Ph.D., for standing beside me when I lost my brother. His patience and encouragement has been exemplary and is greatly appreciated. In addition, I want to thank Diana Jeffery, Ph.D., my research methods mentor, for her excellent suggestions, encouragement, and enthusiasm. I also want to thank Patti Barrows, Ph.D., for her superb supportive feedback when reviewing my research proposal and subsequent drafts to my final dissertation. A special thanks is extended to Sarah Witty, Ph.D., who reviewed my final dissertation draft for Form and Style.

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group for their warm whole-hearted support, and their insightful sharing, which has helped me recognize that I am not alone in learning how to live with my 'new normal," my chronic pain condition. This supportive group experience has proven to be very informative, insightful, and helpful, and my experience with them has inspired and shaped my research project.

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I am grateful for all of the encouragement and support that I have received during the dissertation process. Thank you everyone!

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Chapter 1: Introduction to the Study

Orientation and Background

The findings in the clinical literature on the psychophysiology of pain and its comorbid degenerative pathology deserves greater attention in the American healthcare system, as well as from the public and the nation's leaders in the United States. Recent research using brain imaging technology has demonstrated that both physical pain and psychosocial distress share neural pathways in the human brain (Eisenberger, 2012a, 2012b; Eisenberger & Cole, 2012; Eisenberger & Lieberman, 2004; Eisenberger, Lieberman, & Williams, 2003; Kross, Berman, Mischel, Smith, &Wager, 2011). Remarkably, research has validated that not only is unresolved pain physically stressful, but it is also psychologically distressful. And the growing body of empirical evidence unambiguously establishes that stressful and distressful pain experiences facilitate and promote pain chronicity, impairment, and disability.

Over the past several decades, numerous reports summarizing the psycho-physiological literature have concluded that prolonged recurrent unrelieved musculoskeletal pain contributes toward an array of emotional and cognitive distress symptoms; and conversely, physical stress response and psychological distress heightens the intensity of pain severity levels, and facilitates the pathological processes underlying pain chronicity (Boersma & Linton, 2005, 2012; Burden of Musculoskeletal Diseases in the United States, 2013-2016; Institute of Medicine, 2011; Keefe, 2012; Londhey, 2015). Yet the recommendations put forth by these reports for prevention have not been fully acted upon or implemented (Institute of Medicine, 2011, Nicholas, Linton, Watson,

Main, & the Decade of the Flags Working Group, 2011). To a large extent, these prevention recommendations have been dismissed or ignored, or, at best, marginalized by being relegated to tertiary care.

Aside from depression and anxiety, other psychological aspects of pain and distress during the 'transitional' pain period (i.e., the acute, subacute, and early chronic musculoskeletal pain experience) are not considered by frontline healthcare providers, and early psychological-assisted interventions continue to be overlooked in primary care referrals (Foster, Hartvigsen, & Croft, 2012; Institute of Medicine, 2011; Molina et al., 2012; Roditi & Robinson, 2011). In addition with not fully addressing the psychological aspects of pain in prevention, the American healthcare system's strategy of overreliance on pain medication to bring recurrent pain under control has fueled America's growing opioid addiction epidemic and overdosing deaths crisis (Alexander, Kiang, & Barbieri, 2018; Institute of Medicine, 2011; Soelberg, Brown, Du Vivier, Meyer, & Ramachandran, 2017; Volkow & Collins, 2017).

The clinical literature is replete with reports indicating early pain-related distress in prolonged unresolved pain experience is a reliable predictor of later chronicity and disability (Galli, Ettlin, Palla, Ehlert, & Gaab, 2010; Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Innes, 2005; McCracken, Vowles, & Eccleston, 2004; Pincus, Burton, Vogel, & Field, 2002; Ritchie, Hendrikz, Kenardy, & Sterling, 2013; Vlaeyen, 2015). Recurrent pain associated with musculoskeletal disorders and injuries presents a major health conundrum and costly economic burden to all nations world-wide (Blyth, Hoy, & March, 2012; Blyth, F. M., van der Windt, & Croft, 2010; Hogg-Johnson et al.,

2008; Woolf & Pfleger, 2003; World Health Organization, 2003). This same trend is well documented in the United States (Burden of Musculoskeletal Diseases in the United States, 2013-2016; Drexler, 2008; Gatchel & Schultz, 2014a, 2014b; Institute of Medicine, 2011; Keefe, 2012).

People with musculoskeletal conditions and injuries are prone to develop chronic pain, thereby becoming further disabled, and requiring rehabilitative and specialist interventions, in addition to primary care services (Gatchel & Schultz, 2014b; Groopman, 2005; Institute of Medicine, 2011; Keefe, 2012; Nampiaparampil, 2009; Wise, 2003). Both illness behaviors and psychological distress associated with unrelieved acute and subacute pain have been found to be salient predictors of pain chronification and impairment (Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Innes, 2005; Lumley et al., 2011; Ritchie, Hendrikz, Kenardy, & Sterling, 2013; Vlaeyen, 2015). Early pain-related distress predicts later pain chronicity and disability along with predictors of pain severity, functional physical status, and mental health well-being (Aronoff & Feldman, 2000; Babcock, Lewis, Hay, McCarney, & Croft, 2002; Gatchel, 2004; Hoogendoorn et al., 2000; Jensen, 2010; Jensen & Karoly, 2010; Kent & Keating, 2008; Lumley et al., 2011; Pincus, Burton, Vogel, & Field, 2002).

Jensen and Karoly (2010) reported that early pain-related distress involves complex multiple and often overlapping affective, cognitive, and environmental dimensions and causes. According to Jensen and Karoly, people's thoughts, perceptions, and emotional responses to the events comprising their pain experience can be uniquely mixed because of individual differences and their unique sets of circumstances and life

events. To better understand the problems associated with pain and suffering, an integrated comprehensive approach has been advocated (Gatchel & Schultz, 2014a, 2014b; Institute of Medicine, 2011; Keefe, 2012).

Theoretical Foundations

Historically, the study of pain and pain-related problems is complex (Beecher, 1959; Borrell-Carrio, Suchman, & Epstein, 2004; Engel, 1959, 1977; Hubert, 1984; Lillrank, 2003; Rey, 1993; Werner, Steihaug, & Malterud, 2003). In her seminal work, *The History of Pain*, French historian Roselyne Rey (1993) traced the evolution of humanity's basic understanding of pain by documenting the conjectural history of pain, based upon a multidisciplinary approach of popular perceptions and social constructions of pain across millennia in western civilization (Ahlstrom, 2008; Campbell, 1999; Olson, 2013). More recently, during the 20th and 21st centuries, a number of theoretical approaches have been used to understand pain and its etiology and epidemiology, pain management, and related rehabilitation (Gatchel & Schultz, 2014a, 2014b; Keefe, 2012; Sullivan, Adams, & Ellis, 2013; Turk & Gatchel, 2013; Turk & Okifuji, 2002). As utilized in this study, the biopsychoecological (BPE) model of pain and pain pathogenesis (Stineman & Streim, 2010) serves as an integrative megatheoretical foundation from which to examine the, relationships between three psychological constructs (e.g., perceived rejection in social constraints, quality of life in everyday activities, and current satisfaction with life) and episodes of core pain-related distress symptom in the anxiety-depression spectrum.

The Biopsychoecological Paradigm of Distress and Trigger Events

The biopsychoecological (BPE) paradigm of pain pathogenesis purports that psychological distress during early prolonged unresolved pain experience is a major psychosocial risk factor that promotes and predicts later chronicity and disability outcomes (Gatchel & Schultz, 2014a, 2014b; Keefe, 2012; Stineman & Streim, 2010). This same contention is also evident in the body of research literature that supports the earlier biopsychosocial (BPS) model preceding the BPE model (Atkinson, Slater, & Epping-Jordan, 1997; Epping-Jordan et al., 1998; Kent & Keating, 2005, 2008; Klenerman et al., 1995; Pincus, Burton, Vogel, & Field, 2002; Von Korff, LeResche, & Dworkin, 1993; Wahlgren et al., 1997). More research is needed on stressors that directly contribute to and exacerbate early pain-related psychological distress symptoms (Gatchel & Schultz, 2014a, 2014b; Keefe, 2012; Stineman & Streim, 2010).

Specific psychosocial issues influencing distress severity in human pain experience need to be identified (Carey, Mansell, & Tai, 2014; Gatchel & Schultz, 2014a, 2014b; Jensen & Turk, 2014; Keefe, 2012; Turk & Monarch, 2002). Further focus is needed on psychosocial stressors that potentially predict early pain-related distress, chronicity, and disability (Carey, Mansell, & Tai, 2014; Institute of Medicine, 2011; Gatchel & Schultz, 2014a, 2014b; Jensen & Turk, 2014; Keefe, 2012; Turk & Monarch, 2002).

Gaps in the Literature

There is little published information on the relationship between psychosocial issues and pain experiences (Gatchel & Schultz, 2014a, 2014b; Jensen & Turk, 2014;

Keefe, 2012; Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Price, 2000). Likewise, there is limited published research on the predictive relationships of specific types of psychosocial issues on the frequency and severity of pain-related psychological distress symptoms episodes during early pain experience or transitional pain period (Eccleston, Crombez, Scotford, Clinch, & Connell, 2004; Gupta et al., 2007; Jenewein et al., 2009; Keefe, 2012; Linton, 2005). These gaps in the clinical literature deserve greater attention because, according to the report by the National Academy of Medicine (see: Institute of Medicine, 2011), psychological issues continue to remain unaddressed in patients with acute, subacute, and early chronic musculoskeletal pain; specifically, their emotional, informational, and psychosocial needs. Because these unmet needs can exacerbate distress during the course of transitional pain experience, interdisciplinary interventions addressing early detected psychological factors may help alleviate pain severity, suffering, and disability (Artner, Kurz, Cakir, Reichel, & Lattig, 2012; Institute of Medicine, 2011).

Problem Statement

Prolonged pain experience adversely impacts an individual's psychological and social domains (Gatchel & Gardea, 1999; Gatchel & Schultz, 2014a; Innes, 2005; Jenson, 2010). Psychosocial difficulties impact levels of distress associated with musculoskeletal pain (Denison, Asenlof, & Lindberg, 2004; Gatchel & Schultz, 2014a; Keefe, 2012). Three psychosocial issues that have been identified as trigger events or stressors in the current proposed study are presented next.

Three Psychosocial Trigger Events in Early Pain-related Distress

The first emergent trigger event I investigated in this study involves the perceived rejection that patients may experience resulting from constraints placed on their pain disclosure and the social support provided by others in their social networks (Cano & Williams, 2010; Craig, 2009; Rime, 2009). The second issue involves the quality of life in patients' level of functioning in their daily activities (Cowan & Kelly, 2003). And a third issue involves the difficulties associated with patients' current level of satisfaction with their life (Diener, Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993; Vassar, 2008). Issues involving perceived rejection, quality of life, and satisfaction with life are thought to exacerbate the frequency and severity of pain-related distress symptoms during transitional pain experience, including the frequency and severity of anxiety and depressed mood episodes. Collectively, studies of these three psychological constructs indicate they may serve as important trigger events that not only exacerbate pain-related distress during the pain experience but may promote pain chronicity and disability.

Frequency of Pain-related Distress Episodes

Transitional pain-related distress includes an array of precursor symptomology that culminate in the anxiety and depressed mood episodes often seen in chronic pain (Butt et al., 2008; Meuser et al., 2001). Most early distress symptoms are associated with stress-reactivity and are in line with the anxiety-depression spectrum (Bair, Wu, Damush, Sutherland, & Kroenke, 2008; McWilliams, Goodwin, & Cox, 2004). Distress is conceptualized as a fluid process with symptoms and severity changing across time and situations (Lazarus, 2000). This process includes psychosocial factors and symptoms

observed during acute, subacute and chronic pain experience (Bair et al., 2008; Butt et al., 2008; Fernandez, 2005; Gureje, 2008; McWilliams et al., 2004; Meuser et al., 2001; Tsang et al., 2008).

Purpose of the Study

This research study was composed of two online surveys that I used to investigate the extent that the three psychosocial issues influence and predict the frequency of pain-related distress episodes: anxiety and depressed mood episodes. The survey on anxiety was called the Musculoskeletal Pain Distress Survey (MPDS), and the survey on depression was called the Musculoskeletal Pain-related Depressed Mood Survey (MPDMS). Both surveys were designed to investigate the problem outlined above and the concomitant factors related to it. I conducted both surveys comprising the study over the internet through an online host.

The purpose of both surveys was to explore the extent that three psychosocial issues and pain-related anxiety symptoms are evident during the first 16 weeks following musculoskeletal pain onset, and to statistically describe their interrelationships. Beyond these objectives, another purpose of the study was to determine if perceived rejection in social support networks, quality of life in daily functioning, and current satisfaction with life have a predictive relationship with the level of self-reported frequency of episodes with core pain-related anxiety and depressed mood symptoms. Together with these objectives, and with the support of the literature, I aimed to improve the conceptual clarity in preventive research on the influence of psychosocial factors upon pain-related distress during the transitional musculoskeletal pain (Carey, Mansell, & Tai, 2014;

Gatchel & Schultz, 2014a; Institute of Medicine, 2011; Jensen & Turk, 2014; Keefe, 2012; Turk & Monarch, 2002).

If it was determined that any of these issues have a strong predictive relationship with anxiety and depressed mood distress episode frequency, then such information may be helpful in assisting primary care healthcare providers in directing referrals of patients with pain to nonpharmacological and psychological-assisted interventions. Individuals identified as being at risk for heightened pain-related distress can then be referred to preventive interdisciplinary preventive and rehabilitation interventions (Carey, et al., 2014; Gatchel & Gardea, 1999; Gatchel, McGeary, McGeary, & Lippe, 2014; Gatchel & Schultz, 2014b; Jensen & Turk, 2014; Keefe, 2012; Sullivan, Adams, & Ellis, 2013). In addition, to fulfill the ultimate goal of pain chronicity and disability prevention in patients at risk, frontline healthcare providers will need to use reliable screening tools designed to detect psychosocial issues that promote pain-related distress, and make the requisite interdisciplinary referrals to psychological-assisted assessment and intervention resources during the transitional pain period.

Nature of the Study

The study was a quantitative multivariate within-subjects exploratory descriptive cross-sectional survey designed to examine the context of relationships between perceived rejection, quality of life in daily functioning, and satisfaction with life with the frequency of episodes of core anxiety and depressed mood symptoms as outcomes during early musculature pain experience. In addition, in the study, I controlled for the influences of two pain-related demographic risk factors (viz., age range and gender) and

three covariate medical protocol-related factors (i.e., pain intensity, pain interference, and general type of musculoskeletal pain diagnosis). According to Creswell (2003), exploratory descriptive research in quantitative surveys is based upon the traditional scientific methods that includes determinism, reductionism, empirical observation and precise measurements, and the verification of theory. Research questions and hypotheses in exploratory descriptive research are tied to theory, supporting literature, and clinical recommendations for future research (Creswell, 2003; Jensen & Karoly, 2010; Mertler & Vannatta, 2010; Petrocelli, 2003). The use of quantitative survey provides an empirical approach from which to assess personal experiences using the methods of applied quantitative analytics (Beecher, 1959; Crotty, 1998; Jensen & Karoly, 2010; Phillips & Burbules, 2000).

In the present study, the information collected from both quantitative surveys was statistically analyzed using advanced multivariate methods to assess the influence of sets of predictor variables upon a single outcome or criterion variable, as outlined by Aron and Aron (1999) and Cohen (2001). According to Petrocelli (2003), hierarchical multiple regression (HMR) is useful for testing the relationships between theoretical constructs. I used HMR as the data analysis method for this study.

<p align="center">**Research Questions and Hypotheses**</p>

In both online survey studies I addressed two research questions. First, are the three psychosocial trigger events (i.e., perceived rejection, quality of life in daily functioning, and satisfaction with life) correlated with episodes of core anxiety and depressed mood symptoms during transitional pain experience? Secondly, which

psychosocial trigger event(s) serve as the most reliable predictor(s) of anxiety and depressed mood episodes? Multivariate quantitative approaches were used to answer these two research questions with separate analyses of each of the psychosocial predictor variables with either anxiety or depressed mood episodes as the outcome or criterion variable. The following is a succinct description of the study's research questions and hypotheses.

First Research Question and Hypotheses

In the first research question, I sought to determine whether the frequency of episodes in pain-related anxiety and depressed mood symptoms are associated with and change in relation to the three psychosocial trigger events, while controlling for five potential confounding predictor variables. The first research question (RQ1) for both surveys (designated with the subscripts 1 and 2 respectfully), and the three sets of null (H_O) and research (H_I) hypotheses that addressed the first research question were stated as follows:

RQ1: What is the relationship between the scores indicating high perceived rejection, low quality of life in daily functioning, and low satisfaction with life and the scores on the frequency of episodes of pain-related distress symptoms (i.e., either anxiety or depressed mood), after controlling for age, gender, and scores for pain intensity, pain interference, and general type of musculoskeletal diagnosis (injury or condition)?

$Ho1_1$: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and high scores in perceived rejection, after controlling for

age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_I1_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_O1_2: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_I1_2: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_O2_1: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_I2_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and type of musculoskeletal pain.

H$_O2_2$: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_I2_2$: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_O3_1$: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_I3_1$: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_O3_2$: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_I3_2$: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling

for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

Second Research Question and Hypotheses

In the second research question, I sought to determine which of the three psychosocial predictor variables best predicted the frequency of the criterion variable (either anxiety or depressed mood episodes) from the regression equation. In each survey, there were a set of three hypotheses that address the second research question. The second research question (RQ2) for both surveys and the three sets of null (H_O) and research hypotheses (H_I) that address the second research question were succinctly stated as follows:.

RQ2: Does the regression equation resulting from a subset of scores on perceived rejection, quality of life in daily functioning, and satisfaction with life significantly predict the level of frequency of episodes of distress symptoms (either anxiety or depressed mood)?

H_O4_1: The regression equation for scores on perceived rejection do not reliably predict the frequency of anxiety episodes.

H_I4_1: The regression equation for scores on perceived rejection do reliably predict the frequency of anxiety episodes.

H_O4_2: The regression equation for scores on perceived rejection do not reliably predict the frequency of depressed mood episodes.

H_I4_2: The regression equation for scores on perceived rejection do reliably predict the frequency of depressed mood episodes.

H$_O$5$_1$: The regression equation for scores on quality of life do not reliably predict the frequency of anxiety episodes.

H$_1$5$_1$: The regression equation for scores on quality of life do reliably predict the frequency of anxiety episodes.

H$_O$5$_2$: The regression equation for scores on quality of life do not reliably predict the frequency of depressed mood episodes.

H$_1$5$_2$: The regression equation for scores on quality of life do reliably predict the frequency of depressed mood episodes.

H$_O$6$_1$: The regression equation for scores on satisfaction with life do not reliably predict the frequency of anxiety episodes.

H$_1$6$_1$: The regression equation for scores on satisfaction with life do reliably predict the frequency of anxiety episodes.

H$_O$6$_2$: The regression equation for scores on satisfaction with life do not reliably predict the frequency of depressed mood episodes.

H$_1$6$_2$: The regression equation for scores on satisfaction with life do reliably predict the frequency of depressed mood episodes.

Definitions of Terms

Acute Pain: According to the Institute of Clinical Systems Improvement (2012), which is based in Minnesota, this term refers to recurrent fleeting pain of recent origin resulting from a specific cause or harmful event that damages tissues and lasts up to 7 weeks after onset on lower back pain. King (2007, citing Merskey 1979; Merskey & Bogduk 1994) defines acute pain as lasting less than three months.

Chronicity: This term refers to the state whereby pain has become a permanent, recurrent and persistent condition (King, 2007). In medicine, chronicity generally refers to long lasting conditions with insignificant measured progress towards resolution (King, 2007; Venes, *Taber's Cyclopedic Medical Dictionary*, 2001).

*Chronic Pain***:** Chronic pain is pain lasting more than 3 months (King, 2007). Chronic pain has been operationally defined as any pain that persists more than 12 weeks or longer in duration (Institute of Clinical Systems Improvement, 2012; National Institute of Health, 2011). Chronic pain is a neuro-degenerative condition (European Federation of IASP Chapters / International Association for the Study of Pain, 2001; Harding, 1984; International Association for the Study of Pain / European Federation of IASP Chapters, 2002, 2004).

Chronification: This is a relatively new term that refers to the processes whereby pain becomes intractable, pathological and chronic (Scher, Midgette, *&* Lipton, 2008).

*Collaborative Integrative Healthcare Model***:** According to the Institute of Medicine (2011) this terminological phrase refers to the evidence-based model of pain healthcare that is needed to alleviate pain-related suffering and prevent chronic pain in the United States. Bodenheimer, Lorig, Holman, and Grumbach (2002) referred to collaborative care as the cooperative relationship between patients and physicians in which health care decisions are discussed and made together as a team, with the goal of encouraging active patient participation and accountability in pain healthcare.

*Comorbidity***:** Comorbidity refers to the secondary effects of physical or mental disease or disorders that are concurrently linked with a specific primary medical condition (Caughey, Vitry, Gilbert, & Roughead, 2008).

Diathesis**:** This term refers to personal vulnerabilities, usually genetic and shaped by life experiences that make the individual susceptible to diseases and disorders (Ingram & Luxton, 2005).

*Disability***:** This term refers to intractable or permanent limitations in activities and restrictions in full participation of everyday living (Stineman & Streim, 2010).

Early Detection: Early detection refers to pain and distress assessment within the first three months following pain onset (Barker, Taylor, & Johnson, 2014). The aim of early detection is to identify those individuals who are at risk of developing anxiety and depression symptoms, impaired physical and social functioning, and pain chronicity after 3 to 6 months, and pain-related disability after 12-months, and to refer them to preventive interventions (McCarberg, 2011).

Early Prevention: This term refers to the integration of early collaborative psychological approaches with frontline medical, pharmacotherapy, physical therapy, and surgical care to minimize concurrent distress, disease chronicity and debilitation (Barker, Taylor, & Johnson, 2014; Bodenheimer, Lorig, Holman, & Grumbach, 2002; Linton, 2002; Loeppke, 2008).

Ecological: This term refers to the social and physical environmental factors influencing and facilitating adjustment, chronicity, disability, disorders, disease, distress,

health, healing, illness, impairment, injury, physical and social functioning, and of course, subjective wellbeing (Stineman & Streim, 2010).

Etiotropic Model: This term refers to pathological models of chronic disease and disorders that guide interdisciplinary assessment and treatment based on the underlying physiological, psychological, and ecological risk factors known to exacerbate the distress and symptoms associated with traumas, injuries, and long-term illness, (Colson, 2004).

Impairment: This term refers to temporary limitations in activities and restrictions in full participation of everyday living resulting from and injury or illness (Stineman & Streim, 2010).

Locus-of-Control: According to Rotter (1990), the progenitor of this concept, this term refers the people's perceived sense of self-mastery or control over events in their life and their destiny. Individuals with an external locus-of-control orientation tend to believe that events are destined by fate and they have little if any influence over events in their lives (Rotter, 1990). And individuals with an internal locus-of-control orientation are more apt to believe that they can influence events in their lives (Rotter, 1990). Both of these orientations can influence the individual's practice of hygienic and health-related behaviors in their everyday lifestyles (Rotter, 1990).

Neural Signatures: This term refers to the processes and mechanisms in neural signals that are encoded to produce conscious sensation and specific patterns of neural transduction signals, which involves affiliate neural receptors and neuronal/glial pathways in the brain and spinal cord (Green et al., 2009).   According to Tracey and

Mantyh (2007), neural signatures play an important role in the generation and maintenance of chronic pain states.

*Nociception***:** This term refers to nociceptive pain, which is elicited by a harmful environmental stimulus when nerve endings in the skin, muscles, connective, and visceral tissues send pain messages to and through the spinal cord and to the brain for processing (Dubin & Patapoutian, 2010).

Pain: This term has recently been updated by the International Association for the Study of Pain (IASP, de C Williams & Craig, 2016). According to de C Williams and Craig**,** "**Pain is a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive and social components"** (p. 2420, column 1, para 3, sent 1). The IASP used to define pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey & Bogduk, 1994, p. 210). Pain is the fifth vital sign (Pasero & McCaffery, 1997). The new IASP definition accommodates the emotional, cognitive and social dimensions of the pain experience, beyond the sensory domain.

*Pain Control***:** This term refers to relieving the discomfort of pain via biomedical approaches with pharmacotherapy, physical therapy, and surgical procedures; and includes psychological approaches that encourage patient perceived self-control through self-efficacy and pain self-management training (Bandura, O'Leary, Taylor, Gauthier, & Gossard, 1987; Chester, Jerosch-Herold, Lewis, & Shepstone, 2016).

*Pain Disclosure Constraints***:** This term refers to verbalizations that reveal one's experiences with problematic pain (Herbette & Rime, 2004; Lepore & Revenson, 2007;

Rime, 2009). Constraints occur when these disclosures are suppressed, either directly by others who make rude or insensitive comments, or through self-censure, as a result of anticipated, perceived, or overt annoyance by other people who tire of listening to such disclosures (Herbette & Rime, 2004).

Pain Management: This term refers to relieving the discomfort of pain via interdisciplinary biopsychosocial approaches to pain assessment, treatment, and self-management (Gatchel, Howard, & Haggard, 2011, p. 469).

Pain Pathogenesis: This term refers to the physiological and psychological processes exacerbated by physical and social environmental influences and life experiences that facilitate the transition of pain from normal healing acute and subacute pain processes to pathological chronic pain conditions (Simons, Elman, & Borsook, 2014).

*Pain-related Psychological Distress***:** This term refers to the following eight set of psychological symptoms often observed in early pain experience: (a) accumulative chronic stress with exhaustion, fatigue, muscle tension and stiffness (Dahl, Wilson, & Nilsson, 2004; Melzack, 1998, 2001; Woo, 2012), (b) worry and heightened anxiety sensitivity (Gerrits et al., 2012), (c) frequent episodes involving negative emotions (Trost, Vangronsveld, Linton, Quartana, & Sullivan, 2012), (d) sleep interference (Ohayon, 2011), (e) depressed mood and low energy (Cheatle, 2011), (f) negative thoughts and catastrophizing (Nicholas, 2011), (g) difficulty concentrating and remembering (Martelli, Zasler, Bender, & Nicholson, 2004), and (h) periodic confusion (Yunus, 2007). The concept of distress refers to the psychological dimension associated with stress

(Aneshensel, 1992). According to Aneshensel (citing Selye, 1936, 1973), distress is conceptualized as a behavioral or psychological consequence of the body's internal stress response to external threats or stressors in the individual's physical and social environments.

*Pain Prevention Management***:** This term refers to the empirically-based strategies and methods utilized in our healthcare system to achieve pain control and pain prevention, and to minimize and eliminate individual suffering (Bergman, 2007; Gloth, 2001; Hooshmand, 1993, 2018; Weiner & Nordin, 2010).

Pain Transition: This term refers to the pathological processes involved in the change from acute to chronic pain, including runaway inflammatory immune response and the hyperarousal of nerve fibers and peripheral and central sensitization (Katz & Seltzer, 2009).

*Perceived Rejection***:** This term refers to episodes that may occur within the context of an individual's social support network, where significant others place constraints on (a) listening to the person's disclosures about their pain and/or the problems associated with their pain, and (b) the extent that soothing and caring social support is proffered from others to them (Beeney, Franklin, Levy, & Adams, 2011; Herbette & Rimé, 2004). Neurological research has found the distressful social pain associated with social rejection shares the same neuropathways as physical pain (Beeney, Franklin, Levy, & Adams, 2011; Cacioppo & Cacioppo, 2016; Eisenberger, 2012a, 2012b; Eisenberger & Cole, 2012; Eisenberger & Lieberman, 2004; Herbette & Rimé, 2004; MacDonald & Leary, 2005).

*Perceptions of Injustice***:**   This term refers to the individual's perceptions of unfairness in their suffering during the course of their pain experience, usually as the result of the negligent actions by another person or a group of people, or because of extenuating circumstances believed to be beyond their control, and their appraisals of experiencing an irreparable sense of loss (Sullivan, Scott, & Trost, 2012).

*Psychological-Assisted Interventions***:**   This term refers to interdisciplinary pain health-care assessments and treatments that target the individual patient's emergent pain-related psychosocial issues, and their pain education and pain self-management needs for the purpose of preventing pain chronicity, disability, and impairment (Institute of Medicine, 2011; Keefe, Porter, Somers. Shelby, & Wren, 2013; Watermeyer, 2012).

*Psychosocial Distress***:**   This term refers specifically to the distress that has an identifiable interpersonal or social source, trigger event or stressor. Livneh and Antonak (2005, citing Lazarus & Folkman, 1984), conceptualized psychosocial distress as an attempt by the individual to adapt behaviorally, cognitively and emotionally to the state of their physiological stress level, and to the threatening event(s). These stressors include threatening events in their interpersonal relationships and social environments that elicit their stress response (Lazarus & Folkman, 1984; Livneh & Antonak, 2005).

*Psychosocial Stressors***:** This term refers to stressful and traumatic life events within the context of the person's interpersonal relationships and social environments that exacerbate musculoskeletal pain-related distress, including anxiety and depression (Poleshuck et al., 2009).

Quality of Life in Daily Functioning: This term refers to the impairment in performing common everyday activities resulting from a painful musculoskeletal injury or condition as it is associated with the individual's perception of their quality of life (Cowan & Kelly, 2003; Miró, Martínez, Sánchez, Prados, & Medina, 2011; Smith, Torrance, Bennett, & Lee, 2007).

Satisfaction with Life: This term refers to the individual's sense of subjective well-being (Diener, Emmons, Larsen, & Griffin, 1985) and the construct of life satisfaction (Pavot & Diener, 2008).

Self-Efficacy: According to Costa, Maher, McAuley, Hancock, and Smeets (2011, citing Bandura, 1977), self-efficacy is derived from social learning theory and refers to set of beliefs that tasks involving self-sufficiency can be confidently performed adequately and successfully in a particular situation or events encountered in everyday life.

Social Support Constraints: This concept refers to instances where people with pain problems are avoided or shunned, and no longer included in a social circle, usually as a result of their complaints or disclosures concerning their pain and their difficulties associated with it (Lepore, Silver, Wortman, & Wayment, 1996; Rime, 2009).

Subacute Pain: According to King (2007, citing Van Tulder, Koes, & Bouter, 1997) subacute pain is defined as pain lasting six weeks to three months, and categorizes it as a subset of acute pain. The Institute of Clinical Systems Improvement (2012) based in Minnesota, define subacute pain in the lower back cases as recurrent lingering pain that lasts 7 to 12 weeks after onset. Subacute pain has been found to predict long-term

pain at 12 months in a prospective study on orthopedic surgery outcomes (Veal, Bereznicki, Thompson, Peterson, & Orlikowski, 2015).

Transitional Pain: Transitional pain usually refers to a specific type of neck and back pain, or to a period of pain following surgery. As it is employed here, the term refers to the first 4-month period of early stage unresolved musculoskeletal pain following its onset, which includes the transition from acute, through subacute, and to early chronic pain (Ekman, Andersson, & Hagberg, 2009; Institute of Medicine, 2011; Katz & Seltzer, 2009; Viniol, Jegan, Brugger, Leonhardt, Barth, Baum, Becker, & Strauch, 2015).

Trigger Event: According to Veissier and Boissy (2007, citing Selye, 1936, 1973) the term *trigger event* refers to environmental conditions and social events that elicits a stress response in the organism, and is another name for stressors. In humans, trigger events associated with pain and pain-related distress includes many aspects of the individual's everyday life, e.g., failure to keep pain under control, limitations in activities of daily living, conflicts in interpersonal relations, social isolation, and loses in socioeconomic status (Poleshuck et al., 2009).

Assumptions, Limitations, and Delimitations

The survey study was predicated upon several basic assumptions that will be identified shortly. In addition, a number of methical limitations are recognized. The study also includes inclusionary and exclusionary delimitations.

Assumptions

To begin with, I assumed that during the transitional musculoskeletal pain experience, or the first 4 months after pain onset, certain psychosocial trigger events may

emerge. Likewise, I assumed the customized measures selected for transitional pain-related distress provides an accurate profile from which to appraise the frequency of anxiety and depressed mood symptom episodes. I also assumed that the survey respondents in the study were honest when answering the self-report survey.

In choosing the measures, I assumed each to be valid and reliable at the same level reported in earlier scale development studies in the research literature. Another assumption I made was that the survey respondents would have varying types of musculoskeletal pain conditions or injuries, behavioral skills and cognitive abilities, coping capacity strengths and weaknesses, developmental histories, ethnic and racial backgrounds, levels of education, life and work experiences, and personality traits. And I assumed that such characteristics would be evenly distributed. I also assumed that the data was normally distributed, and all of the potential issues concerning both multicollinearity and homoscedasticity were properly addressed, and the power analysis would provide sufficient power to detect statistical significance across the study's hypotheses are defined in Chapter 3, and summaries on how each and all of these assumptions were statically tested is described in detail in Chapter 4.

Limitations

Potential limitations in the study included difficulties obtaining a representative sample of the pain-related psychologically distressed population, potential sampling and effect size issues, and adequately addressing the potential for any data collection errors. In addition, unknown population parameters may have limited the generalizability of the survey results to other adult populations with musculoskeletal pain; therefore, the results

may not be generalized to other groups without internet access, or with acute, subacute, and chronic pain, or with people diagnosed with malignant pain conditions. The use of continuous sampling in the online host's partner panel settings may also have created a threat to external validity, making it difficult to generalize findings to populations beyond the online convenience sample. Moreover, the restrictions to generalization may include other psychosocial issues not included in the study, e.g., pain acceptance difficulties; and constructs not under consideration by researchers.

Delimitations

Inclusionary Delimitations. The study has inclusionary delimitations associated with the choice of participants and instrumentation. Participants in this study included adults with acute, subacute, and early chronic musculoskeletal pain, who speak English as their primary language. In addition, short-form standardized instrumentation were selected for the study's questionnaire to limit subject burden in completing the number of items comprising the study's survey.

Exclusionary Delimitations. The proposed study has exclusionary delimitations associated with the selection of participants. In particular, research participant candidates were required to pass a set of eligibility criteria. This set of criteria included screening survey items with disqualification response options following the study's informed consent statement and participants' consent agreement statement. Survey respondents met the following set of eligibility criteria: (a) they had to be 18 years of age or older, (b) sustained a recent musculoskeletal injury or a recent diagnosis of a musculoskeletal condition lasting no more than 4 months from pain onset, (c) experienced moderate to

severe pain levels during the past 7 days, (d) experienced frequent episodes of the targeted distress symptom (either anxiety or depressed mood according to the survey that they participated in, and (e) experienced any or all of the three targeted psychosocial issues.

Significance of the Study

The online study examined the relationship of three emergent pain-related issues associated with distress frequency and severity during transitional pain experience to bring contextual clarity to the concept of psychosocial trigger events. In the current study, contextual clarity of the psychological, social, and environmental influences on pain-related distress and disability was sought by way of utilizing an integrated comprehensive paradigm, i.e., the biopsychoecological diathesis-stress process paradigm.

A number of studies conducted by Stineman and her associates have used the biopsychoecological paradigm to lend support for contextual clarity. For example, Stineman, Ross, Maislin, and Gray (2007) noted that biological, psychological, social, and environmental processes are linked with distress and disability rather than a single root cause. Stineman, Rist, and Burke (2008) developed a procedure to simulate patient experience of distress and disability for clinicians through which contexts and meanings become apparent independent of the clinicians' training and professional attitudes. A study by Stineman, Rist, Kurichi, and Maislin (2009) suggests that the multifaceted psychological, social and physical environmental contexts of being a patient with distress and disabilities versus a clinician are more compelling influences of activity limitation. A review of the biopsychoecological concept by Stineman and Streim (2010) found

disabilities are reduced by integrating the body and mind with both the surrounding physical environment and other people in the patient's everyday social environment.

Using the biopsychoecological (BPE) theoretical model of pain, the current study purported that psychosocial trigger events emerge during the course of pain experience, which are believed to exacerbate an array of distress symptoms associated with prolonged recurrent pain. Although the BPE paradigm was introduced in 2010, and specific pain-related issues have yet to be thoroughly investigated, the results of previous studies tend to support to the idea that distress symptoms are exacerbated by psychosocial issues. Some of these issues include impaired functioning and disability (Aronoff & Feldman, 2000), mental health disorders (Gatchel, 2004), life interference (Morley, 2008), cognitive risk factors (Pincus, 2006), physical environment limitations (Stineman and Streim, 2010), and treatment failure (Turk & Rudy, 1990). In addition, research has shown prolonged pain-related distress promotes pain chronicity and disability (Blyth, Macfarlane, & Nicholas, 2007; Lumley et al., 2011; Truchon, 2001; Veal, Bereznicki, Thompson, Peterson, & Orlikowski, 2015). Therefore, examining specific psychosocial issues that emerge during patient pain experience that predict psychological distress in musculoskeletal pain (Gatchel & Schultz, 2014b) may assist healthcare providers in identifying individuals at risk of developing debilitating chronic pain conditions and inform referrals toward effective psychosocial treatments (Keefe, 2012). Subsequent collaborative case management may then be initiated by referrals toward early preventive interventions (Bodenheimer, Lorig, Holman, & Grumbach, 2002).

Implications for Social Change

The implications for social change from the findings in this study are as follows. Linking these three psychosocial issues with psychological distress in early pain experience will contribute toward the growing research literature on the importance of psychosocial and socioecological factors in the newly emergent comprehensive paradigm of chronic pain pathogenesis. The main theoretical focus in this study utilized the newly expanded biopsychoecological (BPE; Stineman & Streim, 2010) model of pain, pain pathogenesis, and comorbid distress.

In addition, the present research study highlights the need for addressing psychosocial issues much earlier with preventive assessment and intervention efforts in primary, emergency, and urgent care settings. Such psychosocial linkage may further strengthen and validate an etiotropic approach using the BPE model of pain transition to minimize chronicity and disability. In addition, the present study may promote much needed social change in family practice, emergency rooms, and urgent care by focusing attention on and including psychosocial issues in early prevention. The present survey study provides normative data from validated measures for populations with early acute, subacute, and chronic pain. Finally, the study may help encourage the routine use of validated assessment instruments that reliably predict the impact of psychosocial trigger events on distress severity, and assists in directing referrals to pain education, self-management training and health counseling programs.

Summary and Transition

Early pain-related issues that serve as trigger events and predictors of distress severity experienced during musculoskeletal pain experience need to be identified, and patients identified at risk should be referred to nonpharmacological and psychological-assisted interventions. In the remaining chapters of this dissertation, I review the theoretical evidence-based literature, describe the study's research method, present the study's findings, and discuss the implications of the findings in greater detail. In Chapter 2, I review and summarize the literature covering the key concepts and the criterion and predictor variables. I describe the proposed methods in Chapter 3. In Chapter 4, I enumerate the results of the studies analyses. And I discuss and deliberate the implications of findings of the study in Chapter 5.

Chapter 2: Literature Review

The Importance of Distress in Transitional Pain Experience

In this study, based on the findings from a study reported by Hoogendoorn et al. (2000), I assumed the emergence of psychosocial issues during the transitional musculoskeletal pain experience sets the stage for the likelihood of aggravated distress severity, pain chronicity, and pain-related impairment and disability problems thereafter According to Stineman and Streim (2010), the biopsychoecological (BPE) model of pain integrates physiological, psychological, sociological, and ecological processes, and provides a comprehensive understanding of pain chronicity, impaired functioning, disability, and pain-related distress. In addition, a substantive body of research based on the older biopsychosocial (BPS) model and the diathesis-stress heuristic suggests psychosocial issues serve as trigger events that may exacerbate the biopsychological processes and physiological mechanisms underlying central sensitization in chronic pain pathogenesis (Apkarian, Baliki, & Geha, 2009; Meeus & Nijs, 2007; Meeus, Nijs, & De Meirleir, 2007; Woolf & Salter, 2006).

Apkarian, Baliki, and Geha (2009) reviewed the research literature on chronic pain supporting the assumptions that pain experiences can trigger neurological processes that modify psychological states and bestow greater chronicity risks depending on past stress sensitivity. Their theory of chronic pain provides a comprehensive model of the neurological processes involved in pain transition and differentiates the patterns and types of pain across pain conditions (Apkarian et al., 2009). Apkarian et al. (2009) discussed the current status of poor predictive power associated with most psychosocial

factors aside from depression (pp. 5–6). A review on chronic fatigue syndrome and fibromyalgia by Meeus and Nijs (2007) discussed the evidence supporting central sensitization as the key neurological process promoting chronic musculoskeletal pain, and the role of psychosocial factors in symptom flare-ups (p. 470). In another review, Meeus, Nijs, and De Meirleir (2007, citing Clapp et al., 1999; and Fukuda et al., 1994) noted the extent that widespread muscular pain is reported to be exacerbated by moderate exercise (a stressor) in chronic fatigue syndrome (p. 2). Woolf and Salter (2006) discussed the role of neuroplasticity in facilitating processes promoting chronic pain and disability, including the role of psychosocial factors in these processes.

In addition, the literature indicates that psychosocial stressors play a significant role in promoting functional and social impairment, and later disability (Gatchel & Schultz, 2014b; Leeuw et al., 2007; Woby, Roach, Urmston, & Watson, 2007). Thus, knowing more about psychosocial trigger events can inform efforts in reducing distress and preventing pain chronicity and disability (Institute of Medicine, 2011; Sullivan, Adams, Rhodenizer, & Stanish, 2006). Therefore, research identifying psychosocial factors serving as trigger events that influence and predict pain-related distress in the context of pain experience is prerequisite.

Organization of the Chapter

In this chapter, I will review and summarize the theoretical-based and supportive literature covering the key concepts of the criterion and predictor variables under empirical investigation in the proposed study. This literature review is organized according to summaries on the theoretical and supportive empirical literature on

transitional pain-related psychological distress as the outcome or criterion variable. In addition, the literature review is organized according to summaries on the three psychosocial issues of perceived rejection, quality of life, and satisfaction with life, as well as, brief summaries of the literature on the pain-related demographic risk factors and medical protocol-related factors. In the current research study, the three psychosocial issues are conceptualized as trigger events, and along with the demographic factors and medical factors serve as the predictors and independent variables.

The psychosocial issues are derived from the research literature. For example, a substantive body of literature suggests that *perceived rejection* associated with pain disclosure and social support constraints serves as a trigger event to pain-related distress (Cano & Williams, 2010; Craig, 2009; Herbette & Rime, 2004; Lepore & Revenson, 2007; Rime, 2009).   In addition, a substantive body of literature indicates that *quality of life* in daily functioning and activity levels serves as a trigger event to pain-related distress (Apkarian, Baliki, & Geha, 2009; Börsbo, Gerdle, & Peolsson, 2010; Cowan & Kelly, 2003; Nakagawa, Yamaguchi, Kimura, et al., 2017; Orenius, Koskela, Koho, et al., 2013). And another body of literature indicates that current *satisfaction with life* involving the difficulties associated with subjective wellbeing and the pain experience serves as a trigger event to pain-related distress (Diener, Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993; Vassar, 2008).

The other pain-related factors that I investigated in the study included two demographic risk factors, i.e., age range and gender, and three pain-related medical protocol-related covariates, viz., general musculoskeletal diagnosis, pain intensity, and

pain interference. In this chapter, I will also summarize the literature on the recent impetus for social change in pain healthcare and the key concepts and the use of applied quantitative analytic methods in a survey study.

Literature Review Strategy

In the literature searches, I focused on key terminology and combinations of terms based upon the clinical literature on the proposal's key variables. My overall strategy was to conduct a broad and comprehensive search of the literature and to identify relevant current studies and seminal literature covering pain-related psychosocial distress symptoms, perceived rejection, quality of life, and satisfaction with life in transitional pain experience. In my searches, I identified full text peer-reviewed articles in current and classical literature on theoretical foundations and supportive empirical research, which I downloaded, read, and filed. I selected full text articles retained from published reviews and studies. The selection process included a focus on any one of the following criteria. Articles needed to address: (a) adults with musculoskeletal pain; (b) pain-related distress symptoms; (c) predictors of chronic pain, disability, distress, and treatment outcomes; (d) promising early pain management interventions; (e) the full spectrum of transitional pain (acute, subacute and chronic); and (f) valid distress and pain assessment measures. I usually selected anywhere from five to 10 publications from the searches, and two to three were usually retained. My searches were conducted during 2011 through 2019, as the study evolved.

An interval of five to six years since publication was used for identifying the most current peer-reviewed literature. There were no restrictions in publication dates in

searches for classical and historical literature. Some of these dated beyond a couple decades or more. Searches also included peer-reviewed journals from other nations. Pain chronicles and peer-viewed literature using pain narratives were also included in some searches. Searches were repeated periodically to stay abreast with current publications. The key phrases and terms used in the searches are found in the appendices.

A number of databases were employed to survey the literature. I searched databases from academic, journals, managed care, medical, nursing, psychological, and peer-reviewed and public publication resources. These included the following online resources. Primary search sources included the Walden University Library EBSCO database, Google Scholar, Academia.edu, Mendeley Group, HHS Public Access, PubMed, PsychInfo, and NIH Public Access research resources. In addition, the following healthcare websites were helpful in identifying recent published peer-reviewed articles; these websites included Managed Healthcare e-Newsletters, MedScape.Com, Modern Physician Alerts, and Pain-Topics Org.

In addition, I used Elsevier publications and SAGE publications as resources for searches for peer-reviewed med-psych journals (e.g., the Annals of Family Medicine, Family Practice, Social Science & Medicine, and The Primary Care Toolkit). I also searched pain specialty journals (e.g., Journal of Pain Management, Journal of Pain Medicine, Journal of Pain Symptom Management, PAIN, Pain Physician, and Psychosomatics). Other sources for searches included the following pain informational

organizations: the American Academy of Pain Management (AAPM), International Association for the Study of Pain (IASP), and National Pain Foundation (NPF).

My searches also included the American Society of *Law, Medicine & Ethics* (ASLME), Institute of Medicine (IOM), Mayday Fund (MF), Mayo Clinic (MC), National Health Institute (NIH), World Health Organization (WHO), and the American Psychological Association (APA), respectfully. And finally, the resources available at the Patient Reported Outcome Measurements Information System (PROMIS) and National Health Institute Tool Box (NIH-TB) served as another set of search resources. I obtained and filed full copies of each selected article.

I collated research findings by author into a computer file system that categorized the selected literature findings as either conceptual/theoretical or empirical/evidence according to the study's variables and other relevant topics; including advocacy for pain prevention in primary care, and data analysis methods for surveys. In this filing system, I separated peer-reviewed materials from editorials, and selected only news releases and peer-reviewed literature for review in this chapter. After I completed these searches, a literature review matrix provided by Walden University was used to help further organize collated peer-reviewed articles and other documents. In this way, I collated and sorted the surveyed literature for this review.

A Focus on Psychosocial Trigger Events and Early Pain-Related Distress

In the study, I examined the influence of three types of psychosocial issues in early pain experience on the severity and frequency of distress symptoms. In addition, my research identified which of these three antecedent issues served as the most reliable

distress risk predictor. The first of three emergent psychosocial issues included difficulties with pain-related perceived rejection resulting from constraints in pain disclosure and social support. The second emergent issue included quality of life in daily functioning and activity levels. The third emergent issue included current satisfaction with life in the pain experience. Although eight distress symptoms, identified in the research literature, comprise pain-related distress during early pain experience, the focus in the present study was on core symptoms comprising the anxiety-depression spectrum.

I called my study the Musculoskeletal Pain Experience Study (MPES), and in the MPES, I conceptualized pain-related distress during the transitional pain period from the etiological based stress-reactivity model of pain-related distress found in the literature (Foster, Thomas, Bishop, Dunn, & Main, 2010; Kemeny, 2003). A review of the literature indicates pain-related distress includes as many as eight symptoms, as extrapolated from the literature on chronic pain, and the sparse reports on acute and subacute pain. The literature reveals the following eight symptoms are evident during the period of transitional musculoskeletal pain experience. See Table below.

Table 1
List of Eight Stress-related Distress Symptoms in Early Pain Experience   .
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1. Negative effects of accumulative stress, e.g., tension, stiffness, and fatigue
2. Heightened anxiety sensitivity, worry and fear
3. Episodes of negative emotions, including anger, impatience, and irritability
4. Sleep interruption and deprivation, and insomnia
5. Depressed mood, hopelessness, learned helplessness, and low energy levels
6. Catastrophizing and negative thinking about the negative impact of one's pain
7. Cognitive difficulties with attention, concentrating and memory
8. Periodic confusion

These symptoms may be thought of as precursors to the current epidemiological-based model of chronic pain distress with its emphasis on anxiety and depression disorders, as evident in reviews on psychosocial comorbidity in chronic pain reported by Bair, Wu, Damush, Sutherland, and Kroenke (2008) and McWilliams, Goodwin, and Cox (2004). As precursors, they comprise the constellation of pain-related distress symptoms typically seen in episodic anxiety and depressive symptoms and chronic stress during acute and subacute pain (Hall et al., 2011; Koes, Van Tulder, & Thomas, 2006). While acute and subacute pain distress symptoms may differ between individuals and across pain groups (Jellema et al., 2006), the development of intervention strategies directed toward psychosocial factors designed to prevent pain chronicity and disability is emerging in Europe (Jellema et al., 2005). Such strategic development of psychosocial interventions are in line with the call for early chronic pain prevention, as advocated in the seminal report published in 2011 by the Institute of Medicine, a National Institute of Health organization now renamed the American Academy of Medicine.

Frequency of Pain-related Distress Symptom Episodes

This section covers the literature on the study's two key criterion variables, i.e., episodes of transitional pain-related anxiety and depressed mood symptoms, and includes the conceptual and theoretical foundations, as well as supportive empirical research. Emotional distress is known to be associated with pain and the human pain experience, as has been observed by people across millennia, and documented in both the seminal and the popular literature on the history of pain (Bourke, 2014; Golden, 2005; Jensen & Finnerup, 2014; Meldrum, 2003; Miller, 2004, 2005; Rey, 1993; Salmón, 2000). Robert,

Wilson, Donnadieu, Gaudy, and Arreto (2010) have provided a detailed summary on the

scientific literature on pain from 1976 to 2007.

Nociception, or the perception of physiological pain, is, by its very nature,

distressful (Dubin & Patapoutian, 2010). Nociception is an aversive neural signal that

alerts organisms to the threat of or actual tissue damage, and by its very nature is a

cognitively and emotionally distressful experience that mobilizes a set of autonomic and

behavioral responses (Dubin & Patapoutian, p. 3760). Pain experience can become a

personal psychological crisis that is generally referred to as suffering (Miller, 2004,

2005).

Theoretical Foundations for Pain-related Distress and Trigger Events

Attempts to make sense of the complicated nature of pain have generated a

number of conceptual and theoretical frameworks from which to arrive at a better basic

understanding of pain, pain management, pain pathogenesis, and pain rehabilitation

(Gatchel & Schultz, 2014a; Keefe, 2012; Sullivan, Adams, & Ellis, 2013; Turk &

Gatchel, 2013). This integrative conceptual and theoretical development began during

the latter decades of the 20th century with Engel (1977) calling for a movement away

from the biomedical model of pain (Borrell-Carrio, Suchman, & Epstein, 2004).

Biopsychoecological Paradigm. The main theoretical structure in this research

study is the biopsychoecological (BPE) paradigm of pain transition and pain-related

psychological distress (Stineman & Streim, 2010), which was recently expanded from

Engel's (1977, 1980) integrative biopsychosocial theory to include factors from the

physical environment. In the proposed study, the BPE paradigm accommodates the

diathesis-stress process (DSP) heuristic (Turk & Gatchel, 2013). When combined, the DSP heuristic assists the BPE paradigm in generating pain-related sets of hypotheses on psychosocial issues as trigger events (or stressors) on symptoms of distress.

Together these theoretical structures provided the foundation from which to generate a set of comprehensive and integrative explanations for the many complexities associated with distress and the transition of pain pathogenesis across acute, subacute and chronic pain (Apkarian, Baliki, & Geha, 2009). These theoretical foundations have considerable overlap and incorporate other models that address specific aspects of pain, distress, and impairment. Overviews on the overlapping conceptual and theoretical accommodations that the diathesis-stress process heuristic and social cognitive behavioral theory provide, when combined with the biopsychoecological paradigm into a mega-theoretical structure, are presented next.

Diathesis-Stress Process Heuristic. When the diathesis-stress process (DSP) heuristic is integrated with the biopsychoecological (BPE) paradigm of pain pathogenesis, the combined model purports that psychological distress during early pain experience is a major psychosocial risk factor that promotes and predicts later chronicity and disability outcomes (Higgins, Martin, Baker, Vasterling, & Risbrough, 2018; Nielson, Weir, Smith, & Gribbin, 2001; Stineman & Streim, 2010). The same contention is also evident in the body of research literature that supports the earlier biopsychosocial model and diathesis-stress heuristic preceding the ecological enhanced BPE model (Kent & Keating, 2008). This model asserts greater preventive attention must be directed

towards psychosocial issues conceptualized as stressors that trigger and exacerbate pain-related psychological distress symptoms (Stineman & Streim, 2010).

Proponents of the older biopsychosocial and the newer biopsychoecological based paradigms have advocated that specific psychosocial issues serve as trigger events or stressors, influencing distress severity in human pain experience, and need to be identified and brought into greater focus (Carey, Mansell, & Tai, 2014; Jensen & Turk, 2014; Keefe, 2012). This holds true with regard to psychosocial stressors indicating predictive relationships with early pain-related distress, chronicity, and disability (Carey et al., 2014; Jensen & Turk, 2014; Keefe, 2012).

The above comprehensive overlapping theoretical framework that includes the BPE paradigm and the DSP heuristic can also accommodate emergent models of pain distress that are relevant to the proposed survey study. These models and other theories specific to pain-related distress are the basis for the current research study.

Other Relevant Theories Pertaining to Distress and Trigger Events. These are other theories applicable to the biopsychoecological model, and in combination with the integrative model outlined above, that generate hypotheses explaining pain-related distress. These including social cognitive behavioral theory, stress appraisal and coping theory, and self-determination theory. A presentation of the literature on these theories as they are related to distress follows.

Social Cognitive Behavioral Theory. Pain is shaped by the physical and social environmental as well as behavioral and psychological influences. According to the social cognitive behavioral (SCB) theory, psychological distress is conceptualized as the

results of how one's sense of physical and social well-being and social situations are processed and responded to by individuals (Bandura, 2005a; Benight & Bandura, 2004; Eisenberger & Lieberman, 2004; Pallant & Lae, 2002). Social cognitive behavioral theory has influenced thinking in current neurological research studies imaging pain and distress.

Recently it has been suggested that interpersonal interactions during pain may function as predictive social signals involving interoception and social cognition processes within the context of threat or safety that influence the perception of noxious stimuli (Krahé, Springer, Weinman, & Fotopoulou, 2013). Research in pain neuroscience psychology has linked altered pain psychological processes to specific evidence-based treatments, with the intention of assuring greater intervention efficacy and positive outcomes in the future (Simons, Elman, & Borsook, 2014). Jensen et al. (2012) suggested neuroimaging may have the potential of clarifying mediating and predictive factors for successful treatment outcomes by isolating the neural mechanisms to assure the efficacy of different treatment interventions.

A key construct in line with psychological distress is the concept of cognitive dissonance, which is derived from social cognitive behavioral theory. The concept of cognitive dissonance refers to the mental discomfort experienced by individuals or groups when they adhere to contradictory beliefs or perceptions simultaneously, or when they are confronted by new information or experience that conflicts with existing expectations (Festinger, 1962; Jarcho, Berkman, & Lieberman, 2011; Matz & Wood, 2005; Van Veen, Krug, Schooler, & Carter, 2009). Such discomfort is observed in

individuals who experience prolonged pain, and may encounter social functioning difficulties and obstacles in physical functioning when attempting to manage their pain, as evident in pain self-efficacy problems (Asghari & Nicholas, 2006; Bandura, 2006; Denison, Asenlof, & Lindberg, 2004; Nicholas, 2007; Turner, Ersek, & Kemp, 2005). Individuals may experience distress when personal and interpersonal constraints are placed on their pain disclosure and social support, as evident in perceived rejection issues (Cano & Williams, 2010; Craig, 2009; Herbette & Rime, 2004; Lepore & Revenson, 2007; Lepore, Silver, Wortman, & Wayment, 1996; Rime, 2009). Individuals may become distressed when they perceive their pain experience is undeserved, as evident in issues involving perceptions of unfairness (Gray & Wegner, 2010; Scott, Trost, Bernier, & Sullivan, 2013; Sullivan, Adams, Martel, Scott, & Wideman, 2011; Sullivan, Scott, & Trost, 2011).

Social cognitive behavioral (SCB) theory provides a comprehensive framework from which to conceptualize the self-regulatory aspects of psychological distress and the heuristics to generate hypotheses to explain it (Bandura, 2005a, 2005b). Theories of distress that emerged from the SCB framework, include the Lazarus and Folkman (1984) stress appraisal and coping (SAC) theory of distress, and the Ryan, Huta, and Deci (2008) self-determination theory (SDT) of psychological distress.

Stress Appraisal and Coping Theory. In the 1980s, Lazarus and Folkman (1984) published a seminal clinical handbook reporting on stress and cognitive appraisal based on previous work by Lazarus (1966, 1968, 1981, 1982, 1984). Lazarus and Folkman introduced their transactional model of stress, appraisal, and coping, which provides a

framework from which to understand the processes involved in stress and coping with stress and distress. According to Lazarus (1993), stress appraisal and coping (SAC) theory emphasizes the differentiation between an emotion-focus and a problem-focus as two major functions of the coping process. Emotion-focused coping refers to the individual changing (a) the way they attend to the stressor in their environment, or (b) the meaning they ascribe to the stressor and their stress and distress (Lazarus, 1998). Problem-focused coping entails changing the individual's relationship with their living space by acting on the stress-related problem within their environment or themselves or both (Lazarus, 2000).

The psychosocial issues under investigation in the study, viz., perceived rejection, quality of life, and satisfaction with life, may be appraised using either coping strategy, as indicated in a number of studies addressing emotional-focused and problem-focused coping strategies with similar issues in chronic pain populations (Hermann, Hohmeister, Zohsel, Ebinger, & Flor, 2007; Simons & Gaher, 2005). In their seminal paper, Folkman, Lazarus, Gruen, and DeLongis (1986) noted the relationship between psychosocial stressors and psychological symptoms is mediated by the strategies people employ in the course of their coping process.

Self-Determination Theory. Self-determination theory emerged during the 1970s and was founded upon studies on intrinsic motivation and the central role of self-autonomy in everyday activities that are pursued because they are inherently rewarding to the individual (Ryan, Huta, & Deci, 2008). According to Ryan et al., self-determination theory (SDT) is founded upon studies on intrinsic motivation and the central role of

autonomy in everyday activities that are enjoyable, interesting, or important to the well-being of the individual. The SDT model purports that basic psychological needs are the foundation of integrity, personal growth and well-being, and give rise to both internal and external aspirations (Ryan et al., 2008). Furthermore, Ryan et al. (citing Kasser & Ryan, 1996) noted that research on SDT has found that deep relationships, generativity and personal growth are essential intrinsic aspirations, while attractive looks and image, fame and wealth are basic extrinsic aspirations. Ryan, Patrick, Deci, and Williams (2008, citing Williams, Cox, Hedberg, & Deci, 2000) noted that people who are focused on extrinsic aspiration generally tend to engage in risky and unhealthy activities.

A topical review of 15 articles on self-determination theory (SDT) conducted by Ryan, Patrick, Deci, and Williams (2008) reported on the use of SDT in medical adherence interventions and health-behavior rehabilitation. Ryan et al. found self-determination improved physical and mental health-related outcomes. Ryan et al. noted greater quality of life and less anxiety, depressive symptoms and somatization are evident when people feel their psychological needs are being listened to and supported by others. This finding is in line with a study on remission and mortality outcomes in cancer patients conducted by Shrock (2000). Shrock noted that whenever people feel listened to, properly cared for, and supported in a respectful manner, they tend to heal more quickly and generally have more positive physical and mental health outcomes. This observation of the positive outcomes associated with patients feeling they have been listened to by healthcare providers has important implications for psychosocial issues involving perceived rejection.

Self-determination theory of psychological distress purports that infringement on autonomy and volition in everyday lives presents a personal crisis to individuals (Ryan, Huta, & Deci, 2008; Ryan, Patrick, Deci, Williams, 2008). This results in an array of adaptive behavioral, cognitive, and emotional attempts to adjust to the threatening changes, and to re-establish one's equilibrium (Ryan, Huta, et al, 2008; Ryan, Patrick, et al., 2008). Self-determination theory has its origins in social cognitive behavioral theory, particularly in social cognitive processing models of motivation (Bandura, 1989; Lepore, 2001; Rime, 2009; Ryan, Huta, et al., 2008; Ryan, Patrick, et al., 2008).

In addition to providing a conceptual framework for understanding psychological distress, self-determination theory (SDT) provides a useful framework from which to engage and redirect people with pain distress issues towards pain education and self-management training programs (Carlson & Carlson, 2011; Matthias et al. 2010; Walsh et al. 2008). Self-determination theory not only has the potential of engaging and empowering patients (Aujoulat, d'Hoore, & Deccache, 2007; Conger & Kanungo, 1988), but may also empower frontline healthcare providers (Williams, McGregor, Zeldman, Freedman, & Deci, 2004). SDT draws greater attention towards understanding the individual's pain experience as a personal crisis (Aujoulat et al., 2007; Ryan, Huta, & Deci, 2008). In addition, SDT provides a better understanding of the unique set of issues fueling and exacerbating patient distress, and further assists in identifying those areas of infringement and impairment that need to be properly addressed and dealt with in a positive, reassuring and confident manner (Bandura, 2005b; Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Ryan, Huta, & Deci, 2008).

Empirical Support for Prevention of Acute and Subacute Pain Distress Symptoms

This section summarizes the research literature providing empirical support to the conceptualization of pain-related psychological distress in acute and subacute pain. The literature on specific distress symptoms in acute and subacute pain is sparse. However, some of the most important literature on acute and subacute pain focuses on the need for effective preventive approaches in pain management that reduce suffering, chronicity, and disability (Carlson & Carlson, 2011; Biglan, Flay, Embry, & Sandler, 2012; Van Wilgen & Keizer, 2012; Institute of Medicine, 2011).

Over the past couple decades, several studies have reported that the presence of chronic distress as a psychosocial factor within the first 4 weeks of early pain experience predicts chronicity and disability at 12 months (Aronoff & Feldman, 2000; Babcock, Lewis, Hay, McCarney, & Croft, 2002; Gatchel, 2004; Hoogendoorn et al., 2000; Kent & Keating, 2005, 2008; Pincus, Burton, Vogel, & Field, 2002; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008). A recent open-access report by Rice et al. (2016) noted the elevated prevalence of distress in chronic pain populations. Citing Kendall (1999), Rice et al. pointed out psychosocial factors are thought to play a role in pain chronicity and disability. Therefore, current thought is that the key to chronic pain prevention is to focus on reducing pain-related psychological distress (Biglan, Flay, Embry, & Sandler, 2012; Rice et al., 2016; Van Wilgen & Keizer, 2012; Institute of Medicine, 2011).

The seminal report by the Institute of Medicine (2011), now the American Academy of Medicine, called for a cultural revolution in how we view pain, and assess,

treat, and live with pain in the United States. In a review on successful persistent

musculoskeletal pain management, Carlson and Carlson (2011) warned about delaying

treatment while an accurate musculoskeletal pain diagnosis is developed. According to

Carlson and Carlson (citing Matthias et al. 2010; Walsh et al. 2008), engagement of

patients in setting personal goals for treatment outcomes can help inform and guide the

pain management process, as well as promote commitment to treatments. Carlson and

Carlson (citing Foster et al., 2010) noted that psychological factors associated with

musculoskeletal pain intensity and interference should be recognized early on, and

assessment and treatment options discussed with patents to assure their active

participation in positive outcomes. Prior to referrals to formal psychological evaluations,

Carlson and Carlson recommended psychological issues be addressed when discussing

treatment options with patients, including pain education and cognitive behavioral

therapy, and actively involving them in such decisions, (p. 94, column 1, paragraph 2).

According to Carlson & Carlson (citing Kuritzky, 2008; Lamb et al., 2010), patient

education and goal-oriented cognitive behavioral therapy have been shown to be effective

in the management of persistent musculoskeletal pain.

Support for Identifying Symptoms from Chronic Pain Early Distress Literature

This section summarizes the research literature lending empirical support to the

conceptualization of pain-related psychological distress symptoms, including the yellow-

flagged anxiety and depression, and the eight early stress-related symptoms. A basic

assumption in the proposed study is distress symptoms seen in chronic pain are also

evident during acute and subacute pain, and symptoms appear, change, fluctuate, and

intensify across time. In the proposed study, pain-related psychological distress symptoms were identified through extrapolation from the literature on distress in chronic pain, mainly because the literature on distress symptoms during acute and subacute pain is sparse.

In addition, the identification of symptoms was based on the personal experience of this study's primary investigator and those of other people with chronic pain. The primary investigator's professional experience includes deep relaxation response conditioning utilizing electromyographic biofeedback technology, and instruction of stress management training and counseling during the 1980s. Subsequently the pain-related distress symptoms that were experienced during the early and later persistent musculoskeletal pain experience were noted. In addition, symptoms were also noted in the early and later pain experiences shared by cohorts in a chronic pain support group that the primary researcher participated in and co-facilitated from 2009 to 2016. The empirical support for identifying distress symptoms in early pain experience based on the chronic pain literature is presented next. As a global concept, pain-related distress remains confusing, with sparse empirical evidence (Wells & Ridner, 2008). And according to Wells and Ridner, such confusion resulting from a lack of clarity in the changing nature of distress symptom episodes across time contributes to less than ideal symptom management because of inadequate assessment of symptoms. Pain-related distress symptoms often occur concurrently and are intertwined (Vincent et al., 2013).

In the present study, the identification of the symptoms for early pain-related distress was based on the pain experiences of people with chronic pain. In addition, the

identification of early distress symptoms was based on extrapolations from the research literature on chronic pain in musculoskeletal conditions. These conditions include *injuries* (e.g., back, lower back, lower extremities, neck, pelvis, shoulder, spinal cord, and upper extremities) and *diseases* (e.g., chronic musculoskeletal pain, fibromyalgia, juvenile arthritis, multiple sclerosis, muscular dystrophy, rheumatoid arthritis, and temporomandibular disorders). Examples from the current literature on pain-related distress symptoms from the literature on chronic pain follows.

Anxiousness as a Transitional Pain-related Distress Symptom. Past research has shown that unresolved pain during human pain experience is associated with heightened levels of anxiety, worry, and fear avoidance behaviors (Cook, Brawer, & Vowles, 2006; Feeney, 2004; McWilliams, Cox, & Enns, 2003). The literature reveals studies on pain-related anxiety often include anxiety and depressive disorders, and the motivational aspects of anxiety. This trend is evident in much of the current literature on pain-related anxiety.

Sutherland and Morley (2008) conducted a mixed methods study on the enmeshment of self with pain and measures of adjustment in chronic pain. Anxiety was found to have influences with sociotropy and autonomy, and no direct influence with other aspects of self, other than between patients' own hoped-for and their other selves. The results from the study by Sutherland and Morley provides some support for two motivational preferences (autonomy and sociotropy) associated with anxiety and lends empirical support to self-determination theory. Sutherland and Morley recommended further research on self-enmeshment in the future be directed towards pain acceptance.

A mixed methods prospective study on the impact of pain on depressive and anxiety disorders was conducted by Gerrits et al. (2012) on adults with short-term and chronic pain who were followed for 2-years. Their findings indicated 65.5% of participants had a 6-month recent depression and /or anxiety disorder diagnosis, and recovery indicted a broad variance. In addition, 24.6% of participants recovered from their depressive and/or anxiety disorder, and 13.4% recovered after more than 6 months. Relapses occurred 18.5% at least once during follow-up, and chronic courses ran around 43.5% for 2 years. Their results also indicated patients with chronic pain are susceptible to anxiety and depressive disorders. Gerrits et al. recommended all chronic pain patients be assessed for comorbid anxiety and depression.

Depressed Mood as a Transitional Pain-related Distress Symptoms. Research has found that depressed mood is associated with unresolved pain (Gerrits et al., 2012). Depression and catastrophizing are significant predictors of pain-related disability (Arnow et al., 2011). Pain-related depressed mood was found to be one of several symptoms that contributed toward fatigue associated with musculoskeletal pain (Vincent et al., 2013). Other current literature on depressed mood associated with pain-related distress covers pain population differences, psychosocial outcomes, and quality of life.

Alschuler et al. (2012) conducted a cross-sectional descriptive quantitative study that evaluated a convenience sample from a population with muscular dystrophy pain. The intention of their study was to examine the relationship between depression and physical functioning with fatigue and pain. The results from the study indicated middle-aged patients 45–64 years of age experienced the most severe depressive symptoms

compared to younger and older patients. In addition, chronological age had a negative relationship with physical functioning, and depression and physical functioning were each independently associated with fatigue and pain. Alschuler et al. recommended that further research should consider an individual's age and stage in life in interventions for depression, especially the impact of declining physical functioning in their interpersonal relations and daily lives.

In a cross-sectional quantitative study conducted by Amtmann et al. (2015) the relationship between chronic pain and depression was examined to identify the meditational effects of anxiety, fatigue, and sleep in a population with multiple sclerosis (MS). The results from the study indicated anxiety, fatigue, and insomnia mediated the influence of chronic pain on depression, with fatigue indicating the largest mediating effect. Amtmann et al. recommended anxiety, fatigue, and insomnia interventions may benefit individuals with MS who have depressive symptoms along with chronic pain.

In a recent study, Wolfensberger et al. (2016) conducted a prospective quantitative study to answer the question: what biopsychosocial factors in patients with chronic shoulder pain are associated with patient reported outcome measures, and with clinician-rated outcome measurements? The results from the study indicated psychological (i.e., depression, anxiety and pain catastrophizing) and social factors, were associated with poorer impression of change. Depression, anxiety and pain catastrophizing were correlated with greater pain. Psychological and social factors were associated with greater disability. And psychological factors were associated with worse

clinician-rated outcome. Wolfensberger et al. recommended further research on these psychosocial factors.

Summary on Chronic Pain-related Distress

Theoretical foundations for comorbidity hold true for models and concepts of pain-related psychological distress, whether distress is conceptualized as yellow-flagged anxiety and depression disorders, or as eight early precursor stress-related symptoms associated with anxiety and depression. Distress symptoms emerging and developing during early pain experience deserve to be recognized before they become the distress disorders seen during later pain experience; particular after symptoms are intensified, and protracted, and pain becomes officially diagnosed as chronic pain. Early pain-related distress symptoms during the transitional pain experience period emerge as precursors when psychosocial trigger events occur. These triggers events include pain-related perceived rejection, quality of life, and satisfaction with life during the transitional pain experience. Current studies on pain-related outcomes, e.g., anxiety and depressed mood episodes, shed light on the complexities of their interrelationships with one another and other factors. Efforts are underway to identify specific psychosocial trigger events that serve as risk factors predicting pain-related distress, chronicity, and disability. The research literature lending support to the identification of psychosocial trigger events is presented next.

Three Common Pain-related Psychosocial Trigger Events

Three emergent psychosocial issues common in early experience are identified in this research, and these events are assumed to be the independent and predictor variables

in the current research design. In the present research study, the three common psychosocial issues emerging within individuals' social environment are conceptualized as psychosocial trigger events or stressors that fuel and exacerbate co-morbid pain-related psychological distress, thereby potentially promoting pain pathogenesis.

Together these psychosocial trigger events are hypothesized to directly influence and exacerbate stress-reactivity, thereby giving rise to multiple distress symptoms clinically observed to be part of the early pain experience. These early pain-related distress symptoms are precursors to symptoms of chronic pain co-morbid distress, and are a focal point in the current research. These early emergent psychosocial trigger events need to be targeted in current chronic pain prevention efforts, in addition to identifying early pain-related psychological distress and emerging anxiety and depression symptoms.

Theoretical-based Definitions and Explanations of Psychosocial Trigger Events

According to Lazarus and Folkman (1984), trigger events are stressors that elicit the stress response and distress in organisms. Trigger events or stressors, refer to life experiences or sets of circumstances that threaten a vital goal, e.g., physical integrity or psychological well-being (Lazarus & Folkman). Multiple stressors often add-up toward an accumulated or heightened state of distress (Kemeny, 2003). Kemeny noted that in the short-run distress is adaptive; however, when the stress response is chronically or repeatedly activated, distress becomes maladaptive and promotes pathogenic processes. Several studies have reported that the presence of chronic distress as a psychosocial factor within the first 4 weeks of early pain experience predicts chronicity and disability at 12 months (Aronoff & Feldman, 2000; Babcock, Lewis, Hay, McCarney, & Croft,

2002; Gatchel, 2004; Hoogendoorn et al., 2000; Kent & Keating, 2005, 2008; Pincus, Burton, Vogel, & Field, 2002; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008).

The integrative biopsychoecological (BPE) paradigm and diathesis-stress process (DSP) heuristic provide a useful metatheoretical framework from which to conceptualize psychosocial issues that often emerge in early human pain experience; e.g., pain self-efficacy, perceived rejection, perceptions of unfairness, quality of life, and satisfaction with life. These emergent psychosocial issues can be conceptualized as trigger events within the context of the individual's self-concept, interpersonal relationships and social environments, thereby arousing and heightening the stress response and the severity levels of individual's pain-related distress.

Perceived Rejection as a Psychosocial Trigger Event

The first independent variable and predictor in the present research survey study included emergent events during the course of transitional musculoskeletal pain experience that involve the placing of constraints on the person's pain disclosure verbalizations and the extent of their support within the context of their social networks, either by themselves or by others. These psychosocial issues are usually perceived as rejection. Until recently, constraints in pain disclosure and social support have been viewed and studied separately in the research literature. However, the conceptual work and research conducted by Herbette and Rime (2004) have served to integrate these separate concepts into one meaningful psychosocial stressor that recognizes the deleterious impact of social constraints on health conditions and healing. In the

Musculoskeletal Pain Experience Study, this integrated predictor variable will be examined as participants' *perceived rejection* within the context of distress episodes during the acute, subacute, and early chronic pain experience.

Perceived Rejection as a Psychosocial Issue. Perceived rejection was conceptualized as a psychosocial trigger event in the present study. Current literature on perceived rejection sheds light on the importance of dialogue on pain and social support across individuals' everyday social environments, including places of work and their occupations. Summaries on some of the most pertinent up-to-date studies on perceived rejection in pain disclosure and social support follows.

Work-related Social Support and Pain-related Impairment. A study on predictors of *symptoms* and *functional impairment* in upper extremity injuries and conditions reported by Gardner, Dale, VanDillen, Franzblau, and Evanoff (2008) identified personal and work-related predictors among workers employed for 6 months in a new job. Predictors included psychosocial, personal risk, and physical work exposures factors. The items covered personal risk factors (e.g., age, baseline upper extremity symptoms, body mass index, gender, and race), physical work exposure (i.e., forceful gripping, lifting, vibrating tools, and wrist bending), and psychosocial factors (including social support, levels of job decision latitude, and levels of job insecurity). The results indicated social support, baseline history and severity of upper extremity symptoms, and wrist bending were predictors for functional impairment. Gardner et al. recommended further research look into the problem associated with collinearity between personal, psychosocial, and physical risk factors.

Social Support and Disability Impact. Recently, a study was published addressing the association of emotional support, instrumental support, and positive psychosocial illness impact with disability in patients with upper extremity illness. Nota et al. (2016) conducted a prognostic quantitative study that evaluated a sample from a population with upper extremity pain. The results from the study indicated goal interference due to pain had the greatest effect on disability, while disability was influenced to a lesser by the positive impact of illness, and emotional and instrumental support. Nota et al. recommended further research be directed toward replicating their results.

Social Support and Early-Return-to-Work. A qualitative study conducted by Hoefsmit, Houkes, and Nijhuis (2014) evaluated a sample from a population with occupational injuries in the Netherlands. Hoefsmit et al. were interested in the identification of factors supporting early return-to-work (RTW), including personal and environmental variables. The results from the study indicated early return-to-work was supported by social support from relatives, adequate cooperation between stakeholders (e.g., employees, employers and occupational physicians), the employers' communicative skills, and belief that work stimulates health. Hoefsmit et al. recommended return-to-work interventions should include these socially supportive environmental and personal factors.

Brain Imaging and Perceived Rejection. A study conducted by Eisenberger, Lieberman, and Williams (2003) investigated the neural correlates of social exclusion, and tested the hypothesis that the brain bases and neural pathways of social pain are

similar to those of physical pain. In their experiment, participants were scanned with brain imaging technology while they played a computerized virtual ball-tossing game in which they were eventually excluded. Eisenberger et al. found the anterior cingulate cortex was more active during exclusion than during inclusion and correlated positively with participants' self-reported distress, which corresponded to the results from physical pain studies. In addition, they found the right ventral prefrontal cortex was active during exclusion and correlated negatively with self-reported distress, and the anterior cingulate cortex changes mediated the right ventral prefrontal cortex-distress correlation, suggesting that the right ventral prefrontal cortex regulates the distress of social exclusion by disrupting anterior cingulate cortex activity.

In a review of the literature conducted by Eisenberger and Lieberman (2004) suggested the physical–social pain circuitry might share components of a broader neural alarm system. They reviewed the research evidence indicating the anterior cingulate cortex may play a key role in the physical–social pain neural-pathway overlap. Eisenberger and Lieberman found mounting evidence from the animal lesion and human neuroimaging literatures that suggests a physical and social pain overlap in their underlying brain computational processes in their neural circuitry. This body of research evidence suggests that the social-attachment system borrowed the computations of the pain system to prevent the potentially harmful consequences of social separation in mammalian species. In addition, Eisenberger and Lieberman point out that in numerous human languages, 'social pain' characterizes the feelings resulting from social estrangement, with words typically reserved for describing physical pain.

A study conducted by MacDonald and Leary (2005) hypothesized that social exclusion is experienced as painful, mainly because reactions to rejection are enabled by features of the physical pain system. They theorized that the overlap between physical and social pain was the results of an evolutionary development to aid social animals in responding to threats to inclusion. MacDonald and Leary reviewed the research evidence indicating humans demonstrate convergence between the two types of pain in behavior, emotions, and thought. In addition, through nonhuman animal research, they showed that physical and social pain share common physiological mechanisms. In conclusion, they explored the implications of social pain theory for physical pain disorders and rejection-elicited aggression.

In another experimental study conducted by Eisenberger, Jarcho, Lieberman, and Naliboff (2006), two hypotheses were tested stemming from this overlap, namely: (1) that baseline sensitivity to physical pain predicts sensitivity to social rejection and (2) that experiences that heighten social distress heighten sensitivity to physical pain as well. In this study, prior to the completion of a task manipulating feelings of social distress, the participants' baseline cutaneous heat pain unpleasantness thresholds were assessed. As in the previous 2003 study, participants played a virtual ball-tossing game in which they were eventually excluded. However, after the game was over, three pain stimuli were delivered and participants rated the unpleasantness of each stimuli. Remarkably, Eisenberger, Jarcho, Lieberman, and Naliboff found greater baseline sensitivity to pain was associated with greater self-reported social distress in response to the social rejection conditions. In addition, those participants in the social rejection conditions reported

greater social distress associated with corresponding reports of pain unpleasantness to the thermal stimuli, thereby providing additional support for the hypothesis that pain distress and social distress share neurocognitive substrates.

Recent studies using neuroimaging technology lend support to the contention that depression, pain distress, and rejection distress share the same neurobiological pathways. A study conducted by Ehnvall, Mitchell, Hadzi□Pavlovic, Malhi, and Parker (2009) investigated the hypothesis that increased rejection sensitivity is related to perception of increased pain during depression. Ehnvall et al. analyzed the data from a study of 186 treatment□resistant depressed patients who met DSM□IV criteria for depression and had completed a self□report questionnaire regarding currently perceived pain and rejection sensitivity. They found a major increase in rejection sensitivity during depression predicted a corresponding increase in the experience of pain during depression. Based on these findings, they concluded that the experience of increased pain during depression is related to increased rejection sensitivity. They recommended that further research to clarify this relationship.

Perceived Rejection and Social Pain Theory. Macdonald and Kingsbury (2006) tested the hypothesis that pain affect serves as a signal of perceived social exclusion, derived from social pain theory (MacDonald & Leary, 2005). In their study, the participants ranged in experience of persistent physical pain, and completed measures of anxiety, depression, anxious and avoidant attachment, and pain affect. They found higher levels of pain affect to be associated with higher levels of anxiousness, but not avoidant attachment. In addition, they found the relation between pain affect and emotional

distress were partially mediated by anxious attachment. Remarkably, the results from their study lend support for the conclusion that one reason individuals with persistent pain experience anxiety and depression is because of heightened concerns over rejection, thereby lending support to their conclusion that anxious attachment is more strongly related to the fight–flight–freezing system than to avoidant attachment.

     Perceived Rejection and Fear. In three studies, Riva, Williams, and Gallucci (2014) examined the links between fear of social threat and fear of physical pain, testing the hypothesis on whether these fears predict responses to social distress and physical pain. According to a review of the research literature conducted by Riva, Williams, and Gallucci, the past research indicated measuring individuals' fear of pain predicted their physical pain perceptions, i.e., individuals reporting higher levels of fear of pain also reported higher levels of pain. Across their three studies, Riva, Williams, and Gallucci found in their first study that fear of social and physical threat were inter-related, but were distinct psychological constructs. In their second study, they found that fear of social threat, but not physical threat, predicted the individuals' perception of social distress. And conversely, in their third study, Riva, Williams, and Gallucci found fear of physical pain, but not social pain, predicted the perception of physical pain. Thus, similar to the influence of fear of physical pain on physical pain perception, fear of social threat moderated the perception of social distress. However, they also found these effects were specific, such that each type of fear uniquely predicted the experience of the same type of distress. In conclusion, Riva, Williams, and Gallucci contend timely identification of high levels of social threat-related fear is critical for identifying individuals who will

benefit most from preventative interventions aimed to limit negative cycles of increased social threat perception and high avoidance. In addition, they contend that their studies sets a boundary condition to pain overlap theory by demonstrating that high levels of fear of one type of pain are linked specifically to increased perception of that particular type of pain but not the other.

Quality of Life as a Psychosocial Trigger Event

The second independent variable and predictor in the present online survey study included emergent events during the course of participants' transitional musculoskeletal pain experience that involve the pain-related limitations in their daily functioning and activity levels. These types of psychosocial issues are usually associated with *quality of life*. In the present study, quality of life, as a predictor variable, will be examined as the level of functioning in daily activities within the context of distress episodes during the transitional pain experience.

Quality of Life as a Psychosocial Issue. Quality of life is conceptualized as a psychosocial trigger event in the present study. Current literature on quality of life sheds light on the importance of unimpeded daily functioning and activities level during the transitional musculoskeletal pain experience in pain prevention. Summaries on some of the most pertinent up-to-date studies on quality of life in daily functioning and activity levels are presented next.

The Core Elements of Quality of Life. Quality of life has an extensive literature dating back several decades, and it is now widely recognized that the personal burden of any disorder cannot be described fully by measures of disease status (Muldoon, Barger,

Flory, & Manuck, 1998). According to Muldoon, Barger, Flory, and Manuck, psychosocial factors such as functional impairments and restricted mobility in daily life, including difficulties fulfilling personal and family responsibilities, financial burden, pain apprehension, and diminished cognition must also be considered in assessments and treatments. Although the importance of quality of life is broadly acknowledged, Muldoon, Barger, Flory, and Manuck noted that confusion and skepticism remain on how quality of life should be measured and the extent of its usefulness in medical research. In a study conducted by Muldoon, Barger, Flory, and Manuck, a simple framework was presented that described the core elements of quality of life related to health and they used it to evaluate quality of life measurement as it is currently conducted. They summarized six key summary points as follows.

Measures of disease status alone are insufficient to describe the burden of illness; quality of life factors such as pain, apprehension, depressed mood, and functional impairment must also be considered.

1. Two operational definitions of quality of life are identified—objective functioning and subjective wellbeing.

2. Assessments of objective functioning and subjective wellbeing convey different information, they also present different problems in relation to validation.

3. Assessment of functioning derived from questionnaires must be validated against measures of directly observed behavioral performance.

4. Subjective appraisal of wellbeing may be influenced substantially by psychological factors unrelated to health or to changes over time in patients' criteria for appraising wellbeing.

5. Whether and how quality of life researchers respond to these obstacles and deficiencies will probably determine the quality of their work in the future (Muldoon, Barger, Flory, & Manuck, 1998, p. 542).

Quality of Life and Medical Research. Although its interpretation is often variable, according to Katz (2002), *quality of life* is a relatively recent inclusion in medical research, and is recognized as one of the most important factors to be measured in the evaluation of medical therapies, including the management of pain. Katz noted that pain has a detrimental effect on all aspects of quality of life, when it is not properly relieved and treated. In addition, this negative impact has been found to span every age group, and includes all sources and types of pain. Katz recommended that measures of quality of life be included as an outcome domain in pharmacotherapeutic research.

Quality of Life and Pain-related Depression. The literature shows depression and pain often occur together (Lin, Yen, Chen, & Chen, 2014). A cross-sectional study conducted by Lin, Yen, Chen, and Chen investigated the effects of depression and pain on the quality of life of depressed patients and the level of impairment of daily functioning. Although they found a weak correlation between depression and pain, they concluded depression and pain exert a direct influence on quality of life and the impairment of daily functioning of depressed patients. Lin, Yen, Chen, and Chen noted

that such impairment was expected regardless of increased depression, pain, or both pain and depression.

A study on chronic pain and quality of life conducted by Andersen, Kohberg, Kristensen, et al., (2014) found chronic pain was associated with higher levels and prevalence of depression and diagnoses of widespread pain. According to Andersen, Kohberg, Kristensen, et al., nonspecific pain was more associated with depression than was specific pain. Remarkably, they found the link between stress, anxiety, and chronic pain were not obvious. In addition to pain itself, Andersen, Kohberg, Kristensen, et al., found people living with recurrent pain are affected in other aspects of life, including challenges involving lower quality of life, conflicts in close relationships, disability, and depressive thoughts. The implications of their study suggests that interventions for people with chronic pain take into consideration all of these far-reaching consequences beyond the pain itself.

Quality of Life and Pain-related Anxiety and Depression. A study conducted by Orenius, Koskela, Koho, et al. (2012) examined the effects of baseline anxiety, depression and fear of movement on quality of life collected at admission with a 12-month follow-up survey following a multidisciplinary pain management program. They found that while anxiety at baseline predicted significant negative change in quality of life, depression predicted significant positive change in quality of life, and fear of movement did not predict any significant change in quality of life. Orenius, Koskela, Koho, et al. concluded that patients with recurrent musculoskeletal pain and mild to

moderate depression benefit most from a multidisciplinary pain management program in contrast to patients with anxiety.

A study conducted by Nakagawa, Yamaguchi, Kimura, et al. (2017) sought to examine the independent association of anxiety and depression with pain and quality of life by clarifying the incidence of anxiety and depression among patients with chronic foot and ankle diseases. In their study, a multiple regression analysis was performed to examine the independent association of anxiety and depression with pain and quality of life. A total of 250 patients were included in the analysis. Nakagawa, Yamaguchi, Kimura, et al. found 30% of patients with chronic foot and ankle disease had anxiety or depression, and in their sample the prevalence of anxiety and depression was 30% for anxiety and 27%, for depression respectively. They recommended that healthcare providers recognize the possibility of concurrent anxiety and depression to provide a more comprehensive treatment for chronic foot and ankle disease.

Fibromyalgia and Quality of Life. Fibromyalgia syndrome is a highly prevalent musculoskeletal condition that has been extensively investigated. Miro, Martinez, Sanchez, Prados, and Medina (2011) conducted a cross☐sectional study on daily functioning and emotional distress in fibromyalgia syndrome. Miro, Martinez, Sanchez, Prados. & Medina conceptualized sleep dysfunction as a mediator of the impact of pain intensity. They analyzed the role of sleep dysfunction on anxiety, depression, and daily functioning, and compared them with the mediating role of self☐efficacy. Remarkably, they found women diagnosed with fibromyalgia syndrome had more dysfunctional scores on the variables examined than control participants. In addition, they found in the

mediation models for the fibromyalgia group, there were significant relationships between all the factors they examined. They concluded that their results suggest that sleep improvement could optimize the current management of the fibromyalgia.

Neuropathic Pain and Quality of Life. A study conducted by Smith, Torrance, Bennett, and Lee (2007) examined the quality of life and health associated with chronic pain of predominantly neuropathic origin on daily activity and health in the general population. After making adjustments for pain severity, age, and sex, the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) questionnaire was used to identify patients with pain of predominantly neuropathic origin. Three groups of respondents were identified: (1) those without chronic pain (n =1537), (2) those with chronic pain who tested positive for pain of predominantly neuropathic origin (n =241); and (3) those with chronic pain who tested negative for pain of predominantly neuropathic origin (n =1179). According Smith, Torrance, Bennett, and Lee, the neuropathic origin group was still found to have poorer scores than the other groups, indicating poorer health and greater disability.

Noninflammatory Musculoskeletal Pain and Quality of Life. A study conducted by Hagen, Kvien, and Bjørndal, (1997) on the prevalence of noninflammatory musculoskeletal pain in the general population, found the prevalence was 21.6% for noninflammatory low back pain, 17.0% for noninflammatory widespread pain, and 15.4% for noninflammatory neck pain. In addition, they found disability levels were highest in people with rheumatoid arthritis, followed by widespread pain, low back pain, and neck pain. Except for levels of disability, Hagen, Kvien, and Bjørndal, also found

widespread pain and RA had similar health effect, i.e., people experienced similar mental distress levels, and problems with health satisfaction, insomnia, and pain intensity.

Quality of Life in Older Adults. A study conducted by Şimşek, Şimşek, Yümin, et al. (2010) examined the relations between health-related quality of life, satisfaction with life, and pain in older adults above the age of 65 years. Their sample included a total of 163 subjects, 58 35.6% were females, and 64.4% males, with an average age of 73.26 years of age. Sociodemographic data was collected, and the Nottingham Health Profile (NHP) was used to assess health-related quality of life. Satisfaction with life and level of pain were evaluated using Visual Analogue Scale. They found 54% subjects reported pain originating from extremities, knees, and lower back, with an average Visual Analogue Scale score of 5.75 ± 2.18. In addition, there were significant differences between older adults reporting pain and those who did not report pain in the aspects of satisfaction with life and NHP (total and all subscales) ($P < .05$), and severity of pain was found to have a negative effect on NHP and social isolation subscale (NHP) ($P < .05$). Şimşek, Şimşek, Yümin, et al. concluded their investigation demonstrated the adverse impact of pain on quality of life. They recommended that because pain is a significant problem, it needs to be routinely assessed and treated in the older-adult population.

Satisfaction with Life as a Psychosocial Trigger Event

The third independent variable and predictor in the present study included emergent events during the course of participants' transitional musculoskeletal pain experience that involve their sense of subjective wellbeing. These kinds of psychosocial issues are usually associated with the individual's current level of satisfaction with life.

In the present study, as a predictor variable, *satisfaction with life* will be examined as the participants; current level of satisfaction with their subjective wellbeing within the context of distress episodes during the transitional pain experience.

Satisfaction with Life as a Psychosocial Issue. Satisfaction with life was conceptualized as a psychosocial trigger event in the present study. Current literature on satisfaction with life sheds light on the importance of the individual's current level of satisfaction with their sense of subjective wellbeing and in meeting their life goals during their transitional musculoskeletal pain experience in pain prevention. Summaries on some of the most pertinent up-to-date studies on satisfaction with life are presented next.

Satisfaction with Life and Treatment Outcomes. A study conducted by Åsenlöf, Denison, and Lindberg (2005) examined the outcomes of an experimental individually tailored behavioral medicine intervention with a control physical exercise therapy. In the experimental intervention, each participant's functional behavioral analyses and behavioral treatment goals was individualized. Participants were patients with musculoskeletal pain who were recruited at three primary care clinics. A total of 122 patients were randomized assigned to either the experimental or control treat groups. The data for their study was collected at baseline, immediately after treatment, and at a 3-month follow-up session. As a result of the individualized treatment condition, Åsenlöf, Denison, and Lindberg found the experimental group experienced higher levels of pain control ($P = .001$), lower maximum pain intensity ($P = .02$), lower fear of movement ($P = .022$), and lower levels of disability ($P = .01$). The participants in the experimental group reported more positive effects after treatment. Remarkably, physical performance ($P =$

.0001) and self-efficacy (P = .0001) increased over time for both groups. Åsenlöf, Denison, and Lindberg noted that pain might be managed by the patients themselves and their activity levels can be resumed when treatment incorporates treatment strategies are tailored according to empirically derived determinants of pain-related disability and the individual's priorities of everyday life activities. According to Åsenlöf, Denison, and Lindberg, their study demonstrated the biomedical and the psychosocial perspectives of the experiences and consequences of pain complement rather than contradict each other. Primary health care patients with persistent musculoskeletal pain benefit more from individualized treatments based on biopsychosocial factors than from a physical-based exercise intervention. This study suggests patients may experience greater satisfaction with life resulting from their individualized treatments.

Life Satisfaction and Long-term Musculoskeletal Pain. In a survey study conducted by Anke, Damsgard, and Røe (2013) designed to investigate levels of life satisfaction in patients with long-term musculoskeletal pain in relation to pain characteristics and coping, respondents answered self-report questionnaires regarding life satisfaction, pain distribution and pain intensity at rest and during activity, self-efficacy, and sense of coherence. Anke, Damsgard, and Røe found levels of life satisfaction and scores for sense of coherence were low. Using cluster analysis, Anke, Damsgard, and Røe identified clinically meaningful subgroups with regard to adaptation, and the highest level of coping was found in the adaptive cluster with high life satisfaction / low pain intensity at rest. Multiple regression analyses revealed pain intensity at rest was negatively correlated with global life satisfaction. In addition, they found the life

satisfaction domains activities of daily living/contacts were negatively correlated with pain intensity during activity, and the domains work/economy were negatively correlated with pain distribution. Anke, Damsgard, and Røe concluded that long-term pain is related to low levels of life satisfaction, and pain intensity and distribution influence satisfaction in different domains, and pain intensity is negatively associated with coping. The results support efforts to reduce pain, together with addressing individual needs and strengthening active coping processes.

Life Satisfaction and Mental Health. A survey study conducted by Stålnacke (2011) examined life satisfaction, anxiety, depression, disability, pain intensity, and posttraumatic stress in patients with injury-related chronic pain and to analyze gender differences in these variables. The survey was responded to by 160 patients at assessment at the Pain Rehabilitation Clinic at the Umeå University Hospital in Sweden. Measures in their survey addressed life satisfaction [Life Satisfaction-11]), pain intensity (Visual Analogue Scale [VAS]), anxiety and depression (Hospital Anxiety and Depression [HAD] scale), posttraumatic stress (Impact of Event Scale), disability (disability rating index. Using a multivariate logistic regression model for data analysis, Stålnacke found a statistically significant association between low scores on the overall life satisfaction on LiSat-11 and high scores on HAD-depression (odds ratio = 1.141, confidence interval 1.014–1.285). Few gender differences were found. High level of pain intensity was scored on the VAS (mean value 64.5 ± 21.1 mm) together with high levels of anxiety, depression, and posttraumatic stress. Activity limitations in everyday life and decreased life satisfaction were reported, particularly on the items psychological

health and physical health. According to Stålnacke, these findings highlight the value of a broad screening in patients with injury-related chronic pain with respect to the relationship of life satisfaction with pain intensity, anxiety, depression, posttraumatic stress, and disability, and supports the biopsychosocial approach to optimally assess and treat recurrent musculoskeletal patients.

A cross-sectional survey study conducted in Iceland by Björnsdóttir, Jónsson, and Valdimarsdóttir (2014) examined mental health indicators, including self-reported subjective well-being, quality of life, stress, symptoms of depression, and sleep disruption among men and women with musculoskeletal chronic pain in a general population. In their survey, chronic pain conditions included reports of current chronic neck symptoms, back pain, and/or fibromyalgia. Using logistic regression analyses adjusting for age, body mass index, education, income, smoking, and residence, gender-stratified associations of chronic pain conditions with mental health indicators were estimated. Björnsdóttir, Jónsson, and Valdimarsdóttir found higher adjusted odds ratio of low satisfaction with life (women =2.0, men = 2.3). In addition, they also found higher levels of diminished quality of life (women = 1.6, men = 1.5), perceived stress (women = 1.7, men = 1.5), depressive symptoms (women = 2.4, men = 2.8, 95%), and sleep disruption (women =2.8, 95%, men 2.2, 95%), and among individuals with chronic pain compared with those without the condition. Björnsdóttir et al. concluded that individuals with musculoskeletal chronic pain have increased risk of poor mental health and diminished life satisfaction and quality of life. They recommended further research be

conducted on the decline in mental health among individuals with chronic pain and on the identification of efficacious treatment and preventative measures.

Life Satisfaction and Fibromyalgia. A study conducted by Çeliker and Borman (2000) designed to determine the differences of life satisfaction in fibromyalgia syndrome and rheumatoid arthritis patient groups, compared the intensity of anxiety, depression, and hopelessness in female patients. The measures in their included the Life Satisfaction Index (LSI) was used to measure psychological well-being, the Beck Depression Inventory (BDI), Spielberger State and Trait Anxiety Inventory (STAI), and Beck Hopelessness Scale (BHS) were used to evaluate psychological disturbance. Çeliker and Borman found life satisfaction was similar in fibromyalgia syndrome and rheumatoid arthritis patients. However, rheumatoid arthritis patients were more disabled. In fibromyalgia syndrome patients only anxiety had a negative role on life satisfaction, while in rheumatoid arthritis patients both depression and anxiety were predictors of low life satisfaction.

Satisfaction with Life and Chronic Nonmalignant Musculoskeletal Pain. A survey study conducted by Brekke, Hjortdahl, and Kvien (2002) examined the associations between residential areas of contrasting socioeconomic status and the severity of non-inflammatory musculoskeletal pain. In their study, a 4-page questionnaire inquired about life satisfaction, mental health, musculoskeletal pain, physical disability, and use of health services was sent to 10,000 randomly selected adults in Oslo, Norway. Brekke, Hjortdahl, and Kvien analyzed the survey data from respondents living in two socioeconomically contrasting areas of the city. Using multiple

regression analyses adjusted for age, Brekke, Hjortdahl, and Kvien revealed that living in the less affluent area was associated with low life satisfaction, high levels of physical disability and mental distress, and widespread and strong pain. In addition, living in the less affluent area was associated with low level of involvement in own health care, and with frequent use of analgesics, after adjusting for age, levels of physical disability, mental distress, and pain intensity. They concluded that non-inflammatory musculoskeletal pain was a more serious condition in a population living in a less affluent residential area compared with a more affluent one. They noted that in the disadvantaged part of the population, increased disease severity may amplify the impact of chronic morbidity. The findings from their study has important implications for health care provision, especially if the goal is treatment according to individual needs.

A test-retest study on the reliability of a measure of life satisfaction was conducted by Boonstra, Reneman, Posthumus, et al. (2008). They recruited 51 patients over 18 years of age suffering from chronic nonmalignant musculoskeletal pain from a rehabilitation center. They sought to determine the reliability of the Life Satisfaction Questionnaire, Dutch version (LSQ-DV), in assessing chronic pain patients. Boonstra, Reneman, Posthumus, et al. found that the reliability of the LSQ-DV proved moderate to good for most domains, though low for the 'family life' domain. They recommended employing the LSQ-DV in clinical practice and research. However they noted, the 'family life' score needs to be interpreted with caution.

A follow-up study conducted by Boonsra, Reneman, Stewart, Post, and Schiphorst Preuper (2013) sought to determine to identify predictors of life satisfaction,

and the life satisfaction of patients with chronic non-malignant musculoskeletal pain compared to the general population. Boonsra, Reneman, Stewart, Post, and Schiphorst Preuper used ordinal logistic regression to analyze differences between patients with chronic non-malignant musculoskeletal pain and the general population, and predictors of life satisfaction in patients with chronic non-malignant musculoskeletal pain. They found individuals with chronic non-malignant musculoskeletal pain. Compared to the general population, patients with chronic non-malignant musculoskeletal pain reported lower satisfaction with 'life as a whole' across six life domains: self-care, vocational and financial situation, leisure, contacts with friends, and sex life. In the chronic non-malignant musculoskeletal pain group, age, marital status, and mental health were associated with most satisfaction scores. Boonsra, Reneman, Stewart, Post, and Schiphorst Preuper found the most consistent predictors of life satisfaction were pain, vitality, marital status, and mental health.

Life Satisfaction and Core Domains in Clinical Trials. A report by Turk, Dworkin, Allen, et al. (2003) outlined recommendations for the core outcome domains that should be *considered* by researchers conducting clinical trials of the effectiveness of treatments for chronic pain. According to Turk, Dworkin, Allen, et al., a core set of outcome domains needs to be developed to: (1) facilitate the pooling and comparison of data, (2) encourage more complete reporting of treatment outcomes, (3) simplify the preparation and review of manuscripts and research proposals, and (4) allow clinicians to make informed decisions regarding the risks and benefits of treatment. According to Turk, et al., twenty-seven specialists from academia, governmental agencies, and the

pharmaceutical industry, under the auspices of the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT), participated in a consensus meeting where they identified core outcome domains that need to be *considered* in clinical trials of treatments for chronic pain. The consensus was chronic pain clinical trials should assess outcomes representing six core domains: (1) pain, (2) physical functioning, (3) emotional functioning, (4) participant ratings of improvement and satisfaction with treatment, (5) symptoms and adverse events, and (6) participant disposition and adherence to the treatment regimen and reasons for withdrawal from the trial. They noted that consideration should be given to the assessment of each of these domains, however, there may be exceptions in including all of these domains in each chronic pain trials. When this occurs, Turk et al. recommended that the rationale for not including domains should be noted in proposals and reports on findings, as it was not the intention of these recommendations that assessment of the core domains be considered a *requisite* for approval, whether a product applications by regulatory agencies, or that a treatment must demonstrate statistically significant effects for all of the relevant core domains to establish evidence of its effectiveness.

Life Satisfaction and the Effects of Multidisciplinary Rehabilitation. A study conducted by Heikkila, Heikkila, and Eisemann (1998) examined the effects of a multidisciplinary rehabilitation program on life satisfaction, coping resources, and sick-leave in whiplash patients and other pain patients. They recruited 40 patients suffering from symptoms after whiplash trauma and 33 patients with musculoskeletal pain in the neck or back, and for a control group, 97 consecutive patients admitted to the Department

of Neurosurgery with cervical disc herniation or symptomatic spondylosis with cervical pain. Heikkila, Heikkila, and Eisemann found whiplash patients experienced poorer life satisfaction and decreased coping resources at the beginning of the rehabilitation program compared to the control group. After the rehabilitation period, 49% of the patients had improved their coping resources totaling to 63% after 2 years. And at follow-up 46% of patients had increased their life satisfaction. In addition, the whiplash injury group showed a significant increase in sick absenteeism whereas the group without whiplash trauma had decreased their sick-leave. Eighty-eight per cent of the patients were correctly classified according to their vocational outcome by means of discriminant function. Ethnic origin of the patient and living in the countryside, and the elapse of time since working, low life satisfaction, lack of increase in coping resources during the rehabilitation program predicted poor vocational outcome. Heikkila, Heikkila, and Eisemann findings suggest factors from the social environment and coping resources as useful predictors for treatment outcome.

Wicksell, Ahlqvist, Bring, Melin, & Olsson (2008) conducted a study on the effectiveness of a cognitive therapy approach that promotes acceptance of pain and other associated negative private events, instead of controlling or reducing pain-related distress symptoms that had received increasing attention in the clinical literature. They noted that although the empirical support for treatments emphasizing acceptance and exposure is growing, there is a need for more outcome studies, particularly randomized controlled trials. In this study, participants ($N = 21$) with chronic pain and whiplash□associated disorders were recruited from a patient organization and randomized to either a treatment

or a wait☐list control condition. Both groups continued to receive treatment as usual. In the experimental condition, a learning theory framework was applied to the analysis and treatment. The intervention consisted of a 10☐session protocol emphasizing values☐ based exposure and acceptance strategies to improve functioning and life satisfaction by increasing the participants' abilities to behave in accordance with values in the presence of interfering pain and distress (psychological flexibility). After treatment, significant differences in favor of the treatment group were seen in pain disability, life satisfaction, fear of movements, depression, and psychological inflexibility. No change for any of the groups was seen in pain intensity. Improvements in the treatment group were maintained at 7☐month follow☐up. The authors discuss implications of these findings and offer suggestions for further research in this area.

Life Satisfaction and Older Adults. A study conducted by Şimşek, Şimşek, Yümin, et al. (2010) examined the relations between satisfaction with life, health-related quality of life, and pain in older adults above the age of 65 years. Their sample included a total of 163 subjects, 58 35.6% were females, and 64.4% males, with an average age of 73.26 years of age. Sociodemographic data was collected, and the Nottingham Health Profile (NHP) was used to assess health-related quality of life. Satisfaction with life and level of pain were evaluated using Visual Analogue Scale. They found 54% subjects reported pain originating from extremities, knees, and lower back, with an average Visual Analogue Scale score of 5.75 ± 2.18. In addition, there were significant differences between older adults reporting pain and those who did not report pain in the aspects of satisfaction with life and NHP (total and all subscales) ($P < .05$),and severity of pain was

found to have a negative effect on NHP and social isolation subscale (NHP) ($P < .05$).

Şimşek, Şimşek, Yümin, et al. concluded their investigation demonstrated the adverse

impact of pain on quality of life. They recommended that because pain is a significant

problem, it needs to be routinely assessed and treated in the older-adult population.

Summary on Psychosocial Issues

During the course of early pain experience, a number of psychosocial stressors

may emerge that add to, fuel, and exacerbate the stress-reactivity and the pain-related

psychological distress associated with persistent recurrent transitional musculoskeletal

pain. It is important to recognize early pain experience as a personal crisis that some

people weather better than others, while other people may struggle. Three psychosocial

stressors believed to influence the severity of early pain-related psychological distress

symptoms have been identified, including pain disclosure and social support constraints,

activity levels associated with daily functioning and quality of life, and current level of

satisfaction with life. Currently, it is not clear which of these three emergent issues in

early pain experience is more influential and which may serve as the best predictors of

pain-related psychological distress.

Furthermore, it is also important to recognize and understand that pain-related

psychological distresses in early pain experience may have multiple causes other than

pain intensity, pain interference, and subjective well-being; and may include psychosocial

issues that emerge during the course of pain experience. Subsequently, multiple stressors

may add to the person's stress associated with their early pain experience and increase the

severity of their distress and suffering. I theorized that psychosocial stressors have an

accumulative affect and become evident in the severity of symptoms comprising early pain-related distress during acute and subacute musculoskeletal pain experience. It is assumed that the study's findings will show acute and subacute pain-related psychosocial stressors influence and predict severity of distress symptoms during early pain experience. Across past, recent, and current research literature, there are no reports or reviews in the clinical literature that specifically cover perceived rejection, quality of life, and satisfaction with life in acute and subacute human pain experience, nor do they cover pain self-efficacy or perceived injustice.

<div align="center">**Other Pain-related Factors Investigated in the Study**</div>

In addition with examining the extent that the three psychosocial issues influence and predict distress episodes, the study investigated five other pain-related factors. These factors included the respondents' *age range* and *gender*, their *general musculoskeletal diagnosis*, *pain intensity* levels, and the extent of *pain interference* in their daily lives. A summary of the literature on each these pain related factors follows.

Pain Intensity as a Covariate Pain-related Factor

The fourth independent variable and predictor in the present study included emergent events during the course of participants' transitional musculoskeletal pain experience that involve their levels of pain severity. This biopsychological issue is usually associated with the extent of the individual's *pain intensity*. In the present study, as a predictor variable, *pain intensity* will be examined as the participants' current levels of pain severity within the context of distress episodes during the transitional pain experience.

Pain Intensity as a Pain-related Issue. I conceptualized pain intensity as a covariate trigger event in the present study. Current literature on pain intensity sheds light on the importance of pain severity levels during the transitional musculoskeletal pain experience in pain prevention, and the extent of such interference in influencing and predicting pain-related distress episodes. Summaries on some of the most pertinent up-to-date studies on pain intensity are presented next.

The Pain Experience and Pain Intensity. A study conducted by Johnson and Rice (1974) described the pain experience as having two basic components; viz., sensory and reactive mechanisms. Johnson and Rice recruited 52 male college students who experienced ischemic pain in their arms in a test of the hypothesis that the intensity of the reactive component of the pain experienced is a function between expected and experienced physical sensations. Expected physical sensations were varied by the type of preparatory information the participants received. Participants were randomly assigned to 1 of 4 information conditions. These included (1) a description of sensations unlikely to occur with ischemic pain, (2) a description of only two of the sensations the participant could expect to experience, (3) a description of all the typical sensations experienced, and (4) a description of the procedure without any sensations. Participants were instructed to rate the intensity and distress of the sensations on separate scales. Conditions 2 and 3 resulted in lower distress ratings compared to the other two information conditions. The effects of information on ratings of the intensity of the sensations were borderline significant. Remarkably these findings indicate that in clinical settings, patients who receive a partial description of pain-related sensations they may experience will have as

much reduction in distress as those who receive a complete description of sensations they may experience. In their conclusion, Johnson and Rice discussed the potential usefulness of the measurement of each component of pain vs. pain threshold measures for clinical management of pain.

Pain Intensity and Psychosocial Issues. A study conducted by Stålnacke (2011) examined pain intensity, posttraumatic stress, anxiety, depression, disability, and life satisfaction in patients with injury-related chronic pain and to analyze differences in these variables regarding gender. Stålnacke found high level of pain intensity was scored on the VAS (mean value 64.5 ± 21.1 mm) together with high levels of anxiety, depression, and posttraumatic stress. Stålnacke findings highlight the value of a broad screening in patients with injury-related chronic pain with respect to the relationship of life satisfaction with pain intensity, anxiety, depression, posttraumatic stress, and disability. In addition, the findings lend support to the biopsychosocial approach in optimally assessing and treating these pain patients.

A study conducted by Severeijns, Vlaeyen, van den Hout, and Weber (2001) investigated the relation between catastrophizing and pain intensity, pain-related disability, and psychological distress in a group of patients with chronic pain, controlling for the level of physical impairment. In addition, they explored whether these relations are the same for three subgroups of chronic pain patients: (1) chronic low back pain, (2) chronic musculoskeletal pain other than low back pain, and (3) miscellaneous chronic pain complaints, excluding low back pain and musculoskeletal pain. Two-hundred eleven participants, all of whom had a chronic pain problem, were recruited from a

university hospital pain management and research center. Using regression analyses, Severeijns, Vlaeyen, van den Hout, and Weber found chronic pain patients who catastrophize reported more pain intensity, felt more disabled by their pain problem, and experienced more psychological distress; thereby revealing catastrophizing was a potent predictor of pain intensity, disability, and psychological distress, even when controlled for physical impairment, and no fundamental differences between the three subgroups were found in this respect. Remarkably, it was shown that there was no relationship between physical catastrophizing and impairment. Severeijns, Vlaeyen, van den Hout, and Weber concluded that catastrophizing plays a crucial role in the chronic pain experience, significantly contributing to the variance of pain intensity, pain-related disability, and psychological distress. Moreover, these inter-relationships are not confounded by the level of physical impairment. They concluded that these results support the validity of a cognitive–behavioral conceptualization of chronic pain–related disability.

Pain Intensity and Past Memories of Pain. A study conducted by Eich, Reeves, Jaeger, and Graff-Radford (1985) investigated the extent that memory of the intensity of past physical pain is influenced by the intensity of present pain. Eich, Reeves, Jaeger, and Graff-Radford found that when present pain intensity was high, patients with chronic myofascial origin headaches rated their maximum, usual, and minimum levels of prior pain as being more severe than what their hourly pain diaries indicated. Conversely, when their present pain intensity was low, the same patients remembered all 3 levels of prior pain as being less severe than they actually had been. These results indicate pain

produces systematic distortions of memory similar to those associated with alterations of affect or mood. In addition, the results suggest a possible resolution to a noticeable recurrent conflict in the pain literature of that decade.

Pain Beliefs and Pain Intensity. A cross sectional survey study conducted by McParland and Knussen (2012) investigated the extent that beliefs unrelated to pain, esp., just world beliefs, might impact the coping and adjustment experience. The focus of their study was on the ability of just world beliefs to influence the relationships that psychological distress had with pain intensity and disability in chronic pain. They recruited 95 pain patients from arthritis and fibromyalgia support groups to investigate these social beliefs in a controlled community pain context. McParland and Knussen found the personal just world belief was endorsed significantly more than the general just world belief. Moreover, the endorsement of the personal just world belief was negatively correlated with pain intensity, disability and psychological distress. Remarkably, the general just world belief was unrelated to these variables. In addition, McParland and Knussen found the personal just world belief did not predict psychological distress when interaction terms relating to personal and general just world beliefs were entered simultaneously into regression analyses. Nevertheless, they found pain intensity positively predicted psychological distress at low but not high levels of the general just world belief, while disability predicted psychological distress at low and high levels. Their findings indicate that a strong general just world belief has implications for psychological well being in chronic pain, and as such this belief may occupy a potential coping function within this context.

Pain Intensity and Cold Pressor Procedures. A controlled cold pressor procedure study conducted by Masedo and Esteve (2007) examined the tolerance time, the distress, and the perceived pain intensity in three groups. Two hundred and nineteen undergraduates were recruited to participate, and were assigned to suppression, acceptance and spontaneous coping groups. Masedo and Esteve found the suppression group showed the shortest tolerance time, and the acceptance group showed the longest tolerance time. In addition, the acceptance group showed pain and distress immersion ratings that were significantly lower than in the other two groups, between which the differences were not significant. The suppression group showed pain and distress ratings that were higher than in the other two groups in the first recovery period. Whereas in the second recovery period, the suppression and the spontaneous coping groups did not differ. Masedo and Esteve discussed the likelihood of a 'rebound' of physical discomfort and the effects of suppression on behavioral avoidance. The results of Masedo and Esteve study lends support the acceptance approach in the management of pain.

Brain Imaging and Pain Intensity. In a brain-imaging study conducted by Coghill, Sang, Maisog, and Iadarola (1999), psychophysical assessment of graded painful stimuli was combined with positron emission tomography to identify a brain mechanism underlying pain intensity processing and to characterize the multiregional organization of supraspinal pain processing mechanisms. A multiple regression analysis revealed statistically reliable relationships between perceived pain intensity and activation of a functionally diverse group of brain regions, including those important in affect, and attention affect, attention, motor control, and sensation. Coghill, Sang, Maisog, and

Iadarola found bilateral pain intensity–related activation involving the anterior cingulate cortex, cerebellum, insula, putamen, thalamus, secondary somatosensory cortex, and thalamus. In addition, they found contralateral activation in the primary somatosensory cortex and supplementary motor area, and ipsilateral activation in the ventral premotor area. Their findings confirmed the existence of a highly distributed, bilateral supra-spinal mechanism engaged in the processing of pain intensity. Their findings contrasted sharply with traditional views that sensory-discriminative processing of pain is confined within the somatosensory cortex.

A brain imaging study conducted by Saarela, Hlushchuk, de C. Williams, Schürmann, and Riitta Hari (2007) examined the extent that the presence of pain and the intensity of the observed pain is encoded in the observer's brain. They found that when participants observed pain from the faces of chronic pain patients, there were activations in the bilateral anterior insula, left anterior cingulate cortex, and left inferior parietal lobe in the observer's brain correlated with their estimates of the intensity of observed pain. In addition, the strengths of these activation were correlated with participants' self-rated empathy. The implication of these findings are that the intersubjective representation of pain in the human brain is more complicated than previously thought.

Pain Intensity Scales. A study on pain intensity scales conducted by Jensen, Karoly, and Braver (1985) examined several scales used to assess the intensity construct, to determine which scales provides the most predictively valid, replicable, and precise measure. A set of five criteria for evaluating intensity scales have been considered in previous research. These include: (1) the ease of scoring; (2) rates of incorrect

responding; (3) the number of available response categories; (4) statistical power; and (5) the relationship between each scale and a linear combination of pain intensity indices. Jensen, Karoly, and Braver recruited 75 chronic pain patients who were asked to rate four kinds of pain (present, least, most, and average) using the six pain intensity scales. The utility and validity of each of the scales was assessed using the five criteria. Their results indicates that the scales yield similar results in terms of the number of subjects who respond correctly to them and their predictive validity. They found the 101-point numerical rating scale to be the most practical index. I might point out here that Jensen, Karoly, and Braver's study was conducted several decades before the pain intensity scale used in the present study was developed.

A study on the 11-point pain intensity numerical rating scale conducted by Farrar, Young, LaMoreaux, Werth, and Poole (2001) investigated the difficulties in interpreting the changes from baseline on this scale, as there were no data driven estimates for the clinically important differences in pain intensity scales used in many chronic pain studies. Data from 10 recently completed placebo-controlled clinical trials were used, involving on 2,724 participants. The studies had similar designs and measurement instruments, including the PI-NRS. The changes in the PI-NRS from baseline to the end-point were compared to the patient global impression of change (PGIC) for each subject. Relationship to the PI-NRS was explored, and categories of 'much improved' and 'very much improved' were used as determinants of a clinically important difference. Farrar et al. found that a consistent relationship between the change in PI-NRS and the standard

seven-point patient global impression of change regardless of the study, treatment group, study result, age, disease type, or sex.

Pain Interference as a Covariate Pain-related Factor

The fifth independent variable and predictor in the present study included emergent events during the course of participants' transitional musculoskeletal pain experience that involve the extent of their limitations in managing household chores and socializing with family, friends, and other in their social orbits. This bio-psycho-socio-ecological issue is usually associated with the extent of the individual's *pain interference*. In the present study, as a predictor variable, *pain interference* will be examined as the participants' current levels of interference in their daily lives, work around their homes, completing household chores, and socializing within the context of distress episodes during their transitional pain experience.

Pain Interference as a Pain-related Issue. In the present study, pain interference was conceptualized as a covariate trigger event. Current literature on pain interference sheds light on the importance of the extent that pain encumbers routine activities in the individual's daily life and the extent of such interference in influencing and predicting pain-related distress episodes. Summaries on some of the most pertinent up-to-date studies on pain interference are presented next.

The Soundness of the PROMIS Short-form Pain Interference Scale. A study conducted by Amtmann, Cook, Jensen, et al. (2010) profiled the pain interference bank developed by the Patient-Reported Outcome Measurement Information System. They found the construct validity was supported by correlation patterns with other health

outcomes, and the scores discriminated individuals with pain intensity, disabling conditions, different numbers of chronic conditions, and levels of self-reported health ($p < 0.0001$). They noted that short forms of this bank and computerized adaptive testing are available. Their results demonstrated that the PROMIS-PI items constitute a sound psychometric bank.

 The Role of Fatigue in Distress and Pain Interference. A study conducted by Boggero, Kniffin, de Leeuw, and Carlson, (2014) explored the role of fatigue and its subtypes in mediating the relationship between psychological distress and pain interference. The subtypes of fatigue included vigor, emotional, mental, physical, and general exhaustion. Boggero, Kniffin, de Leeuw, and Carlson examined de-identified retrospective records of 431 patients seeking treatment for persistent orofacial pain. The primary diagnoses of participants included: muscle pain (29.8%), joint pain (26.0%), fibromyalgia, centrally mediated myalgia, tendonitis, dental pain, cervical spine displacement, and no diagnosis (24.7%), and neuropathic pain (19.5%). In addition, mediation models were tested with distress as the independent variable, interference as the dependent variable, and fatigue subtypes as the mediators. They controlled for pain duration and average levels of pain. They found the relationship between distress and interference was mediated by total fatigue, and fatigue subtypes partially mediated the relationship between distress and interference however, mediation was strongest with the composite fatigue variable. Boggero et al. noted the results should be interpreted with caution, as data do not imply causality because they were collected at a single time point.

Psychosocial Factors associated with Pain Interference. A survey study
conducted by Osbourne, Jensen, Ehde, Hanley, and Kraft (2007) tested a biopsychosocial
model of chronic pain that recognizes the psychological and environmental factors as
important aspects of adjustment to pain for persons with multiple sclerosis. The study's
participants were 125 community-dwelling persons with MS and pain who completed a
mailed questionnaire that included measures of pain interference, pain intensity
psychological functioning, catastrophizing, social support, and pain beliefs and coping.
After controlling for demographic and disease-related factors, the study tested the BPS
chronic pain model by evaluating the associations of several psychosocial variables (viz.,
pain beliefs, pain coping, pain-related catastrophizing, and perceived social support) with
pain intensity, pain interference with functioning, and psychological functioning in
persons with chronic pain and multiple sclerosis. Using regression analyses and
controlling for disease-related and demographic factors ($p < .001$), Osbourne, Jensen,
Ehde, Hanley, and Kraft found that the psychosocial variables accounted for an additional
25% of the variance in average pain intensity. In addition, these variables explained 43%
of the variance in psychological functioning ($p < .001$), after adjusting for demographic
and MS-related variables and average pain intensity, and an additional 22% the variance
in pain-related interference ($p < .001$). Remarkably, social support, pain beliefs, and pain
coping were associated with some criterion measures but not others, and catastrophizing
was consistently and independently associated with all criterion measures. The results of
Osbourne et al.'s study indicate catastrophizing may be important in adjustment to pain in

persons with multiple sclerosis, and lends empirical support for a biopsychosocial understanding of chronic pain in MS.

Negative Thoughts and Pain Interference. A survey/regression study conducted by Stroud, Thorn, Jensen, and Boothby (2000) investigated how cognitions and beliefs are related to and predict psychosocial functioning in chronic pain. Stroud, Thorn, Jensen, and Boothby recruited one hundred and sixty-three chronic pain out-patients who responded to three measure, including the Inventory of Negative Thoughts in Response to Pain and the Pain Beliefs and Perceptions Inventory for assessing the study's predictor variables, and the West Haven Yale Multidimensional Pain Inventory for the study's criterion variables. Stroud et al. found pain beliefs and pain cognition were correlated, and after controlling for demographics, employment status and pain severity, pain beliefs and cognitions accounted for a significant amount of the variance in pain interference, affective distress, and general activity levels. In addition, negative cognitions, specifically negative self-statements, were more predictive of outcome than pain beliefs. Stroud et al. noted that even though these data are correlational, they lend support for a biopsychosocial model of adjustment to chronic pain.

Mental Defeat and Pain Interference. A survey/regression study conducted by Tang, Goodchild, Hester, and Salkovskis (2010) examined the extent to which mental defeat is associated with pain-related interference, distress, and disability. Tang, Goodchild, Hester, and Salkovskis recruited 133 participants who completed the Pain Self-Perception Scale, a measure designed to assess mental defeat in relation to pain. In addition, the participants completed a set of questionnaires that measured pain

interference, distress, disability and other demographic (age, body mass index), clinical (pain intensity) and psychological predictors of disability, e.g., catastrophizing. Tang et al. found mental defeat to be strongly correlated with pain interference, anxiety, depression, functional disability psychosocial disability, and sleep disturbance. These correlations remained significant even when demographic factors and pain intensity were controlled. In addition, those participants with higher levels of mental defeat reported greater degree of pain interference, distress and disability; comparative to chronic pain patients with lower levels of mental defeat. A series of regression analyses found mental defeat emerged as the strongest predictor of pain interference, depression and psychosocial disability, whereas catastrophizing was the best predictor of anxiety, functional disability, and sleep interference. The findings from this study indicate mental defeat may be an important intermediary of disability and distress in chronic pain.

Pain Interference and Quality of Life. A couple of regression studies conducted by Putzke, Richards, Hicken, and DeVivo (2002) investigated important predictors of pain following spinal cord injury and the impact of pain on self-reported quality of life. In Study 1, the predictive validity of multiple demographic, medical, and quality of life factors at year 1 post-SCI to self-reported pain interference 2 years post-injury were examined. The results indicated that pain interference, lower self-reported mental health, and middle age range (i.e., 30–59-year-of-age) at 1 year post-spinal cord injury were the most important unique predictors of pain interference at 2 years post-spinal cord injury. In Study 2, the participants were separated into four groups: (1) those pain-free at years 1 and 2, (2) those pain-free at year 1 and in pain at year 2, (3) those in pain at year 1 and

pain-free at year 2, and (4) those in pain at years 1 and 2. The results of indicated that only those experiencing a change in pain interference status reported a change in quality of life. Remarkably, those participants developing pain interference (Group 2) from year 1 to year 2 reported decreased life satisfaction, mental health, and physical health, while those with resolving pain interference from year 1 to year 2 reported an increase across these same domains. An unexpected finding was that change in pain interference status was unrelated to change in self-reported impairments.

Pain Interference and Social Support. A study conducted by Stroud, Turner, Jensen, and Cardenas (2006) examined the extent to which psychosocial variables, i.e., social support and partner responses to pain behaviors) are associated with pain-related activity interference and depressive symptom severity among individuals with spinal cord injury and chronic pain. Stroud, Turner, Jensen, and Cardenas recruited seventy adults (45 men, 25 women) with spinal cord injury and pain, and 68 partners who completed four measures. These measures included Part II of the West Haven–Yale Multidimensional Pain Inventory, a measure of partner responses to pain behaviors, and individuals with spinal cord injury and pain completed the Social Support Questionnaire–6, a modified Brief Pain Inventory Pain Interference Scale, and the Center for Epidemiological Studies-Depression scale. Stroud et al. found that spinal cord injury participants' ratings of partner responses to pain behaviors, but not partner ratings, were associated significantly with pain-related activity interference and depressive symptom severity. In addition, Stroud et al. found negative partner response to pain behaviors explained the most variance in these two outcome measures. These results lend

preliminary support for the importance of partner responses to pain behaviors in outcomes of individuals with spinal cord injury and chronic pain.

Pain Interference and Couple Congruence. A study using hierarchical multiple regression conducted by Cano, Johansen, and Franz (2005) examined couple congruence on ratings of pain severity. Participants included older community individuals with chronic pain and their spouses who completed three measures. These measures included he Multidimensional Pain Inventory, which includes measures of pain interference, pain severity, negative spouse responses to pain, the Sickness Impact Profile, which includes measures covering physical disability and psychosocial disability, and the Mood and Anxiety Symptom Questionnaire, which measures psychological distress. Cano, Johansen, and Franz found no significant couple incongruence in pain severity or psychosocial disability. Predictors of the couples' mean ratings of pain and disability were identified. Females with chronic pain reported higher couples' ratings of pain severity and interference. Distress was related to higher couples' ratings of all pain and disability variables, and spouse distress levels were related to higher psychosocial disability ratings. Remarkably, perceptions of negative spouse responses were also positively associated with couples' ratings of physical and psychosocial disability. In terms of congruence, the distress of individuals with chronic pain was associated with incongruence on pain interference, physical disability, and psychosocial disability, while spouse distress predicted incongruence on pain severity, and pain interference. Cano et al. pointed out that their study implies that understanding couples' pain outcome ratings

involves an awareness of factors that might influence both their behaviors, as well as their perceptions.

   Pain Interference and Postural Control. A study conducted by Moseley and Hodges (2005) sought to clarify whether voluntary limb movements are associated with involuntary and automatic postural adjustments of the trunk muscles by recording electromyographic activity of the upper and lower abdominal muscles during voluntary arm movements that were coupled with painful cutaneous stimulation at the low back. They recruited 16 patients who performed 30 forward movements of the right arm in response to a visual cue as a control trial. Then seventy pain trials were then conducted in which arm movement was coupled with pain, and 70 "no pain trials" were conducted without the pain stimulus. They found there was a gradual and increasing delay of the lower abdominal muscles' electromyographic augmentation of upper abdominal muscles during the pain trials, both of which gradually returned to control values during the no pain trials. Moseley and Hodges concluded their results indicate altered postural adjustments of the trunk muscles during pain are not caused by pain interference, but are more likely to reflect the development and adoption of an alternate postural adjustment approach, which may serve to limit the trunk excursion velocity and amplitude caused by arm movement.

   Pain Interference and Aspects of Self-reported Pain. A cross-sectional postal study conducted by Thomas, Peatt, Harris, Wilkie, and Croft (2004) examined the prevalence of three aspects of self-reported pain, including: (1) occurrence of any recent pain, (2) number and location of pain sites, and (3) interference with daily life, to

determine their relation with age in older people. Thomas, Peatt, Harris, Wilkie, and Croft recruited 11,230 adults aged 50 years and over, who were registered with three general practices (*n*=11230) in North Staffordshire using mailed questionnaires. Completed questionnaires were received from 7878 respondents with an adjusted response rate incidence of 71.3%). Thomas et al. found pain that interfered with daily activities was reported by 3002 (38.1%) respondents overall. There was a clear age-related rise in this prevalence with age up to and including the oldest group. Within each regional pain subgroup, the proportion of people who also reported pain interference rose with age. These findings provide evidence that the extent to which pain interferes with everyday life increases incrementally with age up to the oldest age-group in the general population.

General Musculoskeletal Diagnosis as a Covariate Pain-related Factor

The sixth independent variable and predictor in the present study included emergent events during the course of participants' transitional musculoskeletal pain experience that involve their musculoskeletal injury or condition. This biological and medical issue is associated with the extent of the individual's *general type of musculoskeletal diagnosis*. In the present study, as a predictor variable, participants' *general musculoskeletal diagnosis* will be examined as either the results of an injury or a musculoskeletal disease condition within the context of distress episodes during their transitional pain experience.

General Musculoskeletal Diagnosis as a Pain-related Issue. There is little evidence indicating the existence of a difference in pain intensity, pain interference, or

pain experience resulting from either a musculoskeletal injury or a condition. In the present study, general musculoskeletal diagnosis was conceptualized as a possible covariate pain-related factor. Current literature on pain interference sheds light on the importance of any differences between musculoskeletal injuries and conditions in their extent of influencing and predicting pain-related distress episodes. Summaries on some of the most pertinent up-to-date studies on pain interference are presented next.

The Central Pain Amplification Mechanisms of Psychological Distress. The clinical research literature on the physiology of the amplification mechanisms that underlie central sensitization and pain perception reveals chronic pain to be a complex degenerative neurological disease where neural transduction signals from nociceptors are influenced by molecular genetics (Cox, et al., 2010; Lantero, Tramullas, Díaz, & Hurlé, 2012) and through a process referred to as neuroplasticity can be triggered in the absence of injury by innocuous stimuli (Brooks & Tracey, 2005; Latremoliere & Woolf, 2009; Tracey & Dickenson, 2012; Tracey & Mantyh, 2007; Woolf, 1993, 2011; Woolf & Salter, 2006). Studies conducted by neurobiologists, Woolf and his associates, have laid important groundwork on the neural processes underlying central sensitization, from which to better understand how pain transduction signals are transmitted, amplified, and perceived by the brain. In particular, how signals in the ascending neural pathways are amplified and can override endorphins, the natural soothing opioid neurotransmitters, in the descending persistent pain pathway (Latremoliere & Woolf, 2009; Woolf, 1993; Woolf, 2011; Woolf & Salter, 2006). In addition, other investigations using brain imaging conducted by Tracey and her associates found that certain emotional episodes,

such as feeling anxious, afraid, or sad, can amplify pain transductions signals to the brain. (Brooks & Tracey, 2005; Tracey & Dickenson, 2012; Tracey & Mantyh, 2007). Thus persistent pain hypersensitivity is complicated and involves genetics and episodes of emotional distress. The reviews that follow sheds further light on the complexities involving distress episodes and emergent pain-related psychosocial issues.

A literature review report conducted by Crofford (2015) outlined several constructs associated with the inter-relationships between chronic pain, psychological distress and central pain amplification. Crofford addressed mechanisms shared in common between chronic pain and mood disorders, including the individual factors that influence psychological comorbidity, and how pain affects mood and vice versa. In addition, the utility of cognitive behavioral approaches in the management of chronic pain symptoms were deliberated.

MacFarlane (2007) noted stress is often considered an important factor in the onset and maintenance of widespread musculoskeletal pain, however, the relationship is more complex than appears on initial consideration. McFarlane noted that the lack of specificity of the symptoms of the different disorders used to describe widespread musculoskeletal pain may be explained by their shared etiology, including alterations of the hypothalamic–pituitary–adrenal (HPA) axis due to stress and neural sensitization. In addition, McFarlane (2007) recommended the overlap with psychiatric disorders and the role of stress in the etiology must be assessed in patients with musculoskeletal pain. In addition, McFarlane recommended the types of event that lead to stress need to be described, particularly the role of traumatic events due to the shared association with

post-traumatic stress disorder. According to McFarlane, fear avoidance is a central behavioral dimension and stress-related perceptual characteristic in these disorders, and successful interventions depend on thorough assessment, implementing well documented evidence-based treatments, and by including psychiatric diagnosis.

To describe the occurrence of kinesiophobia, a prospective descriptive survey study conducted by Lundberg, Larsson, O�̈stlund, and Styf (2006) examined the association between psychological characteristics in patients with musculoskeletal pain, pain-related variables, physical exercise measures, with kinesiophobia. Participants included 140 of 369 (38%) consecutive physical therapy patients with musculoskeletal pain between 18 and 65 years of age, who completed questionnaires that included background data, pain variables, physical exercise measures and psychological characteristics. Lundberg, Larsson, Omatḧstlund, and Styf conducted a simple and a multiple logistic regression model to identify associations among the variables, and kinesiophobia was the dependent variable. They found a high degree of psychological distress and kinesiophobia in approximately 50% of the participants. Simple logistic regression analysis revealed the factors that seemed to be associated with kinesiophobia included: affective distress, depressed mood, disability, life control, pain intensity, pain interference, pain severity, and solicitous response. However, the multiple logistic regression analysis showed nonsignificant associations. Lundberg et al. concluded that because kinesiophobia is a commonly seen factor among patients with musculoskeletal pain, it needs be taken into consideration in physical therapy rehabilitation.

A review of the literature on chronic musculoskeletal pain conducted by McBeth and Jones (2007) investigated the rate of musculoskeletal pain in adolescent and adult populations. They found the data on musculoskeletal pain in adolescent populations was scarce, although available studies indicated that while pain is common, the actual rates are not discernable, probably due to differences in populations and study methodologies. In addition, McBeth and Jones found pain among adult populations to be widely reported, with up to one 50% reporting low back pain, 33% shoulder pain, and almost 20% reporting widespread pain in a 1-month period. The prevalence of pain varies within specific population subgroups, including individual and group factors were all associated with the reporting of musculoskeletal pain. However, the precise nature of these relationships, particularly the mechanisms of association, are not clear and require further research.

A postal survey study conducted by Carnes, Parsons, Ashby, et al. (2007) examined the frequency and health impact of chronic multi-site musculoskeletal pain the UK in a representative sample. Carnes, Parsons, Ashby, et al used 16 general practices in the southeast of England, in a nationally representative urban/rural, ethnic and socioeconomic mix. From this process, 4,049 registered patients, aged 18 or over, were sent a questionnaire. The main outcome measures were chronic pain location, distress, pain intensity and disability as measured by the Chronic Pain Grade scales and the General Health Questionnaire-12. As a result of this recruitment process, 2,445 patients (60%) responded to the survey (44% male, mean age 52 years of age), with 45% having chronic musculoskeletal pain. Of those with chronic pain, 75% had pain in multiple sites.

Using logistic regression analyses, Carnes et al found factors that significantly predicted multiple sites of chronic pain included: (1) psychological distress, (2) high pain intensity, and (3) age under 55. Remarkably, only a third of multi-site pain distributions conformed to the American College of Rheumatology definition of chronic widespread pain. Carnes et al, concluded that multi-site chronic pain is more common than single-site chronic pain and is commonly associated with other problems. They recommended that targeting research and care for chronic musculoskeletal pain on single sites is often inappropriate.

Fibromyalgia and Chronic Generalized Musculoskeletal Pain. An article on chronic generalized musculoskeletal pain and fibromyalgia by Gran (2003) reported that approximately ten percent of the general population report chronic widespread musculoskeletal pain complaints, thereby indicating chronic widespread musculoskeletal pain as a major health problem in the Western world. Gran noted that the literature indicates higher rates of such complaints among women compared with men, however the mechanisms underlying the skewed gender ratio remain unidentified. Gran also pointed out the prevalence of fibromyalgia is reportedly 3–5%, with a significant female predominance. According to Gran, there is a body of evidence suggesting psychological and sociocultural factors are important for contracting such pain syndromes.

The Genetics of Fibromyalgia. An article on the genetics of the fibromyalgia by Ablin and Buskila (2015) reported that fibromyalgia syndrome has a genetic background because it has a familial aggregation. Most studies have targeted genes that play a role in the transmission and processing of pain, and have focused on markers related to neurotransmitter systems, including catecholamines and serotonin. And only recently

have novel target genes been explored. In addition, recently genome-wide sequencing scanning are being studied for chronic pain, including fibromyalgia. Micro RNAs are another novel field of research related to fibromyalgia.

  Neuropathic Pain. A French nationwide postal survey study conducted by Bouhassira, Lanteri-Minet, Attal, Laurent, and Touboul (2008) investigated the prevalence of chronic pain with or without neuropathic characteristics in the general population. The questionnaire evaluated recurrent pain body locations, duration, and intensity, and was mailed to 30,155 individuals. Of these, 24,497 (81.2%) were returned and 23,712 (96.8%) were suitable to be evaluated. Bouhassira, Lanteri-Minet, Attal, Laurent, and Touboul found respondents who reported chronic pain totaled 7,521 with a prevalence of 31.7%, and 4709 said the pain intensity was moderate to severe with a prevalence = 19.9%. Neuropathic characteristics were reported by 1,631 respondents with chronic pain for a prevalence of 6.9%, which was moderate to severe in 1,209 with a prevalence = 5.1%. In addition, they found a higher prevalence was associated with middle age (50–64 years), which included those living in rural areas and the manual professions. Chronic pain with neuropathic characteristics was more frequently located in the lower limbs and its intensity and duration were higher in comparison with individuals without neuropathic characteristics. Their study found a significant proportion of chronic pain patients report neuropathic characteristics as a specific health problem according to its clinical features and a distinctive socio-demographic profile.

  A systematic review of the epidemiological literature on the neuropathic pain conducted by van Hecke, Austin, Khan, Smith, and Torrance (2014) noted that most

patients with neuropathic pain symptoms present and are managed in primary care, with only a minority of patients being referred for pain specialist clinical assessment and diagnoses. Van Hecke, Austin, Khan, Smith, and Torrance conducted the first systematic review of epidemiological studies of neuropathic pain in the general population. They searched electronic databases from January 1966 to December 2012, and included studies where the main focus was on neuropathic pain prevalence and/or incidence, and excluded studies in which data were extracted from pain or other specialist clinics or focusing on specific population subgroups. Van Hecke et al. identified twenty-one articles that underwent quality assessment and data extraction. Studies in which data were extracted from pain or other specialist clinics or focusing on specific population subgroups were excluded. According to Van Hecke et al., the best estimate of population prevalence of pain with neuropathic characteristics is likely to lie between 6.9% and 10%. They recommended a standardized approach for identifying neuropathic pain in future epidemiological studies.

Noninflammatory Musculoskeletal Pain and Socioeconomic Status. A postal survey study conducted by Brekke, Hjortdahlm, and Kvien, (2002) examined the associations between severity of non-inflammatory musculoskeletal pain and residential areas of contrasting socioeconomic status. A questionnaire inquiring about musculoskeletal pain, physical disability, and the extent of use of health services, mental health, and life satisfaction was sent to 10,000 randomly selected adults in Oslo, Norway. In their study, data from respondents living in two socioeconomically contrasting areas of the city was analyzed. Controlling for age, Brekke et al. used multiple regression

analyses. Their analyses found that living in the less affluent area was associated with resilient widespread pain, with low life satisfaction and high levels of mental distress, and physical disability. In addition, their findings indicated living in the less affluent area was associated with low levels of involvement in own health care, and frequent use of analgesics, after adjustment for age, levels of physical disability, mental distress, and pain intensity.

Musculoskeletal Injuries. An article on musculoskeletal pain by Main and de Williams, A. C. (2002) found musculoskeletal symptoms of various types to be a major reason for consultation in primary care. Main and de Williams noted that low back pain has a substantial evidence base for its management. However, they also noted that many of the same principles of management outlined for low back pain are applicable to non-specific musculoskeletal pain.

An article on low back pain by Koes, van Tulder, and Thomas (2006) noted that low back pain is the most commonly treated in primary healthcare settings and represents a major health problem in all developed countries. In addition, Koes, van Tulder, and Thomas pointed out that the diagnostic and therapeutic management of patients with low back pain has long been characterized by considerable variation within and between countries. They reported that only recently a large number of randomized clinical trials have been conducted, with numerous systematic reviews, and clinical guidelines becoming available. Koes et al. noted that with these developments, evidence based management of low back pain has greatly improved.

Age Range as a Covariate Pain-related Factor

The seventh independent variable and predictor in the present study included participants' age. This pain-related biological factor is associated with the *age range* demographic. In the present study, as a predictor variable, participants' *age* will be examined according to their age range within the context of distress episodes during their transitional pain experience.

Age Range as a Pain-related Demographic. In the present study, age range was conceptualized as a possible demographic pain-related factor. Current literature on age range sheds light on the importance of any differences between age range during transitional musculoskeletal pain experience in the extent of influencing and predicting pain-related distress episodes. Summaries on some of the most pertinent up-to-date studies on age range groups are presented next.

The Role of Psychology in Pain Management and Age Range. A literature review article by Eccleston (2001) provides a summary of the literature on the importance of role of psychology in pain management with difference age groups. Eccleston pointed out the importance of effects of emotional and cognitive development upon the experience of pain for children, adolescents, and older adults, all of which remain unresearched. Subsequently, only recently have we began to learn about the effects of cognitive impairment on pain experience at the end of the lifespan. Eccleston recommended greater research attention be directed to these area.

Rate of Musculoskeletal Pain across Age Ranges. A literature review study conducted by McBeth and Jones (2007) investigated the rate of musculoskeletal pain in

adolescent and adult populations, with a focus on three commonly reported pain-related disorders; including fibromyalgia/chronic widespread pain, low back pain and shoulder pain. McBeth and Jones noted that pain is frequently reported among adult populations, with almost 20% reporting widespread pain, 33% shoulder pain, and up to 50% reporting low back pain during a 30 day period. In addition, the prevalence of pain varies within specific population subgroups; i.e., group factors and individual factors are all related with the reporting of musculoskeletal pain; but the exact nature of these relationships, particularly the mechanisms of association, remain unclear and need further investigation.

Age Range Associated with Chronic Pain Intensity, Body Locations, and Duration. A nationwide postal survey study conducted in France by Bouhassira, Lanteri-Minet, Attal, Laurent, and Touboul (2008) investigated chronic pain body locations, duration, and pain intensity. A questionnaire was sent to a representative sample of 30,155 adults to identify neuropathic characteristics. The questionnaires were returned by 24,497 (81.2%), and of these, 23,712 (96.8%) were assessed. Those reporting chronic pain included 7, 522 (31.7%); and 4,709 said the pain intensity was moderate to severe (19.9%). Bouhassira, Lanteri-Minet, Attal, Laurent, and Touboul found higher prevalence of chronic pain with neuropathic characteristics was associated with; (1) manual professions, (2) those living in rural areas, and (3) middle age (50–64 years). Recurrent pain was frequently located in the lower limbs, and its level of intensity and duration were higher in comparison with chronic pain without neuropathic characteristics. According to Bouhassira et al., their findings suggest that a significant proportion of chronic pain patients report neuropathic characteristics; and identified

distinctive clinical features and socio-demographic profile, thereby indicating that chronic pain with neuropathic characteristics is a significant health problem.

Age Range in Distress and Fear-avoidance Beliefs. A comparative study on chronic low back pain conducted by Grotle, Vøllestad, Veierød, and Ivar-Brox (2004) explored distress and fear-avoidance beliefs. The objectives of their study was to compare the level of fear-avoidance beliefs and distress in patients with acute lower back pain to patients with chronic lower back pain, and to evaluate the relationship of fear-avoidance beliefs and distress to disability in both conditions. The acute lower back pain group included 123 patients, and chronic lower back pain group included 233 patients. The main outcome measures were work loss and the Oswestry Disability Index. Grotle, Vøllestad, Veierød, and Ivar-Brox found the scores for distress and fear-avoidance beliefs in patients with acute lower back pain to be significantly lower than patients with chronic lower back pain. The results of their study replicated those in previous studies on the association between distress, disability, fear-avoidance beliefs, and pain experience in chronic lower back pain, and extended the findings to patients in early stages of acute lower back pain.

Age Range Differences in Musculoskeletal Pain. A postal survey study in Norway conducted by Rustøen, Wahl, Hanestad, Lerdal, Paul, and Miaskowski (2005) examined age differences in chronic pain and to evaluate for differences in health-related and demographic factors among younger (18-39 years), middle-aged (40-59 years), and older adults (60-81 years) who reported chronic pain. Questionnaires were sent to 4,000 Norwegian citizens that measured demographic, health-related, mood, pain, quality of life

variables. A total of 1,912 respondents participated in their study, with 19.2% representing the younger age group, 27.5% the middle-aged group, and 31.2% the older group reported chronic pain. Pain of longer duration, more comorbidities, and frequent pain treatment were reported by participants in the older age group. A total of 58.9% of the participants in chronic pain reported having a chronic disease, with the most common being musculoskeletal problems, chronic pain disorder, and osteoarthritis. In addition, they had higher total quality of life scores, were more satisfied with their material comforts and social life, and reported better mood. The middle-aged group reported: (1) the cause of their pain was not known, (2) the largest number of pain locations, (3) having fibromyalgia more frequently, and (4) were less satisfied with their social life than the older age group. Whereas, the younger age group reported the highest rates of injury and accidents as the cause of their pain, yet remarkably, almost 43% of the younger age group was not receiving any treatment of their chronic pain.

Pain and the Severity of Psychological Distress. A survey study conducted in the UK by van der Windt, Croft, and Penninx (2002) examined the relationship between the extent of pain and the severity of psychological distress in neck and upper limb pain, to establish whether the extent of pain is linked with consultation frequency in primary care. Van der Windt et al. recruited respondents from a general health survey conducted in a general practice in North Staffordshire, UK. Those who reported pain in the neck or upper limb area were included. The survey questionnaire included the Hospital Anxiety and Depression Scale (HADS), and primary care consultation data were retrieved for a period of 12 months following the survey. Van der Windt et al. found a total of 867

responders had experienced neck-upper limb pain in the month preceding the survey (33% of all responders). In addition, respondents with more generalized pain within the neck-upper limb area reported significantly higher HADS scores compared to responders with pain in one area only, particularly for depression (median scores 5 vs 3 points). Among respondents with generalized pain, annual consultation frequency was also higher. Remarkably, the relationship between extent of pain and consultation frequency was weak and not statistically significant when the analysis was restricted to consultations specifically related to neck-upper limb pain.

Although scores for anxiety and depression were generally low, with only a small proportion of responders reporting moderate or severe symptoms, their survey revealed a significant relationship between psychological distress and the extent of pain in the neck-upper limb area. They noted that respondents with both depressive symptoms and generalized pain were more likely to consult their family doctor, but not specifically for musculoskeletal pain. According to Van der Windt et al., their findings confirmed the hypothesis that general psychological wellbeing, rather than specific somatic symptoms, predicts the frequency of primary care consultation.

Depression and the Role of Perceived Impact and Control in Age Groups. A study on chronic pain and depression conducted by Turk, Okifuji, and Scharff (1995) investigated the role of perceived impact and perceived control in different age groups. The purposes of their study was wanted to: (1) to extend the cognitive-behavioral model toward the assessment of relationships among cognitive appraisal variables, depressive affect, and pain in the elderly chronic pain population; and (2) replicate the efficacy of a

previous study of the cognitive-behavioral mediation model in explaining the association between depressed affect and pain. Turk, Okifuji, and Scharff recruited 100 chronic pain patients who were divided into two age groups ($\leq$ 69 years and $\geq$ 70 years). Using path analysis, they found that the total sample supported the cognitive-behavioral mediation model of depression in chronic pain, and cognitive appraisal variables mediated the pain-depression relationship. However, in each of the two age groups, correlations among variables revealed different patterns of association. The younger patients demonstrated a low and non-significant correlation between pain severity and depression ($r = 0.01$), which is consistent with the cognitive-behavioral model. Conversely, in the older patients a strong direct association was observed between these variables ($r = 0.51$). Turk et al. concluded that their results indicate that the relationship between pain and depression varies significantly upon age range.

Pain Interference, Location of Pain Sites, and Recent Pain in Older Adults. To determine the association of three aspects of self-reported pain with age in older people, a cross-sectional postal study conducted by Thomas, Peatt, Harris, Wilkie, and Croft (2004) examined the prevalence of: (1) interference with daily life, (3) occurrence of any recent pain, and (3) number and location of pain sites. Thomas, Peatt, Harris, Wilkie, and Croft recruited 11,230 adults aged 50 years and over, who were registered with three general practices (n=11230) in North Staffordshire using mailed questionnaires. Completed questionnaires were received from 7878 respondents with an adjusted response rate incidence of 71.3%). Thomas et al. found pain that interfered with daily activities was reported by 3002 (38.1%) respondents overall. There was a clear age-

related rise in this prevalence with age up to and including the oldest group. Within each regional pain subgroup, the proportion of people who also reported pain interference rose with age. These findings provide evidence that the extent to which pain interferes with everyday life increases incrementally with age up to the oldest age-group in the general population.

Health-related Quality of Life and Satisfaction with Life in Older Adults. A study conducted Şimşek, Şimşek, Yümin, et al. (2010) investigated the relationships between pain, health-related quality of life, and satisfaction with life in older adults above the age of 65 years. Şimşek, Şimşek, Yümin, et al. recruited 163 participants, including 105 males (64.4%) and 58 females (35.6%) with an average age of 73.26 ± 6.58 years. After gathering sociodemographic data, satisfaction with life and level of pain were evaluated using the Visual Analogue Scale, and the Nottingham Health Profile (NHP) was utilized to assess health-related quality of life. Şimşek et al. found eighty-eight (54%) subjects reported pain that mainly originated from lower back, knees, and extremities with an average Visual Analogue Scale score of 5.75 ± 2.18. In addition, there were significant differences between older adults reporting pain and those who did not report pain, particularly in the aspects of satisfaction with life and Nottingham Health Profile; and severity of pain was found to have a negative effect on NHP and social isolation subscale (NHP). Şimşek et al. concluded their study showed the adverse impact of pain on quality of life. They recommended that pain in the older-adult population should be routinely assessed and treated.

Sex Differences in the Pain of Older Adults. A study conducted by Leveille, Zhang, McMullen, Kelly-Hayes, and Felson (2005) investigated sex differences in musculoskeletal pain in older adults. Leveille, Zhang, McMullen, Kelly-Hayes, and Felson recruited 682 women and 380 men aged 72 years and older, who participated in the 22nd biennial exam of the Framingham Study (1992–1993). The participants identified pain locations on regions of the body, and categorized their pain according to number of regions, with the most disseminated pain classified as widespread pain. Leveille et al. found among the men, 52% reported pain in one or more regions, compared to 63% of women. Pain was associated with history of back pain before age 65, fair or poor self-rated health, and disability in both men and women. Widespread pain was more prevalent among women than men (15% versus 5%). In addition, pain was associated with polyarticular radiographic osteoarthritis in men but not women, and factors associated with pain only in women included body-mass index, depressive symptoms, and systolic blood pressure. Leveille et al. concluded that musculoskeletal pain was more prevalent and more widespread in older women than older men, and men and women differed in the factors associated with musculoskeletal pain in older ages. .Leveille et al. recommended further research is needed to understand sex differences in musculoskeletal pain the older population.

Gender as a Covariate Pain-related Factor

The eighth independent variable and predictor in the present study included participants' sex. This pain-related biological factor is associated with the *gender* demographic. In the present study, as a predictor variable, participants' *gender* will be

examined as either male or female within the context of distress episodes during their transitional pain experience.

Gender as a Pain-related Demographics. In the present study, gender was conceptualized as a possible demographic pain-related factor. Current literature on gender sheds light on the importance of any differences between the sexes during the transitional musculoskeletal pain experience in the extent of influencing and predicting pain-related distress episodes. Summaries on some of the most pertinent up-to-date studies on gender difference are presented next.

Role of Psychology in Sex Difference and Pain Management. A literature review study conducted by Eccleston (2001) summarized the literature on the importance of the role of psychology in pain management in dealing with gender differences. Citing a review by Unruh (1996), Eccleston noted that women report more severe levels of pain, longer duration of pain, and more frequent pain than men. In addition, women are more likely to experience recurrent pain, have moderate and severe pain from menstruation and childbirth and may beat increased risk of disability arising from pain (Unruh, 1996). Despite the fact that women report more pain than men, women are more vulnerable to pain being explained as a purely psychological phenomenon, and at greater risk of being labelled as having a psychogenic disorder.

Sex Differences in Psychological Factors and Pain-related Disability. A study conducted by Stubbs, Krebs, Bair, Damush, Wu, Sutherland, and Kroenke (2010) evaluated sex differences in pain-related disability and the extent they may account for psychological factors. Stubbs et al. recruited 249 female and 241 male primary care

patients with moderately severe persistent pain of the back, hip, or knee. Stubbs et al. used multivariable log-linear models to determine the association between sex and pain-related disability, and the extent that sex differences persisted after adjustment for potential psychological mediators and psychiatric comorbidity. They found that sex differences in pain disability pain interference with function remained significant in multivariable models. In addition, they found that women reported worse pain intensity, greater pain-related interference with function, and more disability days due to pain compared with men, and also had worse anxiety, depression, and self-efficacy. However, depression, fear of re-injury, and poor self-efficacy were independently associated with disability in both men and women. Stubbs et al concluded women report greater pain-related disability than do men, even after controlling for depression, anxiety, and other psychological factors. They recommended that pain management strategies targeting functional disability may be a particularly important tactic in the treatment of pain in women.

A literature review study conducted by Rollman and Lautenbacher (2001) examined the extent of sex differences in the presentation of musculoskeletal pain, and what might account for the dissimilarities. Rollman and Lautenbacher noted that clinical, epidemiologic, and experimental evidence indicate adult women have musculoskeletal problems more often than do men. In addition, discrepant findings suggest the presence of such differences during childhood and adolescence, and biologic and psychosocial factors may account for these discrepancies. Rollman and Lautenbacher reviewed the evidence indicating that mechanically induced pressure is more likely to show sex

differences than other noxious stimuli, in studies between individuals suffering from musculoskeletal pain and matched controls. The authors suggest that a state of increased pain sensitivity, with a peripheral or central origin, predisposes individuals to chronic muscle pain conditions, and that there are sex differences in the operation of these mechanisms, subsequently, are vulnerable to pain musculoskeletal condition.

Higher Prevalence of Musculoskeletal Pain in Women. A literature review study on sex differences in pain management conducted by LeResche (2011) found that higher pain prevalence in women is consistently observed, however, it is not well understood. In addition, it is not yet clear how the contributions of sex differences in pain mechanisms and gender differences in psychosocial factors explain the differences in prevalence. LeResche suggests that gender disparities in the healthcare utilization for pain may be partially explained by the experience of higher-intensity pain in women. Pain intensity seems to be a major factor influencing treatment, particularly the prescription of medications. Gender appears to influence diagnostic and treatment decisions for more persistent pain problems.

A postal survey study conducted in The Netherlands by Wijnhoven, de Vet, and Picavet (2006) investigated the extent that prevalence of chronic musculoskeletal pain is due to sex differences in the distribution of known risk factors and/or to the importance of risk factors. In their study, they examined two models: (1) an exposure model, and (2) a vulnerability model. The *exposure model* included sex differences in the distribution of known potential risk factors, and the *vulnerability model* included the importance of risk factors. The mechanisms of these types of sex differences are poorly understood.

Wijnhoven, de Vet, and Picavet recruited 1178 women and 909 men aged 25–65 who were evaluated for ten anatomical locations; including the neck, shoulder, higher back, elbow, wrist/hand, lower back, hip, knee, ankle, and foot. Wijnhoven et al. found that sex differences in chronic musculoskeletal pain was not explained by the distribution of age, educational level, overweight, physical activity, pain catastrophizing and smoking status. They noted that chronic musculoskeletal pain was associated with unemployment and having no paid job was associated with CMP, and explained part of the sex differences, but the role of unemployment was complex. Among women, risk factors with a sex-specific association included overweight (all pain locations) and older age (lower extremities), while among men, pain catastrophizing (upper extremities) was stronger associated with chronic musculoskeletal pain. Wijnhoven et al. concluded that sex differences in prevalence of chronic musculoskeletal pain may partly be explained by sex differences in vulnerability to risk factors. They recommended that future research investigate the sex-specific identification of risk factors, which may lead to sex-specific prevention and management of chronic musculoskeletal pain.

In another Dutch postal survey study conducted by Wijnhoven, de Vet, and Picavet (2007) examined sex differences in consequences of musculoskeletal pain, including disability, healthcare use, limited functioning, and work leave. Wijnhoven, de Vet, and Picavet used the data of a population-based study, limited to 2,517 adults 25 to 64 years of age, which was collected by a postal questionnaire. Wijnhoven et al. found that men with musculoskeletal pain reported more work disability due to low back pain, irrespective of work status; while women with musculoskeletal pain reported more

healthcare use. In addition, none of the sex differences were explained by age, educational level, smoking status, household composition, overweight, pain catastrophizing, and physical activity. Older age was related to more restricted functioning due to pain (women), work disability (men), and healthcare use (men and women). Remarkably, living in a one-person household was associated with use of medicines (men) and work disability (women). Low educational level was associated with contact with a medical caregiver (men), limited functioning (men), work disability (men and women), and work leave (men). Pain catastrophizing was associated with healthcare use, limited functioning, and work leave (men and women), and work disability (men). Physical inactivity was associated with limited functioning in women. And smoking was associated with healthcare use (women), limited functioning (men), and work leave (women).

Sex Differences in Musculoskeletal Pain in Older Adults. A study conducted by Leveille, Zhang, McMullen, Kelly-Hayes, and Felson (2005) found that men and women differed in the factors associated with musculoskeletal pain in older ages. Leveille et al. recruited 380 men and 682 women 72 years and older who participated in the 22nd biennial exam of the Framingham Study (1992–1993). Participants were asked to identify pain locations on all regions of the body, and pain was categorized according to number of regions, with the most disseminated pain classified as widespread pain. Their findings indicated that 63% of women reported pain in one or more regions, compared to 52% of men. Thus, widespread pain was more prevalent among women (15%) than men (5%). In addition, pain was associated with disability and fair or poor self-reported

health history of back pain before age 65 in both men and women. Factors associated with pain only in women included body mass index, depressive symptoms, and systolic blood pressure; whereas in men, pain was associated with polyarticular radiographic osteoarthritis. Their finding suggest that men and women differed in the factors associated with musculoskeletal pain in older ages, musculoskeletal pain was more prevalent and more widespread in older women than older men. Leveille et al. recommended that further research is required to understand sex differences in musculoskeletal pain in the older population.

Gender Differences in Coping with Musculoskeletal Pain. A cross sectional study conducted by Grossi, Soares, and Lundberg (2000) examined gender differences in coping with musculoskeletal pain. Grossi, Soares, and Lundberg recruited 446 Swedish patients (mean age 46 years, 72% women) seeking care for their ailments, who responded to the Coping Strategies Questionnaire. They found women reported more disability compared to male patients, with higher scores for the Coping Strategies Questionnaire indexes: catastrophizing, diverting attention, hoping/praying, increased behavioral activity, and pain behaviors; in addition with higher levels of posttraumatic stress reactions, larger consumption of analgesics, lower self-esteem, and more work strain. Using multivariate analyses, Grossi et al. found that most gender differences in coping were ruled out, except for catastrophizing and posttraumatic stress reactions among women, and the number of previous treatments for pain, while there were no associations found among men.

A descriptive study conducted in Sweden by Jensen, Nygren, Gamberale, Goldie, and Westerholm (1994) investigated the role of gender in coping with long-term intractable pain of the back, neck, and shoulder. Jensen, Nygren, Gamberale, Goldie, and Westerholm recruited 71 women and 50 men (121 patients) to determine the consequences of pain. Jensen et al. used the Coping Strategy Questionnaire (CSQ) and the Multidimensional Pain Inventory (MPI) to assess the dependent variables. Jensen et al. found that the coping strategies used by women were the same as those in previous research that had been found to be related with dysfunction and poor outcome in terms of rehabilitation. In addition, a more complex pattern of related factors was found in women rather than men when considering the consequences of pain on daily living. Remarkably, given the high proportion of working women in Sweden with long-term musculoskeletal pain, the benefits of cognitive behaviorally based treatments were observed to be confined to women. Jensen et al. concluded that the findings in their study indicate the need to tailor rehabilitative strategies differently for men and women. They recommended the development of a research agenda that pays greater attention to the challenges faced by women in the workplace when they are affected by chronic ailments.

Self-reported Headaches and Musculoskeletal Pain. A cross sectional survey study conducted in Sweden by Bingefors and Isacson (2012) investigated self‐reported headache and musculoskeletal pain from a gender perspective. Bingefors and Isacson recruited 5,404 participants aged 20–64 years, of which 4506 (response rate = 68%) were included in their data analyses. They found major gender differences; in particular, back

pain (22.7%) and shoulder pain (21.0%) were the most commonly reported medical problems, in the population, with pain in arms/legs (15.7%) in fifth and headache (12.5%) in eight place. Remarkably, women, reported more severe pain, and the prevalence of pain conditions, especially headache, was also higher among women. In addition, women reported higher psychiatric and somatic problems and co☐morbidity between pain conditions. Factors associated with pain conditions were unevenly distributed between genders. Health☐related quality of life differed by gender and type of pain condition; psychological dimensions were more affected among women, and physical dimensions of health-related quality of life were more affected by headache among men. There were gender differences among both men and women in pain conditions related with life☐style factors and poorer socioeconomic conditions. Being married, half☐time work, and economic difficulties were associated with pain among women, while education level and unemployment status were important only among men. Generally, Bingefors and Isacson found that pain conditions were associated with early disability retirement, long time sick☐leave, lack of exercise, and obesity in both sexes.

Summary on Other Pain-related Factors associated with Distress

During the course of early pain experience, a number of pain-related stressors may emerge that add to, fuel, and exacerbate the stress-reactivity and the pain-related psychological distress associated with persistent recurrent subacute musculoskeletal pain. It is important to recognize transitional pain experience as a personal crisis that some people weather better than others, while other people may struggle. Three stressors are

believed to influence the severity of early pain-related psychological distress symptoms have been identified, including severity of pain intensity, pain interference, and general musculoskeletal diagnosis. Currently, it is not clear which of these three emergent issues during transitional pain experience is more influential and which may serve as the best predictors of pain-related psychological distress.

In addition, although demographics inform us about the likelihood of pain-related distress, the extent that they influence and predict pain-related distress episodes remains unknown. It is also important to recognize and understand that pain-related distresses during the transitional early pain experience may have multiple causes other than pain intensity, pain interference, and general musculoskeletal diagnosis; and may include psychosocial issues that emerge during the course of pain experience. Subsequently, multiple stressors may add to the person's stress associated with their early pain experience and increase the severity of their distress and suffering.

In the present study, in addition with the three psychosocial issues examined as predictors of pain-related distress, five other potential confounding pain-related factors are considered, including three biopsychological covariates and two demographics.

Recent Impetus for Social Change in Pain Healthcare

Mental health and healthcare organizations are shaping the call for a cultural transformation in how pain is assessed and treated in the United States, with an emphasis on prevention (Institute of Medicine, 2011). According to two presidential reports by the American Psychological Association (Bennett-Johnson, 2012a, 2012b), there is a unique

opportunity for psychologists to assist in the translation of research findings into our nation's health care system.

Allied interdisciplinary medical and psychological research on pain, pain pathogenesis, and pain management has grown considerably over the past several decades (Drexler, 2008; Institute of Medicine, 2001, 2011; Mayday Fund, 2009). This collaboration is largely the result of nation-wide commitment to investing in basic and applied scientific research (Drexler, 2008), and the supportive sponsorship of health initiatives (White House, 2000, 2002).

Subsequent scientific advances in interdisciplinary pain science over the past three decades has broaden evidence-based knowledge and basic understanding on pain. These developments have prompted greater recognition of the necessity to intervene earlier in pain-related distress, suffering, and psychosocial difficulties associated with acute and chronic pain than previously thought (Drexler, 2008; Institute of Medicine, 2001, 2011; Mayday Fund, 2009). However, despite the recognition of chronic pain as a degenerative neurological disease and as a syndrome that can be confounded by psychosocial influences and pain-related psychological distress, the translation of this knowledge into healthcare systems remains a formidable challenge. Even a cursory review of the clinical research literature reveals many supportive reports attesting to this encumbrance.

Chronic pain is recognized as a legitimate degenerative neurological disease (Burden of Musculoskeletal Diseases in the United States, 2013-2016; European Federation of IASP Chapters / International Association for the Study of Pain, 2001;

International Association for the Study of Pain / European Federation of IASP Chapters, 2002; World Health Organization, 2003, 2005). Chronic pain is a degenerative neurological syndrome that is exacerbated by psychosocial influences and pain-related psychological distress (Biglan, Flay, Embry, & Sandler, 2012; Van Wilgen & Keizer, 2012). Translation of this knowledge into healthcare systems remains an obstacle for better pain health care (Harris et al., 2008; Hurley, 2007; Zhang et al., 2008).

Healthcare reform proponents and legislation promote greater research attention be directed towards primary care and emergency care settings on integrated collaborative care and the medical home center model (American Psychological Association, Bennett-Johnson, 2012a, 2012b; Institute of Medicine, 2011; Mayday Fund, 2009; United States House of Representatives, H. R. 3962: Affordable Health Care for Americans Act, 2009; Upshur, Luckmann, & Savageau, 2006). A recent report by the Mayday Fund (MF, 2009) called for revolutionary reform in chronic pain healthcare in the United States. A report by the Institute of Medicine (IOM, 2011), now the American Academy of Medicine, went further and advocated a cultural transformation by increasing the accessibility and quality of pain care, and thereby providing relief to many more people who need it. The IOM report also encouraged psychologists to take a more active role in pain care, education, prevention, and research. Reports from the American Psychological Association (APA) advocated expanding psychologists' role not only in promoting public health, but for greater participation and leadership in the development of integrated care in healthcare reform (APA, Government Relations Staff, 2009a, 2009b; Bennett-Johnson, 2012a, 2012b).

Therefore, an improved understanding of the nature of the psychosocial antecedents to pain-related distress, the extent of their influence, and their confounding effects may serve the public and the healthcare system well in preventing chronic pain and minimizing its disability. Such an understanding may serve in assuaging pain related distress and suffering, especially within the context of primary care and emergency care department settings.

Comments on the Metatheoretical Framework and Key Concepts

The current research study attempted to provide greater clarity within the contextual factors associated with the current psychosocial concept, which has been characterized to be vague and meaningless (Nicholas, Linton, Watson, & Main, 2011; citing Blyth, Macfarlane, & Nicholas, 2007). The biopsychosocial / biopsychoecological paradigms and diathesis-stress process heuristic provide a metatheoretical framework for the linkage between social environments and pain-related psychological distress symptoms in early pain experience (Nicholas et al., 2011; O'Donnell et al. 2013; Stineman & Streim, 2010).

Findings generated from this metaframework indicates that the early pain experience should be viewed as a potential personal crisis that not only involves pain, but individual psychological distress responses to emergent issues within the context of their intimate relationships in their social environments (Cano, 2004; Cano & Leong, 2012; Cano, Miller, & Loree, 2009; Eisenberger, Lieberman, & Williams, 2003; Lackner & Gurtman, 2004; Zhou, Vohs, & Baumeister, 2009). Pain-related psychological distress needs to be viewed as a process that involves fluctuations and change across time (Leijon

& Mulder, 2009; Merlijn et al., 2006). Psychosocial stressors or trigger events must be recognized as including an array of different events and multiple causes (Copeland, Keeler, Angold, & Costello, 2007; Zhuo, 2008).

The influence of early psychosocial factors on pain-related psychological distress is coming into greater focus, especially by clinical, counseling and health psychologists (Dersh, Polatin, & Gatchel, 2002; Keefe, Lumley, Anderson, Lynch, & Carson, 2001; White & Farrell, 2006). The influences from patients' intimate and extended social environments, including pain healthcare settings themselves, and our healthcare system as a whole is beginning to come into focus (McBeth et al., 2007; Turk & Gatchel, 2013). The yellow flag protocol for psychosocial risks recommends a focus on psychological risk factors, however the contextual risks within the individual's physical and social environments must not be ignored (Main & Burton, 2000; Nicholas, Linton, Watson, & Main, 2011).

In the past, the reductionistic approach to pain that consolidates symptoms into either anxiety or depression often results in the choice of a linkage with exclusive prescribed pharmacological intervention, while ignoring psychological interventions (Kaiser, Mooreville, & Kannan, 2015; Lindau, Laumann, Levinson, & Waite, 2003). As Lindau et al. noted, this often results in concomitant poor treatment and prognostic outcomes, as well as diminished quality of life for people with pain-related issues. Kaiser, Mooreville, & Kannan noted patients share particular types of experiences across pain conditions. According to Kaiser et al., pharmacological interventions are now increasingly linked with psychological interventions. In addition, Kaiser et al. (citing

Ehde, Dillworth, & Turner 2014; and Kaiser, 2013) noted successful pain management incorporates the contextual aspects involving distress with the psychosocial issues contributing to symptoms, and engages patients in goal setting for treatment outcomes.

The complexities of the context of emergent psychosocial issues and pain-related distress present a number of conceptual issues. Distress in early pain experience can be conceptualized as biopsychosocial determinants converging psychosocially within a diathesis-stress process framework involving the activation of individualized vulnerabilities by environmental triggers (Dersh, Polatin, & Gatchel, 2002; Linton & Shaw, 2011; Turk, 2002). These conceptual components of the study's theoretical foundation are applicable to increased understanding of the distress associated with early pain experience.

Discussion on the Use of Quantitative Analytic Methods in a Survey

The purpose of the research is to explore and describe the types of psychosocial issues associated with pain-related psychological distress symptoms within the context of early pain experience. Psychosocial factors associated with psychological distress at 30 days following the onset of painful health conditions or injury remains the most reliable predictor of pain chronicity and disability at 12 months (Rice et al., 2016). Early psychological interventions continue to be overlooked in primary care referrals (Foster, Hartvigsen, & Croft, 2012; Institute of Medicine, 2011; Molina et al., 2012; Roditi & Robinson, 2011). However, becoming better acquainted with each patients' psychosocial issues will serve as a time-saving protocol and as a foundation for effective case management (Carlson & Carlson, 2011).

Study's Research Inquiry and Hierarchical Multiple Regression

The present multivariate survey study utilized hierarchical multiple regression (HMR) analysis to guide the inquiry. In HMR, the first research question technically seeks to determine whether any or all of the predictor variables in the set under scrutiny have influential relationships with the outcome variable(s), while controlling the potential confounding influences of a second set of predictors (Aron & Aron, 1999; Cohen, 2001; Mertler & Vannatta, 2010; Petrocelli, 2003). The first research question asks whether the severity of episodes in pain-related distress symptoms (i.e., anxiety and depressed mood) is influenced by perceived rejection, quality of life, and satisfaction with life, while controlling the influences of pain intensity, pain interference in activity level, and subjective well-being, and two demographics (age and gender). The second research question inquires which of the three psychosocial trigger events reliably predicts the severity of episodes in pain-related psychological distress symptoms from the regression equation.

These HMR-guided research questions also help direct the development of research hypotheses in such a manner whereby they can then be tested. In the proposed study, the hypotheses are tested to determine whether or not perceived rejection, quality of life, and satisfaction with life are in fact reliable predictors of early pain-related distress, and which of these psychosocial trigger events, if any, serves as the most reliable predictor of severe distress. In this way, the study's research questions are answered.

Summary on the Study's Quantitative Analytic Methods

To summarize here, the descriptive exploratory survey research design using multivariate quantitative analyses, such as hierarchical multiple regression analysis, as utilized in the present study allowed for the examination of psychosocial factors within the context of early pain experience. This quantitative analytic method approach allowed the survey's research questions and hypotheses to be tested and answered. In the future, qualitative research approaches may shed additional light upon the key concepts comprising the study, and contribute towards our budding knowledge base on specific psychosocial influences in early pain experience. The study's research methods are presented in greater detail in the next chapter.

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Summary of the Literature Review

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From the review of the literature, psychological distress is a reliable predictor of pain-related chronicity and disability (Dworkin et al., 2005; Kent & Keating, 2008; Rice et al., 2016; Turk et al., 2008; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008). Furthermore, a number of studies investigating the extent of the influence of pain severity on pain-related distress found no direct relationship between pain intensity / severity and pain-related distress, and indicated psychosocial factors to be much more influential in contributing to patient distress (Blyth, Macfarlane, & Nicholas, 2007; Ene, Nordberg, Johansson, & Sjöström, 2006, Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008). Blyth et al. noted in their review of the literature that few so-called psychosocial oriented interventions have addressed the social or physical environmental

domains. According to Blyth et al., understanding how domains may operate between the behavioral, psychological, and social dimensions has been neglected.

Meta-analyses and studies in treatment outcome research have suggested that attenuated depression and anxiety may not be the best set of symptoms to target as yellow flags for early prevention in pain pathogenesis (Edwards et al., 2007; Osborn, Demoncada, & Feurerstein, 2006; Woo, 2010). While serving as reliable predictors of pain chronicity and disability, anxiety and depression also are usually comorbid with pain problems, thereby suggesting 'preventive' interventions based on their recognition as yellow flags may be too little too late (Aronoff & Feldman, 2000; Gatchel, 2004; Linton & Boersma, 2003). Genuine prevention may entail looking towards the precursors of pain-related depression and anxiety, and promptly acting upon them rather than on the depressive and anxiety symptoms themselves.

Chapter 3: Research Method

Introduction to the Survey Study' Methods

The study was called the Musculoskeletal Pain Experience Study (MPES), and it included 2 quantitative exploratory descriptive cross-sectional online surveys. With the MPES, I examined the role of three psychosocial pain-related issues, as independent variables (IVs) and predictor variables (PVs), within the context of correlational and predictive relationships with episodes of core anxiety and depressed mood distress symptoms during the first four months of transitional (i.e., acute, subacute, and early chronic) musculoskeletal pain experience. The extent or frequency of episodes of recent severity in core anxiety and depression symptoms were the dependent variables (DVs), outcome variables (OVs), and criterion variables (CVs) respectfully.

The Musculoskeletal Pain Experience Study (MPES) was comprised of two separate online surveys investigating the extent that three psychosocial issues influence and predict the frequency of pain-related distress episodes: anxiety and depressed mood episodes. The survey on anxiety episodes was called the Musculoskeletal Pain Distress Survey (MPDS), and the survey on depression episodes was called the Musculoskeletal Pain-related Depressed Mood Survey (MPDMS). Both surveys were designed to investigate the problem outlined above and the concomitant factors related to it. The surveys comprising the study were conducted over the Internet through an online host, Survey Monkey's Audience platform and a partner panel, Cint.

In addition to the online host's recruitment page, both surveys were comprised of three components, including (a) an Introduction page, (b) a Distress & Pain Profile, and

(c) the Pain Experience Profile. The introduction page included a text box with a copy of the informed consent statement, and a survey item that included the consent agreement statement. The Distress & Pain Profile was composed of a targeting and screening page with three items that include four disqualification response options. This page included a couple eligibility confirmation items, a pain-related distress issues profile, and a 3-item pain intensity scale. The second page comprising the Distress & Pain Profile included an item addressing the type of musculoskeletal pain (injury or condition), either a 4-item anxiety or depressed mood scale contingent upon the survey's targeted outcome variable, and a 4-item scale on the level of pain interference. The Pain Experience Profile included scales covering the pain-related psychosocial issues, including perceived rejection, current satisfaction with life, and quality of life in daily activity level. Two demographic data items covering survey respondents' age range and gender were collected by the online host and shared with the primary researcher.

The collected online data were composed of the scores generated from two demographics, three screening items, one pain type item, and six scales (i.e., episodes of anxiety/depression, pain intensity, pain interference, perceived rejection, satisfaction with life, and quality of life in daily activities level). Three scales were located in the Distress & Pain Profile (DPP), and three scales comprised the Pain Experience Profile (PEP). Both of these data collection edifices, i.e., the DPP and PEP, comprising the Musculoskeletal Pain Distress Survey (MPDS) and the Musculoskeletal Pain-related Depressed Mood Survey (MPDMS), were computerized. In addition to preliminary

analyses, descriptive statistical, bivariate, and a simple linear regression analyses, I utilized a hierarchical multiple regression analysis to evaluate the data.

In the study, I used a set of short-form scales to address the frequency of anxiety or depressed mood episodes, pain intensity, and pain interference within a 7 day period during the first four months of the transitional musculoskeletal pain period. These measures included some of the scales derived from the Patient Reported Outcome Measurements Information System (PROMIS) Pain Behavior Scale (PBS). I assembled these scales especially for the study using the online research resources available from the National Institute of Health's (NIH) Patient Reported Outcome Measurements Information System. Items comprising the PROMIS resources initiative, and the PROMIS-PBS specifically, were previously authenticated as reliable and valid by several studies (Carle, Riley, Hays, & Cella, 2015; Cella et al., 2010; Cella et al., 2007; Revicki et al., 2009).

In addition, I employed three other standardized scales. These included the Perceived Rejection Scale (PRS; 2012) developed by researchers associated with the National Institute of Health's Tool Box initiative. The other measures included the Satisfaction with Life Scale (SWLS. Diener, Emmons, Larsen, & Griffin, 1985) and the American Chronic pain Association's Quality of Life Scale (QOLS; Cowan & Kelly, 2003).

In this chapter, I present a brief overview on the problem that the survey study addressed, and identify the gaps in the clinical literature. Next, I will present the purpose of the survey, and the theoretical foundations that informed and guided the study. Then I

will delineate the study's research questions and hypotheses. Next, I will present the research design and approach, data collection and statistical analyses protocols; specifically, I describe and explain the hierarchical multiple regression (HMR) analysis research methods used in my study. After that, I will describe the study's instrumentation and methods, and procedural implementation methods. Finally, I outline and summarize the ethical protocols for the protection of human research participants, and the planned and possible dissemination of findings.

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Problem Statement

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During the course of transitional acute, subacute, and early chronic pain experience, certain psychosocial issues may begin to emerge that exacerbate the frequency of episodes and level of severity in distress symptoms associated with musculoskeletal pain (Costa et al., 2012; Gatchel & Schultz, 2014b; Keefe, 2012). In this study, I have conceptualized these pain-related issues as psychosocial trigger events that fuel distress episodes, including anxiety and depressed mood. Three of the psychosocial trigger events include the following pain-related issues.

A Focus on Three Psychosocial Trigger Events

One trigger event involves the individual's perceived rejection within their social environments resulting from the constraints placed by others upon their pain disclosures and the extent of the social support they receive from others (Cano & Williams, 2010; Craig, 2009; Rime, 2009). Another stressor involves the person's quality of life in their daily functioning and activity level (Cowan & Kelly, 2003). A third psychosocial issue involves the difficulties the individual encounters that are associated with their sense of

subjective wellbeing and their current level of satisfaction with life (Diener, Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993; Vassar, 2008). Issues involving perceived rejection, quality of life, and satisfaction with life are thought to exacerbate the frequency of episodes of pain-related distress symptoms during early pain experience, including the frequency of anxiety and/or depressed mood episodes. This observation is based on an extensive review of the literature, my own personal chronic pain experiences, and the pain experiences shared by other individuals participating in a chronic pain support group that I co-facilitate, of which was not a part of the study. The study tested the basic assumptions underlying this line of thinking.

Purpose of the Study

The purpose of the study was to explore the extent to which three psychosocial issues and episodes of a pain-related distress symptoms (either anxiety or depressed mood) are evident during the first 16 weeks following musculoskeletal pain onset, and to describe these interrelationships statistically. Beyond this objective, another purpose of the study was to determine whether perceived rejection, quality of life in daily functioning, and satisfaction with life have predictive relationships with the frequency of episodes of anxiety or depressed mood symptoms during transitional musculoskeletal pain experience. In addition, this study assessed the extent that perceived rejection, quality of life in daily functioning, and satisfaction with life are associated with one another and with five covariate factors. The five covariates included age range, gender, pain intensity, pain interference, and general type of musculoskeletal pain diagnosis.

Theoretical Foundations

The biopsychoecological (BPE) paradigm and diathesis-stress process (DSP) heuristic serve as a comprehensive integrative metatheoretical foundation to explain pain, distress, chronic pain, and debilitation pathogenesis. The central assumption generated from this metatheoretical structure purports that psychological distress during transitional pain experience is a major contributing psychosocial risk factor that promotes and predicts later chronicity and disability outcomes. This assumption is evident in a robust body of supportive research literature (Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Kent & Keating, 2005, 2008; Pincus, Burton, Vogel, & Field, 2002; Vargas-Prada & Coggon, 2015). The BPE / DSP metastructure also provides a means to generate hypotheses that examine the extent of influence that three psychosocial issues have on pain-related distress.

Research Questions and Hypotheses

In the survey study, I addressed two research questions. First, are the three psychosocial trigger events (i.e., perceived rejection, quality of life, and satisfaction with life) influential stressors for levels of severity and frequency of episodes of anxiety and/or depressed mood symptoms during transitional pain experience following the onset of pain during the first 4 months? Secondly, which psychosocial trigger event(s) serve as the most reliable predictor(s) of the frequency of anxiety / depressed mood symptom episodes? I used a multivariate quantitative approach to answer these two research questions. The following is a detailed description of the study's research questions and hypotheses.

First Research Question and Hypotheses

In the first research question, I sought to determine whether the frequency of episodes in pain-related anxiety and depressed mood symptoms are associated with and change in relation to the three psychosocial trigger events, while controlling for five potential confounding predictor variables. The first research question (RQ1) for both surveys and the three sets of null (H_O) and research hypotheses (H_I) that address the first research question were stated as follows:

RQ1: What is the relationship between the scores indicating high perceived rejection, low quality of life in daily functioning, and low satisfaction with life and the scores on the frequency of episodes of pain-related distress symptoms (i.e., either anxiety or depressed mood), after controlling for age, gender, and scores for pain intensity, pain interference, and general type of musculoskeletal diagnosis (injury or condition)?

H_O1_1: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_I1_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_O1_2: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after

controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_I1_2: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_O2_1: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_I2_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and type of musculoskeletal pain.

H_O2_2: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_I2_2: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_O$3$_1$: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_I$3$_1$: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_O$3$_2$: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H$_I$3$_2$: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

Second Research Question and Hypotheses

In the second research question, I sought to determine which of the three psychosocial predictor variables best predicted the frequency of the criterion variable (either anxiety or depressed mood episodes) from the regression equation. In each survey, there were a set of three hypotheses that address the second research question. The second research question (RQ2) for both surveys and the three sets of null (H$_O$) and

research hypotheses (H_I) that address the second research question were succinctly stated as follows:

RQ2: Does the regression equation resulting from a subset of scores on perceived rejection, quality of life in daily functioning, and satisfaction with life significantly predict the level of frequency of episodes of distress symptoms (either anxiety or depressed mood), after controlling for the influences of age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis (injury or condition)?

H_O4_1: The regression equation for scores on perceived rejection does not reliably predict the frequency of anxiety episodes.

H_I4_1: The regression equation for scores on perceived rejection does reliably predict the frequency of anxiety episodes.

H_O4_2: The regression equation for scores on perceived rejection does not reliably predict the frequency of depressed mood episodes.

H_I4_2: The regression equation for scores on perceived rejection does reliably predict the frequency of depressed mood episodes.

H_O5_1: The regression equation for scores on quality of life does not reliably predict the frequency of anxiety episodes.

H_I5_1: The regression equation for scores on quality of life does reliably predict the frequency of anxiety episodes.

H_O5_2: The regression equation for scores on quality of life does not reliably predict the frequency of depressed mood episodes.

H₁5₂: The regression equation for scores on quality of life does reliably predict the frequency of depressed mood episodes.

H₀6₁: The regression equation for scores on satisfaction with life does not reliably predict the frequency of anxiety episodes.

H₁6₁: The regression equation for scores on satisfaction with life does reliably predict the frequency of anxiety episodes.

H₀6₂: The regression equation for scores on satisfaction with life does not reliably predict the frequency of depressed mood episodes.

H₁6₂: The regression equation for scores on satisfaction with life does reliably predict the frequency of depressed mood episodes.

Research Design and Approach

The online survey study was a within-subjects exploratory descriptive cross-sectional online survey. In the study, I used a quantitative approach that collected data online using a customized battery of short-form self-reported scales, and then analyzed these data using multivariate statistics. In addition to prescreening and descriptive statistical analyses, bivariate, and simple linear regression analyses, hierarchical multiple regression (HMR) analyses were conducted on the criterion variables (CVs) and predictor variables (PVs) to determine correlations and predictive relationships within the first 4 months following the respondents' musculoskeletal pain onset. I used multivariate analyses to confirm the extent three psychosocial issues and two pain-related distress symptoms were evident and have interrelationships during the transitional pain experience. In addition, I used these analyses to determine whether perceived rejection,

quality of life, and satisfaction with life are reliable predictors of the frequency of pain-related distress symptoms episodes. A detailed discussion on the online data collection procedures and statistical analysis methods are addressed elsewhere in this chapter.

Research Settings

I conducted the Musculoskeletal Pain Distress Survey and the Musculoskeletal Pain-related Depressed Mood Survey nationwide in the United States with the assistance of an online host, Cint, a partner panel affiliated within Survey Monkey's Audience platform. Respondents were recruited online by the online hosts. Respondents could access the survey online using desktop computers, laptop computers, tablets, and cell phones.

Sampling Considerations

I over-sampled the study primarily because of the likelihood of incomplete survey responses and abandoned surveys. An online calculator (i.e., DanielSoper.Com, 2016) indicated that a minimum sample of 94 was required. However, when taking sets of planned post-hoc comparisons and bivariate analyses into consideration, a sample size of approximately 110 participants was determined to be sufficient for the proposed project. A-priori power calculation for this sample size indicated a median effect size = 0.15, desired power level = 0.8, and probability level = 0.05 was sufficient. These parameters accommodated 8 predictor variables (i.e., 3 psychosocial PVs in Set A and 5 covariates PVs in Set B) in a hierarchical multiple regression analysis, with an unknown regression constant or intercept.

Respondent Recruitment Procedures and Protocols

Recruitment of respondents for both surveys in the Musculoskeletal Pain Experience Study was handled by Cint, a partner panel of Survey Monkey Audience. The Cint website is a data sampling and collection management research platform that is Health Insurance Portability and Accountability Act (HIPAA) compliant and consistent with all regulatory requirements for patient and employee sensitive data acquisition and storing. Invitations for both surveys' website was publicized through Cint, in an e-mail cover letter sent to regional family practice, primary care, and urgent care health care centers, and to nation-wide healthcare professional organizations.

Description of Participants

Survey respondents were female and male patients 18 years of age and older with persistent recurrent acute, subacute, and early chronic pain lasting no more than 4 months following the onset of their musculoskeletal pain. Respondents were required to speak, read, and write English. Respondents were required to have experienced: (a) any one or all of the pain-related psychosocial issues, (b) an episode or episodes of distress (anxiety or depressed mood symptoms) sometime, often, or always during the past 7 days, and (c) an episode or episodes of moderate-to-extremely severe pain intensity during the past 7 days.

Data Collection and Statistical Analyses Protocols

I describe the methods for the web survey study's data collection and analysis here. The specific instrumentation used in the study's data collection will be described in a separate section later. An overview on data collection methods and procedures follows.

Method of Data Collection in the Proposed Study

I collected data electronically using the following methods. Respondents for both surveys comprising the Musculoskeletal Pain Experience Study were directed to the survey's Introduction Page where they were instructed to read the survey instructions, read, save and /or print a copy of the informed consent statement, and read and respond to the consent agreement statement. Respondents who indicated they agreed to participate in the survey were directed to the first page of the Distress & Pain Profile for eligibility screening, which included a confirmation item, and items addressing the psychosocial issues they experienced, the severity and frequency of their distress episodes levels, and their pain intensity levels. Some of these items included disqualification response options. Respondents who failed to meet the surveys' stringent eligibility criteria were disqualified.

Eligible respondents were directed to the second page of the Distress & Pain Profile, which contained items covering their general type of musculoskeletal diagnosis and their level of pain inference. After completing the Distress & Pain Profile, the respondents were directed to items comprising the Pain Experience Profile, which included items covering episodes of perceived rejection, current satisfaction with life, and their quality of life in daily functioning. Data was collected, populated, and formatted by the online hosts using IBM's *Statistical Product and Service Solutions / Predictive Analytics Soft Ware* (SPSS / PASW) to create a spreadsheet for ongoing periodic review and final data analyses.

Methods of Statistical Data Analyses in the Study

When analyzing the collected data, I utilized advanced statistical methods to determine the significance of the survey's findings. The collected data was populated into an electronic database by the online hosts, and I analyzed this database using the most up-to-date version of IBM's *Statistical Product and Service Solutions / Predictive Analytics Soft Ware* (SPSS / PASW), following guidelines set in the literature by Bryman and Cramer (2011) and Mertler and Vannatta (2010). Because the research study involved forecasting and prediction of more than one independent variable with a single dependent variable, I used a hierarchical multiple regression (HMR) analysis for the main data analysis. In addition, I used HMR analysis, because according to Mertler and Vannatta (2010) and Petrocelli (2003), it allows the researcher greater latitude in controlling predictor variables (PVs), and deciding which PVs to focus upon in the analysis' calculations.

Pre-Analysis Screening and Descriptive Statistics. After the data was collected, I conducted a preliminary screening analysis using SPSS / PASW. This pre-analysis included screening for missing data, multivariate outliers, linearity, normality, and homoscedasticity. A set of descriptive statistics was generated using SPSS / PASW statistical software. This information served to describe the study's sample; esp., respondents' demographics (i.e., age and gender), the frequency of their anxiety and depressed mood episodes, current pain intensity and pain interference levels, their type of musculoskeletal pain, and pain-related psychosocial issues, as well as provided descriptions on dispersion, central tendency, and variability

Hierarchical Multiple Regression (HMR). I utilized IBM's SPSS / PASW statistical software to analyze the study's data and determine the magnitude of effect in the influence and the reliability of predictability within the relationships amongst and between the key variables, i.e., three psychosocial issues and measures of distress symptom episodes. I used the hierarchical option for multiple regression (HMR) to identify the most influential predictor(s) amongst the 3 psychosocial PVs and the 5 controlled covariates. The HMR option was also used to generate a model that determined each psychosocial issue's magnitude of effect in influence and their combination of influence on the frequency of episodic pain-related distress symptoms. The HMR analysis generated a model summary, ANOVA, and regression coefficients. These assisted in interpreting the study's data, and included procedures for linear regression analyses, correlation descriptive analysis, and collinearity diagnostics. The HMR was conducted on the scores for either anxiety or depressed mood episodes, or whichever served as the criterion variables in their survey (comprising a single outcome measure), and the scores for the psychosocial and covariate predictors variables (each in a separate measure).

Planned Post-hoc Comparisons with Bivariate Tests. Contingent upon the findings from the analyzed data, I conducted a set of post-hoc comparisons with bivariate tests on significant factors. These post-hoc comparisons included bivariate tests on the differences in effects of age and gender on significant factors, and simple linear regressions on the extent of any predictive relationship between any significant

psychosocial factors upon episodes of either anxiety and depressed mood. The survey study's instrumentation methods are presented next.

Instrumentation and Methods

Respondents who were interested in serving as survey respondents were directed to both surveys comprising the Musculoskeletal Pain Experience Study (MPES) through recruitment by the online hosts. Both survey's introduction web page provided respondents with a brief explanation of the survey, a copy of the informed consent statement, and a consent agreement statement prior to their decision to participate. Candidates were instructed to read the informed consent statement and save or print a copy for their records. After reading the consent agreement statement, candidates indicated their willingness to participate in the study by selecting the "yes" response option following the statement. Candidates were then directed to the Distress & Pain Profile (DPP) for eligibility screening and profiling. Successful participants were then directed to the Pain Experience Profile (PEP). The details describing the proposed study's methods of data collection, instrumentation and scoring follow.

Shared Demographic Data Collected by the Online Host

The online hosts collected demographic data from potential respondents during their recruitment to both surveys, including data on their age range and gender. These were shared with me, as the primary investigator.

Age Range: Covariate Measure #1. Data on respondents' age range was collected by the online hosts. The scores for age range were as follow: where 1 = 18 years to 29 years, 2 = 30 years to 44 years, 3 = 45 years to 60 years, and 4 = 60+ years.

In the data analyses, the scores from the age range item were calculated by computer software after they were stored in the database of IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' age range, one of the study's covariates (CV#1).

Gender: Covariate Measure #2. The online host also collected data on respondents' gender. The score were as follow: 1 = Male, and 2 = Female. In the data analyses, the scores from the Gender item were calculated by computer software after they were populated in the database of IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' gender, one of the study's covariates (CV#2).

DISTRESS & PAIN PROFILE: The First Data Collection Edifice

After the respondents agreed to participate in the survey, they were directed to the first data collection component, the Distress & Pain Profile (DPP). The DPP included an eligibility screening and disqualification page. In the DPP, I presented candidates with a set of eligibility questions, which assisted me in determining whether the candidate's data was included or excluded in the survey study's analysis. I used the scores generated from measures of current distress and pain levels in the DPP not only for screening purposes but for measures of the outcome variables and one of the covariates. The remainder of the DPP provided data on the type of musculoskeletal pain and the level of pain interference. The details describing each of these components comprising the Distress & Pain Profile follows.

Population Targeting and Eligibility Screening Page. When testing the survey with trials, a dispersion problem was identified. The problem was the result of targeting the respondent population and not ensuring their eligibility in meeting the targeting criteria. To resolve the respondent targeting and eligibility problem, it was recommended by online host specialists that a screening page be created at the beginning of the survey in a separate template page within the Distress & Pain Profile.

Six items comprise the DPP respondent population targeting and eligibility screening page, and three of these items included disqualification response options. These screening items included (a) a dichotomous item with a "yes" or "no" response options confirming respondent pain experience did not exceed 4 months, (b) a dichotomous item with a "yes" or "no" response options confirming respondent pain experience included episodes of either anxiety or depressed mood, and (c) a multiple selection item listing the types of pain-related issues that respondents may have encountered during their pain experience (viz., satisfaction with life, quality of life, perceived rejection, and stressed related pain intensity increase), which included two disqualification response options. The last 3 items included items from the PROMIS Pain Intensity Scale, which will be profiled shortly.

Second DPP Page: Pain Type, Anxiety/Depression, and Pain Interference. The remainder of the Distress & Pain Profile included: (a) a dichotomous item inquiring as to the general type of musculoskeletal pain the respondent was diagnosed with, which included response options indicating either an injury or a musculoskeletal condition, (b) four items covering the extent of episodes of either anxiety or depressed mood, and (c)

four items covering the extent of pain interference encountered by respondents. The latter items were derived from the PROMIS Anxiety, Depressed Mood, and Pain Interference Scales.

First Screening Item: Confirmation of Length of Pain Experience

To confirm the length of respondents' pain experience as an eligibility criterion, a dichotomous item was added to the Distress & Pain Profile. The length of respondents' pain experience confirmation item included a dichotomous option responses to the request, "Please confirm that your current distress experience does not exceed the first 4 months since your pain started." The response options include: "Yes, as I certified above, my current distress experience does not exceed this first 4 months pain period," or "No, actually my distress experience exceeds this 4 month period." **The last option disqualified respondent candidates from the survey, and they were directed to a disqualification page provided by the online host.** In the data analyses, the scores from the length of pain experience confirmation item were calculated by computer software after they were placed in the database by the online host. I used IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program for these calculations. These scores generated data confirming the length of respondents' pain experience met one of the study's legibility criterions.

Second Screening Item: Confirmation of Anxiety / Depressed Mood Episodes

To confirm respondents' experienced episodes of anxiety or depressed mood during their pain experience as an eligibility criterion, I added a dichotomous item to the Distress & Pain Profile screening page. The anxiety or depressed mood episodes

confirmation item included a dichotomous option responses to the request, "Have you experienced reoccurring episodes of anxiety since your pain started?" The response options include: "Yes" or "No." **The last option disqualified respondent candidates from the survey, and they are directed to a disqualification page provided by the online host.** In the data analyses, the scores from the anxiety / depressed mood episodes confirmation item were calculated by computer software after they were placed in the database by the online host, and I used IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program to make these calculations. These scores generated data confirming the length of respondents' pain experience met one of the study's legibility criterions.

Third Screening Item: Distress Issues Encountered in Pain Experience

Recognizing that a number of pain-related distress issues may be encountered during the transitional pain experience period, the addition of a multiple-selection item was recommended by the online host. This item includes multiple-selection response options to the request, "Select all the options that apply to your current pain-related distress experience." The response options included: 1 = "Thoughts that your satisfaction with life has been diminished", 2 = "A social rejection episode, or episodes, where significant others placed constraints on listening to you talk about your pain, and/or the extent you received their comforting support", 3 = "Some limitations in completing your normal daily activities, including household chores, shopping, work-related activities, and family and social life", and 4 = "Pain intensity level increased when you were stressed".

The disqualification response options included" (a) asymptomatic symptoms (i.e., **"Occasional episodes of dizziness, light-headiness, nausea, and vomiting"), and (b) the response option, "None of these."** In the data analyses, the scores from the Distress Issues item were calculated by computer software after they were stored in the database of IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program. These scores generated data on the distress issues respondents encountered during their pain experience met one of the study's legibility criterions. .

PROMIS Pain Intensity Scale: Screening / Covariate Measure

In addition with providing a set of screening items, the 3-item PROMIS-Adult Physical Health-Pain Intensity-SF 3a) was employed as part of the proposed study's descriptive analysis on the survey respondents' pain symptom profile, and also provided a measure for the covariate   The scoring for the items in the Pain Intensity Scale, included five levels of episodes across the past seven days: where 1 = "Slight," 2 = "Mild," 3 = "Moderate," 4 = "Severe," and 5 = "Extremely Severe". In the data analyses, the scores from the PROMIS Pain Intensity Scale were calculated by computer software after they were placed in the database of IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' pain intensity levels, one of the study's covariates (CV#3).

General Musculoskeletal Pain Diagnosis: Covariate Measure

In both surveys, musculoskeletal pain was differentiated according to two broad general types of pain diagnoses, resulting from either injuries or musculoskeletal conditions. This item inquires, "What general musculoskeletal diagnosis has your doctor given as the source of your pain condition?" Respondents were instructed to select one of the following response options: where 1 = "Musculoskeletal injury and / or complications", or 2 = "Recently diagnosed musculoskeletal health-related condition". In the data analyses, the scores from the type of musculoskeletal pain item were calculated by computer software after they were stored in the database of IBM's Statistical Package for the Social Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' type of general musculoskeletal diagnosis, one of the study's covariates (CV#4).

PROMIS Anxiety / Depressed Mood Scales: Criterion-Outcome Measures

Both the Musculoskeletal Pain Distress Survey and the Musculoskeletal Pain-related Depressed Mood Survey used 4-item short-form scales derived from the PROMIS resources to measure their outcome variables. In the Musculoskeletal Pain Distress Survey, the 4-item PROMIS Short Form for Anxiety (Adult Mental Health-Emotional Distress - Anxiety-SF 4a) was utilized to provide a reliable and valid measure for the pain-related symptoms of increased anxiety sensitivity. The scoring for all of the items in the Anxiety Scale, includes five levels of episodes across the past seven days: where 1 = "Never," 2 = "Rarely," 3 = "Sometimes," 4 = "Often," and 5 = "Always." For this item

in the Distress & Pain Profile eligibility screening page, the first two response options were designated for disqualification.

In the Musculoskeletal Pain-related Depressed Mood Survey, the 4-item PROMIS Short Form for Depression (Adult Mental Health-Emotional Distress - Depression-SF 4a) was utilized to provide a reliable and valid measure for the pain-related symptoms of increased anxiety sensitivity. The scoring for all of the items in the Depression Scale, includes five levels of episodes across the past seven days: where 1 = "Never," 2 = "Rarely," 3 = "Sometimes," 4 = "Often," and 5 = "Always." For this item in the Distress & Pain Profile eligibility screening page, the first two response options were designated for disqualification.

Permission was obtained to use the PROMIS short-form scales in the online survey study (see: Appendix C: Permission Request Correspondence). The PROMIS instruments for Anxiety, Depressed Mood, Pain Intensity, and Pain Interference provided the study with a set of reliable and valid quantitative measures with a 5-point range for the response options. All of the PROMIS research resources are based upon item response theory (IRT). IRT examines the question or statement and the response options in a survey. According to IRT, the wording of questions and statements is crucial to how well the item performs in accurately measuring the different levels of the concept describing the parameters of a trait or state (Bjorner, Kosinski, & Ware, 2003; Van der Linden & Hambleton, 1997; Wainer et al., 2001; Ware et al., 2003). The PROMIS research resources utilize five levels of scores in Likert-like response options that have been tested for reliability and validity. The response options differ according the findings

from vigorous statistical and qualitative testing. In the data analyses, the scores from the

PROMIS Anxiety and the Depressed Mood Scales were calculated by computer software

after they were populated in the database of IBM's *Statistical Package for the Social*

Sciences / Predictive Analysis Soft Ware (SPSS / PASW) – Grad Pack 25 program.

These scores generated data on the extent of the survey respondents' frequency of anxiety

or depressed mood episodes, the study's criterion or outcome variables (OVs).

PROMIS Pain Interference Scale: Covariate Measure

The 4-item (PROMIS-Adult Physical Health-Pain Interference-SF 4a), was

employed as part of the proposed study's descriptive analysis on the survey respondents'

pain symptom profile, and also provided a measure for the covariate. The scoring for the

items in the Pain Interference Scale, includes five levels of episodes across the past seven

days: where 1 = "Not at all," 2 = "A little bit," 3 = "Somewhat," 4 = "Quite a bit," and 5

= "Very Much." In the data analyses, the scores from the PROMIS Pain Interference

Scale were calculated by computer software after they were populated in the database of

IBM's *Statistical Package for the Social Sciences / Predictive Analysis Soft Ware* (SPSS /

PASW) – Grad Pack 25 program. These scores generated data on the extent of pain

interference that respondents encountered during their pain experience, one of the study's

covariates (CV#5).

PAIN EXPERIENCE PROFILE: The Second Data Collection Edifice

The Pain Experience Profile is the second data collection component comprising

both the Musculoskeletal Pain Distress Survey and the Musculoskeletal Pain-related

Depressed Mood Survey. After respondents completed both pages of the Distress & Pain

Profile component of the survey, they were then directed to the second data collection

component, the Pain Experience Profile (PEP). The PEP includes the measures for pain-

related psychosocial issues. The PEP presented respondents with a set of standardized

scales to provide measures of social distress (perceived rejection), subjective well-being

(satisfaction with life) and daily functioning level (quality of life) for the survey study's

HMR analysis. The details describing each of these components comprising the Pain

Experience Profile follows.

NIH Toolbox Perceived Rejection Survey: Predictor Measure #1

The first scale in the Pain Experience Profile provided standardized measures for

the first psychosocial issue, i.e., the extent of respondents' perceived social rejection,

which serves as one of the predictor variables (PV#1) in the study's quantitative

multivariate investigation. This issue was measured using the National Institute of

Health's Toolbox Perceived Rejection Survey (NIH-TB-PRS). The 8-item NIH-TB-PRS

is comparable to larger measures found in two combined instruments; viz., the Perception

of Credibility of Health Condition Scale (PCHCS) developed by Herbette and Rime

(2004) and the Social Constraints Questionnaire (SCQ) developed by Lepore and

associates (Lepore, 2001; Lepore & Ituarte, 1999; Lepore & Revenson, 2007; Lepore,

Silver, Wortman, & Wayment, 1996). The NIH-TB-PRS provided the study's survey

battery with a short-brief standardized measure for the first psychosocial variable

comprising Set B in the study's hierarchical multiple regression analysis. Permission was

obtained to use the NIH-TB-PRS in the online survey study (see: Appendix C:

Permission Request Correspondence). A descriptive overview on the short-form NIH-TB-PRS instrument follows, along with a summary on the scoring and cut-off scores.

Brief Overview on the NIH-TB-PRS Instrument. The National Institute of Health's Toolbox Perceived Rejection Scale (NIH-TB-PRS) was developed in conjunction with research teams affiliated with Northwestern University, and the results were made available online at the NIH Toolbox website from 2008 to 2012. This instrument is comprised of eight items designed and tested to measure perceived rejection associated with patients' health conditions. It was employed in the study to measure a pair of interrelated perceived rejections that usually emerge during the course of recurrent unrelieved transitional pain experience, viz. the rejection resulting from constraints placed on pain disclosure verbalizations and constraints placed on social interaction and support. According to the NIH Toolbox website (2008-2012), these types of social interactions and rejection result in emotions of social distress.

Range and Cut-off Scores for the NIH-TB-PRS Instrument. The NIH-TB-PRS includes a total of 8-items designed specifically for measuring social distress emotions associated with negative social interactions and rejection. The NIH-TB-PRS has a statement of context and a 5-point Likert-like response option scale. The statement of context says, "In the past month, please describe how often people in your life...," and is located near the top of the instrument. The NIH-TB-PRS includes the following five levels of frequency of episodes across the past month: where 1 = "Never," 2 = "Rarely," 3 = "Sometimes," 4 = "Usually," 5 = "Always." The highest score in the Perceived Rejection Survey (NIH-TB-PRS) is 40, and the lowest score is zero. The NIH-TB-PRS

has adequate internal consistency, with Cronbach's α = 0.932 (Cyranowski et al., 2013). The data cut-off scores for the National Institute of Health Toolbox Perceived Rejection Scale (NIH-TB-PRS) are delineated as follows.

Cut-off scores for the NIH Toolbox Perceived Rejection Scale (NIH-TB-PRS) were designated as either high or low. The high cut-off scores range from 21 and above, and the low cut-off scores range from 20 and below (NIH Toolbox, 2008-2012). In the data analyses, the scores from the NIH-TB Perceived Rejection Survey were calculated by computer software after they were placed in the database of IBM's *Statistical Package for the Social Sciences / Predictive Analysis Soft Ware* (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' perceived rejection, one of the study's psychosocial predictors (PV#1).

Satisfaction with Life Scale: Predictor Measure #2

The research participants' subjective well-being, as indicated by their level of life satisfaction, was reported and measured in the Pain Experience Profile (PEP) using the Satisfaction with Life Scale (SWLS) developed by Diener, Emmons, Larsen, and Griffin (1985). The SWLS was used to measure the second predictor variable (PV#2) in the quantitative study's HMR analysis. According to Diener et al., the SWLS is a five-item global measure of subjective well-being and life satisfaction rated on a Likert scale from 1 to 7, where 1 = "Strongly disagree" and 7 = "Strongly agree." Higher scores on the SWLS indicate higher levels of satisfaction, with the score of 20 indicating respondents are neither satisfied nor dissatisfied, and conversely, lower scores indicate lower levels of satisfaction (Diener, et al., 1985; Pavot & Diener, 1993). Extreme dissatisfaction with

life is indicated in scores ranging from 5 to 9, and high satisfaction with life is indicated in scores above 30, and mean life satisfaction scores range from 23 to 28 (Pavot & Diener, 1993; Vassar, 2008). As employed in the multivariate quantitative survey study, the cut-off scores for the Satisfaction with Life Scale (SWIS) are listed as follows.

Cut-off scores for the Satisfaction with Life Scale (SWLS) were designated as high or low. The high cut-off scores range from 23 and above, and the low cut-off scores range from 17 and below (Diener, et al., 1985). Permission was obtained to use the SWLS in the online survey study (see: Appendix C: Permission Request Correspondence). In the data analyses, the scores from the Satisfaction with Life Scale were calculated by computer software after they were stored in the database of IBM's *Statistical Package for the Social Sciences / Predictive Analysis Soft Ware* (SPSS / PASW) – Grad Pack 25 program. These scores generated data on respondents' level of satisfaction with life, one of the study's psychosocial predictors (PV#2).

ACPA Quality of Life Scale: Predictor Measure #3

Research participants' quality of life as indicated by their level of functioning in everyday activities was reported and measured in the Pain Experience Profile (PEP) using the American Chronic Pain Association's Quality of Life Scale (ACPA-QOLS) developed by Cowan and Kelly (2003). Permission was obtained to use the ACPA-QOLS in the online survey study (see: Appendix C: Permission Request Correspondence). The ACPA-QOLS was used to measure the third covariate predictor variable (PV#3) in the quantitative study's HMR analysis. The ACPA-QOLS is a single item 11-point column scale that asks respondents to rate their current daily activity level

numerically on a scale from 0 to 10, where 0 = "Non-functioning," and 10 = "Normal

quality of life." As employed in this study, the cut-off scores for the ACPA-QOLS are

listed as follows**.**

Cut-off scores for the American Chronic Pain Association's Quality of Life Scale

(ACPA-QOLS) were designated either as high or low. The high cut-off scores range

from 6 and above, and the low cut-off scores range from 5 and below (Cowan & Kelly,

2003). Permission has been obtained to use the ACPA-QOLS in the proposed survey

study (see: Appendix C: Permission Request Correspondence). In the data analyses, the

scores from the ACPA Quality of Life Scale were calculated by computer software after

they were populated in the database of IBM's *Statistical Package for the Social Sciences

/ Predictive Analysis Soft Ware* (SPSS / PASW) – Grad Pack 25 program. These scores

generated data on respondents' quality of life in daily functioning, one of the study's

psychosocial predictors (PV#3).

Summary on the Research Instrumentation

The above descriptions of the measures used in both of the surveys, included (a)

two demographic items (Age and Sex) shared by the online host, (b) an item on General

Type of Diagnosed Musculoskeletal Pain, (c) four PROMIS short-form scales (Anxiety

Episodes, Depressed Mood Episodes, Pain Intensity, and Pain Interference) in the

Distress & Pain Profile (DPP), and (d) three standardized scales in the Pain Experience

Profile (PEP), including the NIH-TB Perceived Rejection Survey, Satisfaction with Life

Scale, and the ACPA Quality of Life Scale. Their intended purpose in the investigation,

and methods of scoring in the study were delineated. In addition, it should be noted that

in conjunction to its service as early pain experience surveys, the Musculoskeletal Pain

Distress Survey (MPDS) and the Musculoskeletal Pain-related Depressed Mood Survey

(MPDMS) served as predictor regression equation models that were tested by

multivariate analysis in the study. As predictor models, the MPDS and the MPDMS

served as research prototypes, whereby the three psychosocial issues were measured as

predictor variables, and anxiety or depressed mood as pain-related psychological distress

symptoms served as the singular outcome or criterion variable. The single items and

aggregate scales comprising the MPDS and MPDMS were presented online to the survey

participants. An overview on the programing procedures I used in the project

implementation of the study follows.

<div align="center">**Procedural Implementation Methods**</div>

The procedural implementation methods were basically all determined online.by

Survey Monkey's Audience Platform and partner panel, *Cint*. Respondents were recruited

by the online hosts. The online hosts are data collection management companies that are

HIPAA compliant and consistent with all regulatory requirements for patient sensitive

data acquisition and storing. The surveys took most participants less than 5 minutes to

complete. Templates pages provided by the online host allowed me, as the primary

investigator, to program the procedures guiding the survey's implementation steps.

Guidelines provided by the online host recommended that surveys be comprised

of (1) no more than 50 items, (2) no more than 10 template pages, and (3) each page

contain no more than 10 items. Both the Musculoskeletal Pain Distress Survey and

Musculoskeletal Pain-related Depressed Mood Survey contained a total of 32 items,

including one item indicating respondents' consent to participate in the survey and 2

demographic items collected by the online hosts, and a total of 6 pages (counting the

online host's recruitment page). Each page in both surveys contained less that ten items.

Access to both survey's introduction page provided respondents with a brief

statement on the purpose of the study, an eligibility statement, and an informed consent

statement textbox. A copy of the study's introduction page and consent agreement

statement is available in Appendices B (see: p. 327). Respondents were instructed to read

the informed consent statement, and save or print a copy for their records. Near the end

of the introduction page, respondents were instructed to read the consent agreement

statement. Respondents who selected the "yes" response option were admitted into the

survey. Those selecting the "no" option were directed out of the survey.

DISTRESS & PAIN PROFILE: First Data Collection Component

Both of the study's surveys included the two data collection edifices. The first

edifice was the Distress & Pain Profile (DPP), which included two template pages

(template pages #2 and #3). The first page of the DPP is the targeting and eligibility

screening page described in detail previously. Survey respondent candidates were

required to complete a set of eligibility items with disqualification response options.

Disqualification response options were created using a set of programming logic

commands available within the template pages. Respondents selecting a designated

disqualification response option were directed to a disqualification page provided by the

online host. On the second page of the Distress & Pain Profile (DPP), scores were

generated for non-screening items comprising the DPP, specifically for the dichotomous

single-item Type of Musculoskeletal Pain scale, and from 2 PROMIS scales measuring the distress variables (either Anxiety or Depressed Mood) and Pain Interference.

The scale for Anxiety generated scores for the MPDS's outcome or criterion variable (CV) in the study's HMR analysis. While the scale for Depressed Mood generated scores for the MPDMS's outcome or criterion variable (CV). The scores for Pain Intensity, Pain Interference, and Type of Musculoskeletal Pain were used as measures for the three of the controlled covariate variables (CVs) in the study's HMR analysis. Details of the second data collection edifice comprising the both survey is presented next.

PAIN EXPERIENCE PROFILE: Second Data Collection Component

The second data collection edifice in the Musculoskeletal Pain Distress Survey is the Pain Experience Profile (PEP). The PEP generates scores for the study's pain-related psychosocial issues. The PEP was comprised of two template pages (pages #4 and #5). The first template page (p. 4) comprising the PEP generated scores for the 8-item Perceived Rejection Survey (PRS; NIH Toolbox, 2008-2012), which I have described in detail previously.

The second template page (p. 5) comprising the PEP generated scores for the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). and the single item American Chronic Pain Association's Quality of Life Scale, A Measure of Function for People with Pain (ACPA-QOLS; Cowan & Kelly, 2003), both of which were also described in detail previously.

The scales for Perceived Rejection, Satisfaction with Life, and Quality of Life generated scores for the study's predictor variables (PVs) in the study's HMR analyses. Together these four survey components (viz., the online host's recruitment page, the survey's introduction page, and the template pages comprising the Distress & Pain Profile and Pain Experience Profile components), were the methods that shaped the procedural implementation of the survey.

Protection of Human Participants

According to the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2002 / Amended 2010), research psychologists are entrusted and obligated with the responsibly of safeguarding the well-being of human research participants (See: Section 8, the Standards of Research and Publications). A summary on how these standards are addressed in the present research study follows.

Safe-guarding the Comfort and Well-being of Survey Participants

In both surveys, the phone number to a national crisis hot line was provided to respondents in the informed consent statement; largely as a result of adherence to professional ethical guidelines to "do no harm" when conducting psychological research, and to assure that their participation in the proposed study was a positive experience, particularly in minimizing any discomfort and protecting their sense of well-being.

Confidentiality and Informed Consent

The issue of participant confidentiality was addressed by a statement in the survey's introduction page that the survey was completely anonymous. In addition, prior to each respondent beginning the survey, an informed consent statement was available for

respondents to read and save or print a copy for their records. The informed consent statement was found in a text-box within each survey's introduction page. A copy may be found in the appendixes of this proposal.

Social Change Implications

A substantive body of research has found early pain-related distress to be a reliable predictor of later chronicity and disability (Galli, Ettlin, Palla, Ehlert, & Gaab, 2010; Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Innes, 2005; McCracken, Vowles, & Eccleston, 2004; Pincus, Burton, Vogel, & Field, 2002; Ritchie, Hendrikz, Kenardy, & Sterling, 2013; Vlaeyen, 2015). Therefore, empirical studies investigating the influence of psychosocial issues upon the frequency and severity of distress symptoms episodes during acute, subacute, and early chronic (or transitional) pain experience may have implications for social change on the micro and macro levels. I have summarized these implications on the individual and societal levels as follows.

Implications for Social Change on the Micro-Level

To begin with, the findings from the study has implications for social change on the individual level. Recurrent unrelieved early musculoskeletal pain contributes toward an array of emotional and cognitive distress symptoms; conversely, the physical stress response and psychological distress heightens the intensity of pain severity levels (Burden of Musculoskeletal Diseases in the United States, 2013-2016; Institute of Medicine, 2011; Keefe, 2012). Aside from depression and anxiety, other psychological aspects of pain and distress in transitional musculoskeletal pain are not currently considered by frontline healthcare providers, and early psychological-assisted

interventions continue to be overlooked in primary and urgent care referrals (Foster, Hartvigsen, & Croft, 2012; Institute of Medicine, 2011; Molina et al., 2012; Roditi & Robinson, 2011). For individuals with unresolved persistent recurrent acute, subacute, and early chronic pain, the primary burden is suffering and the financial and social costs associated with it (Keefe, 2012).

Implications for Pain Prevention through Improved Healthcare. The social change on the micro-level must address pain-related distress and reduce its impact on patients' quality of life and physical and social functioning, and provide individuals with referrals to earlier psychological and social interventions (Institute of Medicine, 2011). Patients experiencing persistent recurrent acute and subacute pain stand to benefit from better healthcare management and pain chronicity / disability prevention resulting from research on pain-related psychosocial trigger events and distress symptom severity (Institute of Medicine, 2011; Rice et al., 2016; Van Wilgen & Keizer, 2012). Research findings on psychosocial issues and distress symptom severity may provide patients with earlier primary and urgent care referrals to efficacious pain prevention and wellness programs that cover goal-oriented/outcome cognitive behavioral therapy, pain education, pain healthcare counseling, pain self-management training, and social support (Carlson & Carlson, 2011; Ehde, Dillworth, & Turner, 2014; Foster et al., 2010; Kuritzky, 2008; Lamb et al., 2010; Van Wilgen & Keizer, 2012).

Promoting Earlier Interventions Targeting Pain Issues and Distress. Most of the interventions for pain-related psychosocial issues involving perceived rejection, satisfaction with life, and quality of life, in addition with issues not covered in this study

(e.g., self-efficacy and perception of unfairness) are currently used in chronic pain management, and contrary to conservative treatment strategies, the findings from the study recommends these therapies be employed earlier, as advocated by the Academy of Medicine (see report by: Institute of Medicine, 2011). For example, from the literature on chronic pain management, we know the pain-related distress symptoms that are influenced by patient self-efficacy issues may be reduced by psychosocial interventions, e.g., pain education and pain self-management training (Chester, Jerosch-Herold, Lewis, & Shepstone, 2016; Ehde, Dillworth, & Turner, 2014; Roditi & Robinson, 2011).

These types of programs are designed to empower individuals with strategies and coping competencies that help them manage stressors and stress responses, reduce pain intensity levels, reclaim levels of physical and social functioning, and enhance quality of life (Chester, Jerosch-Herold, Lewis, & Shepstone, 2016; Ehde, Dillworth, & Turner, 2014; Keefe, Somers, & Martire, 2008; Roditi & Robinson, 2011). Essentially, the same early psychosocial-assisted intervention strategy can be utilized for anxiety and depressed mood.

Likewise, symptoms of distress known to be influenced by perceived rejection issues may be buffered by programs designed to provide patients with individualized informational and emotional social support (Biglan, Flay, Embry, & Sandler, 2012; Carlson & Carlson, 2011; Matthias et al. 2010; Walsh et al. 2008), and opportunities to share their difficulties in pain experience without the threat of rejection (Van Wilgen & Keizer, 2012). Pain-related distress episodes influenced by psychosocial issues can be addressed by providing individuals with emotional support and goal-oriented/outcome

cognitive behavioral counseling in addition with pain education, and pain self-management training (Carlson & Carlson, 2011; Matthias et al. 2010; Scott, Trost, Bernier, & Sullivan, 2013; Sullivan, Scott, & Trost, 2012). The same early psychosocial-assisted intervention strategy can be utilized for anxiety and depressed mood.

Social Change Implications on the Macro-Level

Communities, society, and nations stand to benefit from research on psychosocial issues and distress symptom severity as well. Persistent recurrent pain associated with musculoskeletal disorders and injuries presents a major health conundrum and costly economic burden to all nations world-wide (Blyth, Hoy, & March, 2012; Blyth, F. M., van der Windt, & Croft, 2010; Hogg-Johnson et al., 2008; Woolf & Pfleger, 2003; World Health Organization, 2003). This trend is also well documented in the United States (Burden of Musculoskeletal Diseases in the United States, 2013-2016; Drexler, 2008; Gatchel & Schultz, 2014a, 2014b; Institute of Medicine, 2011; Keefe, 2012). In the United States, the seminal report by the Institute of Medicine (2011), now the Academy of Medicine, advocated for broad social change and cultural transformation involving the nation's communities and healthcare services and organizations.

Profiles on the Prevalence of Chronic and Severe Pain in Adults. The National Health Interview Survey 2012, a study conducted by the Center of Disease Control through the National Center for Health Statistics, investigated the prevalence of daily occurrence of many health conditions including pain (Blackwell, Lucas, & Clarke, 2014, p. 5). An analysis conducted by Nahin (2015) estimated a total of 50 million adults suffer from pain daily in the United States. According to Nahin's analysis, this total

includes 25 million adults suffering from chronic pain, and 23 million adults suffering from severe pain.

An epidemiological study on chronic pain in Europe conducted by Van Hecke, Torrance, and Smith (2013) found 20% of the adult population suffered from chronic pain. A study by Fayaz, Croft, Langford, Donaldson, and Jones (2016) found almost 28 million adults suffer chronic pain in the United Kingdom. And a study by Goldberg and McGee (2011) reported chronic pain in 20% on the world's adult population, with 10% new cases diagnosed each year. A study conducted by Jackson, Stabile, and McQueen (2014) reported chronic pain prevalence in adults of some nations are near 20% to 25%.

Although the World Health Organization (2005) has supported greater global pain relief efforts over the last decade, pain remains a low priority in public health policy and healthcare services. In an online news release appearing in the University of Southern California's Center for Health Journalism website, investigative healthcare journalist, Christine Felt (2016) observed chronic pain remains a low priority in public health programs world-wide. Likewise, professor of public health policy and clinical medicine at John Hopkins University, Barbara Starfield (2009), argued on the importance of family and primary care physicians to focus on the needs of the patient instead of the disease. According to Starfield, "It is this aspect of the medical care process that has been missing from all consideration of the quality of health care" (p. 64, paragraph 7, sentence 2). In another report, Starfield (2011) pointed toward the unmet need of frontline healthcare workers seeing health difficulties from the patient's perspective. In view of the prevalence of pain in society, the low priority it receives, and current approach toward

pain management, further research on the pain-related issues emerging in people's pain experience deserves greater attention.

The Prioritization of Reducing the Burden and Costs of Chronic Pain. The prevalence of chronic pain disability has an economic burden on society; including economic expenditures associated with absenteeism, employment, government benefit agencies, health care services, and productivity (Institute of Medicine, 2011; Phillips, 2009). Chronic pain is estimated to cost the United States over $600 billion a year (Felt, USC Center for Health Journalism, 2016). More precisely, Gaskin and Richard (2012), health economists at John Hopkins University, reported costs in the range of $560 billion to $635 billion annually. Moreover, to successfully manage, prevent, and treat pain Gaskin and Richard recommended, greater national investment in pain education, research, and training. Gaskin and Richard concluded,

> "In general, given the magnitude of the economic costs of pain, society should consider investing in research, education, and care designed to reduce the impact of pain. In *Relieving Pain in America*, the IOM outlined a national agenda for addressing the problem of pain. Eliminating pain may be impossible, but helping people live better with pain may be achievable" (p. 723, second column, paragraph 3).

Similarly, a systematic analysis of the report by the Global Burden of Disease Study (2010) conducted by Vos et al. (2012) and reported in the Lancet concluded that the top priority should be the development of efficacious and inexpensive approaches to the burden of pain across global healthcare systems. Therefore, earlier prevention

addressing psychosocial issues and the severity of distress symptoms may prove an economical and effective solution to the burdens and costs associated with chronic and severe pain, thereby bringing positive social change on the micro and macro-levels.

Summary of Research Methods

To summarize the research methods here, the study was a multivariate web survey. The study utilized advanced quantitative analytics to investigate the extent that three emergent psychosocial trigger events have influential and predictive relationships with the outcome of symptom frequency in episodes of pain-related anxiety and depressed mood during the respondents' transitional musculoskeletal pain experience. The study's data was collected from respondents participating in a nation-wide online survey. Participants included men and women with recent diagnosed musculoskeletal conditions and injuries, who were surveyed during the first 16 weeks following their transitional pain onset. A hierarchical multiple regression analysis was employed to test each survey's six null and research hypotheses and to answer each surveys' two research questions. The surveys included a number of validated short-form scales that measure the 3 psychosocial stressors, viz., measures of perceived rejection, satisfaction with life, and quality of life in the respondents' pain experience, and a measure of either anxiety or depressed mood episodes, while controlling for the potentially confounding influence of 5 covariates, as measured by 3 scales on levels of pain intensity, pain interference level, and general type of musculoskeletal diagnosis, and 2 demographics, i.e., age range and gender, which served as another set of covariates.

In concluding this dissertation research study, it is noteworthy to keep the impetus for the study in mind. Walden University has the potential of making a significant contribution toward the social change advocated by five prominent health organizations. These organizations include: the American Psychological Association (APA), Institute of Medicine, Mayday Fellows, Mayday Fund, and World Health Organization. The study directs attention toward the identification of early pain-related issues that are believed to serve as trigger events and predictors of anxiety distress severity experienced during transitional musculoskeletal pain experience. In addition, the study is supported by literature on preventive approaches advocating patients identified at risk of pain chronicity and disability be referred to early psychological assisted nonpharmacological interventions. A lack of published peer-reviewed clinical research literature on the emergence of early psychosocial factors as trigger events for pain-related distress is clearly evident, especially covering transitional period or the first 16 weeks of patient pain experience. The survey study begins filling this gap in the literature, and stimulates further research attention directed toward the early pain prevention spectrum.

Chapter 4: Results

Introduction to the Results of the Study's Analyses

This study included two online surveys conducted through Survey Monkey's Audience platform and Cint, an educational, healthcare, and medical partner panel. In the first survey, the Musculoskeletal Pain Distress Survey, as the primary researcher, I focused principally on participants' anxiety episodes as the distress outcome variable; while in the second survey, the Musculoskeletal Pain-related Depressed Mood Survey, I focused on participants' depressed mood episodes as the outcome variable. I designed the study as a quantitative multivariate within-subjects descriptive exploratory research project. The purpose of the survey study, research questions, and hypotheses, and the results of the data analyses are summarized in the sections that follows.

Purpose of the Study

The purpose of the study was to explore the extent that three psychosocial issues and two pain-related distress symptoms (i.e., episodes of anxiety and depressed mood) are evident during the first 4 months following musculoskeletal pain onset, and to describe their interrelationships statistically. Beyond this objective, another purpose of the proposed study was to determine whether perceived rejection in social networks, quality of life in daily functioning, and current satisfaction with life have predictive relationships with the level of frequency of episodes of core pain-related anxiety and depressed mood symptoms during the participants' transitional musculoskeletal pain experience.

In addition with examining the extent that the three psychosocial issues have a predictive relationship with the level of self-reported frequency of episodes of core pain-related anxiety and depressed mood symptoms, I evaluated the extent that perceived rejection, quality of life, and satisfaction with life are associated with one another and with five pain-related biopsychological covariate factors. The five covariates included age range, gender, general musculoskeletal diagnosis, pain intensity, and pain interference. Together with these objectives, I aimed to improve the conceptual clarity in preventive research on the influence of psychosocial factors upon pain-related distress during transitional musculoskeletal pain experience. I based this approach to conceptual clarity on a number of studies that I reviewed in the clinical literature (viz., Carey, Mansell, & Tai, 2014; Gatchel & Schultz, 2014a; Institute of Medicine, 2011; Jensen & Turk, 2014; Keefe, 2012; Turk & Monarch, 2002).

Organization of the Chapter

In this chapter, I present and summarize the study's research questions, the null and alternative hypotheses, the findings of data analyses testing each hypothesis, the methods of data collection, and data analyses results. In each section, I provide relevant details and summaries. I included a number of tables in the section on the summaries of findings and the results of the study's data analyses. A summary concludes this chapter.

Research Questions, Hypotheses, and Summaries of Findings. To begin with, in the section on the study's research questions, hypotheses, and summaries of findings, I begin by delineating the study's research questions and hypotheses according to each online survey. Because I used hierarchical multiple regression for my data analyses to

test the hypotheses, there is a correlational and predictive research question, and six null and alternative hypotheses for each survey. After I present each set of hypotheses, I provide summaries of the findings of the results that my data analyses found for each hypothesis. I present the statistical details of the findings of each analysis elsewhere in the chapter in the section covering the data analysis results of each survey comprising the study.

Methods of Data Collection. In the section on the data collection methods, I identify the online host utilized in respondent recruitment and data gathering. This section summarizes the discrepancies in the study's original data collection plans. I also include summaries on the modifications resulting from online survey trials, the changes resulting from the Anxiety Survey results, and the time frames for data collection completion.

Data Analyses Results. The section on the study's data analyses includes baseline descriptive and demographics of both survey's samples, preliminary analyses of representativeness of the sample in both surveys, descriptive analyses of the variables on the surveys, the results of bivariate correlation analyses of variables in in each survey, and the results of hierarchical multiple regression analyses.

Research Questions, Hypotheses, and Summaries of Findings

In the online survey study, I addressed two research questions. The first question was: are the three pain-related psychosocial issues (i.e., perceived rejection, quality of life, and satisfaction with life), influential stressors in the levels of frequency in episodes of core anxiety and depressed mood symptoms during transitional pain experience

following the onset of pain during the first 4 months of participants' pain experience?
The second question was: which psychosocial trigger events serve as the most reliable
predictor(s) of frequency of anxiety and depressed mood symptom? A multivariate
quantitative approach was used to answer these two research questions. The following is
a description of the study's research questions, hypotheses, and summaries of the findings
of the results of the data analyses.

First Set of Research Questions and Hypotheses in the Anxiety Survey

In the first research question for the anxiety survey, I sought to determine whether
the frequency of moderate-to-severe episodes of core pain-related anxiety are associated
with and change in relation to the three psychosocial trigger events, while controlling for
five potential confounding predictor variables. The first research question (RQ1)) and
the three sets of null (H_O) and alternative hypotheses (H_I), subscripted here as 1 for the
anxiety survey, were stated as follows**:**

RQ1: What is the relationship between the scores indicating high perceived
rejection, low quality of life in daily functioning, and low satisfaction with life and the
scores on the frequency of moderate-to-severe episodes of core pain-related anxiety
symptoms, after controlling for age, gender, and scores for pain intensity, pain
interference, and general type of musculoskeletal diagnosis (injury or condition)?

Ho1$_1$: There is no relationship between high scores in the frequency of episodes
of core anxiety symptoms and high scores in perceived rejection, after controlling for
age, gender, and scores for pain intensity level, pain interference level, and general type
of musculoskeletal diagnosis.

H_I1_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H_O2_1: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_I2_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and type of musculoskeletal pain.

H_O3_1: There is no relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_I3_1: There is a relationship between high scores in the frequency of episodes of core anxiety symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

Findings from Testing the First Set of Hypotheses in the Anxiety Survey

I tested the first set of research hypotheses in the anxiety survey by using hierarchical multiple regression analyses. I present the details on the results of these analyses elsewhere in this chapter. The conclusions derived from the findings of these hypotheses tests are summarized here.

Summary of Analyses on the First Perceived Rejection Hypothesis. Based on the results of data analyses of the first research hypothesis in the anxiety survey, which concerned the extent of a correlational relationship between perceived rejection and anxiety episodes (H_O1_1, H_I1_1), the null hypothesis was rejected and the alternative hypotheses accepted. My analyses found episodes of pain-related anxiety symptoms to be strongly influenced by participants' perceived rejection, after controlling for age, gender, pain intensity level, pain interference level, and general musculoskeletal diagnosis. In addition, among the eight independent / predictor variables, in correlation tests, perceived rejection was found to have the strongest influence on anxiety episodes. Remarkably two of the covariates were also strongly correlated with episodes of anxiety: pain interference was ranked a close second, and pain intensity was ranked third. Although both these covariates were controlled in my analyses, this finding clearly attests to the strength of their magnitude of effect on anxiety episodes.

Summary of Analyses on the First Quality of Life Hypothesis. Based on the results of data analyses on the second research hypothesis in the anxiety survey, which concerned the extent of a correlational relationship between quality of life and anxiety episodes (H_O2_1, H_I2_1), the null hypothesis was accepted. Subsequently, episodes of pain-

related anxiety symptoms was not found to be significantly influenced by participants' quality of life in daily functioning.

Summary of Analyses on the First Satisfaction with Life Hypothesis. Based on the results of data analyses on the third research hypothesis in the anxiety survey, which concerned the extent of a correlational relationship between satisfaction with life and anxiety episodes (H_O3_1, H_I3_1), the null hypothesis was accepted. Therefore, episodes of pain-related anxiety symptoms was not found to be significantly influenced by participants' current level of satisfaction with life.

Second Set of Research Questions and Hypotheses in the Anxiety Survey

In the second research question in the anxiety survey, I sought to determine which of the three psychosocial predictor variables best predicted the frequency of the criterion variable (either anxiety or depressed mood episodes) from the regression equation. There were a set of three research hypotheses that address the second research question. The second research question (RQ2) for the anxiety survey and the three sets of null (H_O) and research hypotheses (H_I), subscripted here as 1 for the anxiety survey, were stated as follows.

RQ2: Does the regression equation resulting from a subset of scores on perceived rejection, quality of life in daily functioning, and satisfaction with life significantly predict the level of frequency of episodes of distress symptoms (either anxiety or depressed mood), after controlling for the influences of age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis (injury or condition)?

H$_O$4$_1$: The regression equation for scores on perceived rejection does not reliably predict the frequency of anxiety episodes.

H$_I$4$_1$: The regression equation for scores on perceived rejection does reliably predict the frequency of anxiety episodes.

H$_O$5$_1$: The regression equation for scores on quality of life does not reliably predict the frequency of anxiety episodes.

H$_I$5$_1$: The regression equation for scores on quality of life does reliably predict the frequency of anxiety episodes.

H$_O$6$_1$: The regression equation for scores on satisfaction with life does not reliably predict the frequency of anxiety episodes.

H$_I$6$_1$: The regression equation for scores on satisfaction with life does reliably predict the frequency of anxiety episodes.

Findings from Testing the Second Set of Hypotheses in the Anxiety Survey

I tested the second set hypotheses in the anxiety survey by utilizing hierarchical multiple regression analyses. I present the details on the results of these analyses elsewhere in this chapter. The conclusions derived from the findings of these hypotheses tests are summarized as follows.

Summary of Analyses on the Second Perceived Rejection Hypothesis. Based on the results of data analyses on the fourth research hypothesis in the anxiety survey, which concerned the extent of a predictive relationship between perceived rejection and anxiety episodes (H_O4_1, H_I4_1), the null hypothesis was rejected. Therefore, the regression equation for scores on perceived rejection in social support networks did reliably predict

the frequency of pain-related anxiety symptom episodes. Among the eight pain-related independent / predictor variables, perceived rejection not only was found to be the strongest influence, but the best predictor of anxiety episodes. Remarkably, two of the covariate variables, viz., pain interference followed by pain intensity, were also found to have a strong relationship with the frequency of anxiety episodes, and to be among the best predictors of anxiety episodes as well.

Summary of Analyses on the Second Quality of Life Hypothesis. Based on the results of data analyses on the fifth research hypothesis in the anxiety survey, which concerned the extent of a predictive relationship between quality of life and anxiety episodes (H_O5_1, H_I5_1), the null hypothesis was accepted. Subsequently, pain-related anxiety symptoms were found not to be influenced by participants' quality of life in daily functioning, and the regression equation for scores on quality of life did not reliably predict the frequency of pain-related anxiety symptom episodes in the anxiety survey.

Summary of Analyses on the Second Satisfaction with Life Hypothesis. Based on the results of data analyses on the research sixth hypothesis in the anxiety survey, which concerned the extent of a predictive relationship between satisfaction with life and anxiety episodes (H_O6_1, H_I6_1), the null hypothesis was accepted. Accordingly, in addition to pain-related anxiety symptoms found not to be influenced by participants' current level of satisfaction with life, the regression equation for scores on satisfaction with life did not reliably predict the frequency of pain-related anxiety symptom episodes in the anxiety survey.

First Set of Research Questions & Hypotheses in the Depression Survey

In the first research question for the depressed mood survey, I sought to determine whether the frequency of moderate-to-severe episodes of pain-related depressed mood is associated with and change in relation to the three psychosocial trigger events, while controlling for five potential confounding predictor variables. The first research question (RQ1)) and the three sets of null (H$_O$) and alternative hypotheses (H$_I$), subscripted here as 2 for the depressed mood survey, were stated as follows:

RQ1: What is the relationship between the scores indicating high perceived rejection, low quality of life in daily functioning, and low satisfaction with life and the scores on the frequency of moderate-to-severe episodes of core pain-related depressed mood symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general type of musculoskeletal diagnosis (injury or condition)?

H$_O$1$_2$: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H$_I$1$_2$: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and high scores in perceived rejection, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis.

H$_O$2$_2$: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning

levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_12_2: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in quality of life in daily functioning levels, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_03_2: There is no relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

H_13_2: There is a relationship between high scores in the frequency of episodes of core depressed mood symptoms and low scores in satisfaction with life, after controlling for age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal pain.

Findings from Testing the First Set of Hypotheses in the Depression Survey

I used hierarchical multiple regression analyses to test the hypotheses of the first set of research hypotheses in the depressed mood survey. I present the details on the results of these analyses elsewhere in this chapter. The conclusions derived from the findings of these hypotheses tests are summarized here.

Summary of Analyses on the First Perceived Rejection Hypothesis. Based on the results of data analyses on the first research hypothesis in the depressed mood survey, which concerned the extent of a correlation relationship between perceived rejection and

depressed mood (H_O1_2, H_I1_2), the null hypothesis was rejected and the alternative hypotheses accepted. Episodes of pain-related depressed mood symptoms was found to be influenced by participants' perceived rejection in their social support networks. In correlation tests, perceived rejection was found to have one of the strongest influences on depressed mood episodes, ranking second amongst the independent / predictor variables. Remarkably the covariates pain interference ranked first, and pain intensity ranked third.

Summary of Analyses on the First Quality of Life Hypothesis. Based on the results of data analyses on the second research hypothesis in the depressed mood survey, which concerned the extent of a correlational relationship between quality of life and depressed mood (H_O2_2, H_I2_2), the null hypothesis was rejected and the alternative hypothesis was accepted. Episodes of pain-related anxiety symptoms was found to be influenced by participants' quality of life in daily functioning. Quality of life was found to have a moderate level of influence on depressed mood episodes in correlation tests.

Summary of Analyses on the First Satisfaction with Life Hypothesis. Based on the results of data analyses on the third research hypothesis in the depressed mood survey, which concerned the extent of a correlational relationship between satisfaction with life and depressed mood (H_O3_2, H_I3_2), the null hypothesis was rejected and the alternative hypothesis was accepted. Episodes of pain-related depressed mood symptoms were found to be influenced by participants' quality of life in daily functioning. In correlation tests, satisfaction with life was found to have a moderate level of influence on depressed mood.

Second Set of Research Questions & Hypotheses in the Depression Survey

In the second research question in the depressed mood survey, I sought to determine which of the three psychosocial predictor variables best predicted the frequency of the criterion variable (moderate-to-severe cote depressed mood episodes) from the regression equation. There were a set of three hypotheses that address the second research question. The second research question (RQ2) for the depressed mood survey and the three sets of null (H_O) and research hypotheses (H_I), subscripted here as 1 for the anxiety survey, were stated as follows.

RQ2: Does the regression equation resulting from a subset of scores on perceived rejection, quality of life in daily functioning, and satisfaction with life significantly predict the level of frequency of episodes of distress symptoms (either anxiety or depressed mood), after controlling for the influences of age, gender, and scores for pain intensity level, pain interference level, and general type of musculoskeletal diagnosis (injury or condition)?

H_O4_2: The regression equation for scores on perceived rejection does not reliably predict the frequency of depressed mood episodes.

H_I4_2: The regression equation for scores on perceived rejection does reliably predict the frequency of depressed mood episodes.

H_O5_2: The regression equation for scores on quality of life does not reliably predict the frequency of depressed mood episodes.

H_I5_2: The regression equation for scores on quality of life does reliably predict the frequency of depressed mood episodes.

H_O6_2: The regression equation for scores on satisfaction with life does not reliably predict the frequency of depressed mood episodes.

H_16_2: The regression equation for scores on satisfaction with life does reliably predict the frequency of depressed mood episodes.

Findings from Tests on the Second Set of Hypotheses in the Depression Survey

I used hierarchical multiple regression analyses to test the hypotheses of the first set hypotheses in the depressed mood survey. I present the details on these analyses elsewhere in this chapter. The conclusions derived from of these hypotheses tests are summarized here.

Summary of Analyses on the Second Perceived Rejection Hypothesis. Based on the results of data analyses on the fourth research hypothesis in the depressed mood survey, which concerned the extent of a predictive relationship between perceived rejection and depressed mood episodes (H_O4_2, H_14_2), the null hypothesis was rejected and the alternative hypotheses accepted. The regression equation for scores on perceived rejection in social support networks did reliably predict the frequency of pain-related depressed mood symptom episodes. Among the eight pain-related independent / predictor variables, perceived rejection was found to be amongst the best predictors of anxiety episodes, ranking second as a reliable predictor. Remarkably, the covariate, pain interference, which incidentally has a psychosocial dimension in the measure I used in both surveys, was found to be the best predictor of the frequency of depressed mood episodes, ranking first, followed by perceived rejection, and pain intensity. It should be noted that the latter consistently ranked third as a predictor in both surveys.

Summary of Analyses on the Second Quality of Life Hypothesis. Based on the results of data analyses on the fifth research hypothesis in the depressed mood survey, which concerned the extent of a predictive relationship between quality of life and depressed mood episodes (H_O5_2, H_15_2), the null hypothesis was rejected, and the alternative hypothesis accepted. Thus in addition to pain-related depressed mood symptoms found to be moderately influenced by participants' quality of life in daily functioning, the regression equation for scores on quality of life does predict the frequency of pain-related anxiety symptom episodes in the depression survey.

Summary of Analyses on the Second Satisfaction with Life Hypothesis. Based on the results of data analyses on the sixth research hypothesis in the depressed mood survey, which concerned the extent of a predictive relationship between satisfaction with life and depressed mood episodes (H_O6_2, H_16_2), the null hypothesis was rejected and the alternative hypothesis accepted. Thus in addition to pain-related depressed mood symptoms found to be moderately influenced by participants' current level of satisfaction with life, the regression equation for scores on satisfaction with life did predict the frequency of pain-related anxiety symptom episodes in the depression survey.

The Statistical and Analytic Profile of Both Surveys

The tests of hypotheses provided a myriad of relevant statistical figures. Table 2 provides a statistical and analytic profile of the independent / predictor and outcome variables in both studies. In Table 2, on the next page, I present a statistical and analytic profile of the independent / predictor and outcome variables in both studies.

Table 2

Statistical & Analytic Profiles of Predictors & Outcome Variable in Both Surveys
Anxiety Survey – (Valid N = 116) & Depressed Mood Survey – (Valid N = 106)

	N	M	SD	Range	Min.-Max.	r	2-Tailed Sig,	p	B	β	t-value	p-value
Anxiety Survey												
Psychosocial Issues												
1. Perceived Rejection	121	22.66	7.48	32	8–40	.565	.000	.01	.136	.383	4.930	.000
2. Quality of Life	118	5.16	2.16	10	1 –11	-.136	.070	.05	-.087	-.070	-.963	.338
3. Satisfaction with Life	120	17.90	6.97	29	5–34	.084	.180	05	.028	.073	1.030	.305
Covariates												
4. Pain Intensity	121	9.08	2.23	12	3–15	.453	.000	.01	.218	.184	1.845	.068
5. Pain Interference	121	13.67	3.50	16	4–20	.523	.000	.01	.208	.275	2.785	.006
6. General Diagnosis	121	1.46	.50	1	1–2	-.028	.381	.05	.086	.016	231	818
Demographics												
7. Age Range	120	3.43	1.03	3	2–5	-.177	.026	.05	-.348	-.135	-1.843	.068
8. Gender	121	1.73	.45	1	1-2	.011	.454	.05	.041	.007	.096	.923
Depressed Mood Survey												
Psychosocial Issues												
1. Perceived Rejection	111	23.56	7.24	32	8–40	.560	.000	.01	.151	.307	4.108	.000
2. Quality of Life	110	5.71	2.73	10	1–11	-.217	.011	.05	-.156	-.120	-1.686	.095
3. Satisfaction with Life	109	19.15	7.81	30	5-35	-.203	.017	.05	-.076	-.169	-2.475	.015
Covariates												
4. Pain Intensity	111	8.77	2.28	12	3–15	.445	.000	.01	.290	.187	2.319	.022
5. Pain Interference	111	13.58	3.76	16	4–20	.623	.000	.01	.343	.371	4.354	.000
6. General Diagnosis	111	1.41	.49	1	1 –2	.006	.474	.05	-.493	-.069	-1.022	.309
Demographics												
7. Age Range	110	3.40	.997	3	2–5	.225	.009	.05	-.481	-.137	-2.008	.047
8. Gender	110	1.53	.500	1	1–2	-.050	.301	.05	-.019	-.003	-.041	.968

Anxiety Episodes – Descriptive Statistics: N = 121, M = 12.65, SD = 2.72, Range = 16, Minimum = 4, and Maximum = 20. Anxiety Survey Intercept: *B = 5.775, t-value = 3.707, p-value = .000*

Depression Episodes – Descriptive Statistics: N = 111, M = 12.43, SD = 3.57, Range = 16, Minimum = 4, and Maximum = 20. Depression Survey Intercept: *B = 6.463, t-value = 3.443, p-value = .001.*

The profile in Table 2 above includes statistical figures on: (a) the number of

participants in each study (*Valid N*), (b) the number of participants associated with each

independent / predictor variable (*N*), (c) the mean (*M*) for each IV, standard deviation

(*SD*), (d) the range in each IV, (e) the minimum and maximum values associated with the

range (*Min-Max*), (f) Pearson's correlation coefficient (*r*), (g) 2-tailed test of significance

(*2-Tailed sig,*), (h) correlation's level of significance (*p<*), (i) the unstandardized

regression coefficient (*B*), (j) standardized regression coefficient (*β*) the coefficient's

standard error (*t-value*), and (k) the coefficient's level of significance (*p-value*). Table 2 also includes a summary of descriptive statistics for each outcome variable and the values for the intercept for both surveys. More detailed summaries and tables will be presented in the Results section of this chapter.

Data Collection

Data collection for both of the study's surveys was provided with assistance from *Survey Monkey's* Audience platform, and Cint, a partner panel. Originally, the study was to be a local grass-roots survey utilizing local and regional medical center resources in northeastern California and northwestern Nevada to recruit eligible survey respondents and direct them to the survey on an online host's website. However, after several months, this data collection strategy proved to be unsustainable due to the low recruitment of participants to meet the sample size requirement. I abandoned the grassroots approach to data collection and sought an alternative. Subsequently for data collection, I employed another online host, *Survey Monkey's* Audience platform; mainly because they guaranteed recruitment of the number of respondents to meet the sampling target in a relatively short period of time.

Discrepancies in Data Collection Plans

After a series of preliminary trials with *Survey Monkey's* Audience platform, their specialists made a couple of recommendations to assist in the study's surveys participant recruitment and data collection. I summarize these below. In addition, the interesting robust results I obtained from the first survey encouraged me to add the second survey to the study.

Modifications Resulting from the Online Survey Trials. Changes in the survey were made as a result of survey trials with the online host. These modifications included the reduction in the number of items comprising the first survey, and the addition of a screening page to assure only eligible respondents participated in the survey. The number of items comprising the survey was streamlined from 50 to 29 items. And the new item total included three screening items with disqualification response options that were added to the survey. The consent agreement statement made the total of number of item equal to 30 items. In addition, the online host collected demographics from respondents on their age and gender, and these were included in the dataset, thereby making the total 32 items.

Modifications Resulting from the Anxiety Survey Results. At one point in time in the survey's developments during 2017, the proposed study approved by Walden's Internal Review Board (IRB) included items from a 4-item scale on depressed mood episodes and a 4-item scale on anxiety episodes. Later, during 2018 with IRB approval, the depressed mood scale was removed and the 4-item scale of anxiety episode was left intact, as a result of reducing the number of items comprising the survey. After the first survey was successfully conducted, the intriguing robust results suggested that depressed mood be reinstated to study again in order to explore the full extent of the pain-related anxiety-depression spectrum. A petition requesting the reinstatement of depressed mood episodes into the study was submitted to IRB and approved. And a separate second survey was then added to the study.

Actual Data Collection Completion Time Frames

Once the surveys was ready to launch, it took only a matter of days to collect data to meet the study's sample size. The first survey went through a series of trials that improved recruitment, screening, and data collection success, and these took several weeks. In addition with the first survey benefitting from these trials, the second survey benefitted as well. The only change in the second survey involved the substitution of one scale with another; i.e., the scale on depressed mood episodes replaced the anxiety episodes scale. Once launched, the first survey took approximately 10 days to complete data collection. Collecting data for the second survey was shorter to complete, and took only 7 days after it was launched.

Results

The first survey, the Musculoskeletal Pain Distress Survey, was designed to investigate the relationships between anxiety episodes and three psychosocial predictors (i.e., perceived rejection in social networks, quality of life in daily activity level, and satisfaction with life), while controlling for the potentially confounding influences of three covariates (viz., pain intensity, pain interference, and general type of musculoskeletal pain diagnosis), and two demographics (viz., age range and gender). And the second survey, the Musculoskeletal Pain-related Depressed Mood Survey, was designed to examine the relationships between depressed mood episodes and the same set of psychosocial predictors, covariates, and demographics. In the sections that follow, the results of the analyses for each survey's baseline descriptive and demographics of the sample, the preliminary analyses, descriptive statistics, evaluation of assumptions, and

the univariate, bivariate, and multivariate statistical analyses of the hypotheses are presented.

Baseline Descriptive and Demographics of the Sample

The participants in both surveys can best be described by the study's stringent eligibility criteria. To participate in the study, respondents had to be 18 years of age or older, they had to have sustained a recent musculoskeletal injury or were recently diagnosed with a musculoskeletal condition, their pain experience did not exceed the first four months since pain onset, they experienced moderate to severe pain-related distress episodes resulting from their pain, and experienced one or more episodes of the three pain-related psychosocial issues. Respondents who did not meet this eligibility criteria were disqualified.

The screening items in both surveys included: (a) a binary item confirming that respondents' current pain experience has not exceeding the targeted first four months period with a disqualification response option, (b) a multi-selection item on the psychosocial issues that respondents may have encountered during this period, including two disqualification response options, and (c) a binary item inquiring if respondents have experienced reoccurring episodes of the targeted distress symptom in the survey, either anxiety or depressed mood, with a disqualification response option. Thus the two binary items were completed 100% by participants in both surveys.

In Tables 3 and 4, the frequency results for the response options in the multi-selection item are presented. In the anxiety survey the frequency for the multi-selection item found 29.2% of participants encountered perceived rejection episodes, 65.3%

encountered quality of life issues, and 56.2% experienced issues regarding their

satisfaction with life, and only 51.2% reported that stress increased their pain level.

Whereas in the depression survey the frequency for the multi-selection item found 36.9%

of participants encountered perceived rejection episodes, 65.8% encountered quality of

life issues, 62.2% experienced issues regarding their satisfaction with life, and only

54.1% reported that stress increased their pain levels.

Table 3
Screening Item: Participants' Frequencies of Encountered Psychosocial Issues in the
Anxiety Survey

Response Options	N	%

Q3. Select all the options that apply to your pain distress experience.

	N	%
1. A rejection episode, or episodes, where significant others have placed constraints on listening to you talk about your pain, and/or the extent you received their comforting support.	36	29.8%
2. Some limitations in your normal daily activities, including household chores, shopping, work-related activities, and family and social life.	79	65.3%
3. Thoughts that your satisfaction with life has been diminished.	68	56.2%
4. Pain intensity level Increased with stress.	62	51.2%

These are the frequencies of the first four response options for the anxiety survey's multi-selection screening item. From: Musculoskeletal Pain Distress Survey – (N = 121)

Table 4 on the frequency results for the response options in the multi-selection screening item in the depression survey is presented on the next4 on the frequency results for the response options in the multi-selection screening item in the depression survey is presented next.

Table 4
Screening Item: Participants' Frequencies of Encountered Psychosocial Issues in the Depression Survey

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Response Options	N	%
Q3. Select all the options that apply to your pain distress experience.		
1. A rejection episode, or episodes, where significant others have placed constraints on listening to you talk about your pain, and/or the extent you received their comforting support.	41	36.9%
2. Some limitations in your normal daily activities, including household chores, shopping, work-related activities, and family and social life.	73	65.8%
3. Thoughts that your satisfaction with life has been diminished.	69	62.2%
4. Pain intensity level Increased with stress.	60	54.1%

These are the frequencies of the first four response options for the depression survey's multi-selection screening item. From: Musculoskeletal Pain-related Depressed Mood Survey – (N = 111)

Sampling Frequencies in the Anxiety Sample. The data-set from the anxiety survey is comprised of a total of 121 participants out of 540 recruited respondents, who were contacted by the online host to complete the screened Musculoskeletal Pain Distress Survey. The survey completion rate was 22.4%. Most respondents were disqualified because they failed to meet the survey's stringent eligibility criteria, while others abandoned the survey.

Single Missing Responses in the Anxiety Survey Data-set. The data set Musculoskeletal Pain Distress Survey revealed five surveys had skipped items, which included a single respondent with a missing item response in the Satisfaction with Life Scale (SWLS), three respondents with a single missing item response in the Quality of Life Scale QOLS), and a respondent with a missing item response in the age range demographic. The issue involving the missing response in the age range demographic can be resolved by simply creating a response option that read "Prefer not to answer". A cursory review of the other missing item responses in the SWLS and QOLS revealed their values could be estimated from existing responses within the data-set. However, because the study was oversampled, these changes were waived. In addition, SPSS software systematically excluded these missing items in the analyses. Table 5 identifies the missing items in the anxiety survey's data-set.

Table 5

Missing or Skipped Items in the Anxiety Episodes Data-set

Participant #	Question	Scale	Item
110	Q29	Satisfaction with Life Scale	Last Item of 5-Items
7	Q30	Quality of Life Scale	Single Item Scale
27	Q30	Quality of Life Scale	Single Item Scale
102	Q30	Quality of Life Scale	Single Item Scale
13	Q31	Age Range Demographic	Single Item Scale

Demographic Frequencies in the Anxiety Survey's Sample. The respondents in data sample were 18 years of age and older. Their age range spanned 21.5% in the 18-29 years of age range, 32.2% in the 30-44 years of age range, 27.3% in the 45-60 years of age range, and 18.2% were older than 60 years of age. The survey respondents included 72.7% females and 27.3% males. The percentages of respondents with recurrent pain resulting from a musculoskeletal injury was 53.7%, and 46.3% from recently diagnosed musculoskeletal conditions. Table 6 identifies these demographics by the number of participants and percentages comprising each demographic category.

Table 6
Frequencies in Demographics for the Anxiety Survey

	N	%
Pain related Anxiety Episodes	121	100%
Age Range	121	100%
18-29	26	21.5%
30-44	39	32.2%
45-60	33	27.3%
60 >	22	18.2%
Prefer not to answer	1	00.8%
Gender	121	100%
Female	88	72.7%
Male	33	27.3%
General Musculoskeletal D_X	121	100%
Injury	65	53.7%
Condition	56	46.3%

Sampling Frequencies in the Depressed Mood Sample. The data-set from the depression survey is comprised of a total of 111 participants out of 534 recruited respondents by the online host, who were contacted to complete the screened Musculoskeletal Pain-related Depressed Mood Survey. The survey completion rate was 22.3%. Most respondents were disqualified because they failed to meet the survey's stringent eligibility criteria, while others abandoned the survey.

Single Missing Responses in the Depression Data-set. The Musculoskeletal Pain-related Depressed Mood Survey data set revealed five surveys included skipped items, which included two respondents with a missing single item response in the Satisfaction with Life Scale (SWL), one respondent with a missing single item response in the Quality of Life Scale (QOL), a respondent with a missing single item response in

the age range demographic, and a respondent with a missing single item response in the gender demographic. The issues involving the missing responses in age range and gender can be resolved by adding a response option that read "Prefer not to answer". A cursory review of the other missing item responses in the SWLS and QOLS revealed their values could be estimated from existing responses within the data-set. However, because the study was oversampled, these changes were waived. In addition, SPSS software systematically excluded these missing items in the analyses. Table 7 identifies the missing items in data set of the depression survey.

Table 7
Missing or Skipped Items in the Depressed Mood Episodes Data-set
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.Participant #	Question	Scale	Item .
90	Q26	Satisfaction with Life Scale	Second Item of 5 Items
93	Q29	Satisfaction with Life Scale	Last Item of 5 Items
19	Q30	Quality of Life Scale	Single Item Scale
89	Q31	Age Range Demographic	Single Item Scale
89	Q32	Gender Demographic	Single Item Scale

Demographic Frequencies in the Depression Survey's Sample. The respondents in the data sample were 18 years of age and older. Their age range spanned 23.6% in the 18-29 years of age range, 26.3% in 30-44 years of age range, 36.4% in the 45-60 years of age range, and 13.6% were older than 60 years of age. Survey respondents included 52.7% females and 47.3% males. The percentages of survey respondents with recurrent pain resulting from a musculoskeletal injury was 58.6%, and 41.4% from musculoskeletal conditions. See Table 8 below.

Table 8

Frequencies in Demographics for the Depression Survey

	N	%
Pain-related Depressed Mood	111	100%
Age Range	111	100%
18-29	26	23.6%
30-44	29	26.3%
45-60	40	36.4%
60 >	15	13.6%
Prefer not to answer	1	00.9%
Gender	111	100%
Female	58	52.7%
Male	52	47.3%
Prefer not to answer	1	00.9%
General Pain Diagnosis	111	100%
Injury	65	58.6%
Condition	46	41.4%

Preliminary Analyses: Representativeness in the Anxiety Survey Sample

To test for the representativeness in the sample of the Musculoskeletal Pain

Distress Survey, I conducted a 1 Sample Chi-Square Test. The results for each of the

survey's variables are summarized as follows.

Anxiety Episodes: 1 Sample Chi-Square Test Results. The test found χ^2 *(14)* =

89.868*, p = 000, with* 0 cells (0.0%) having expected frequencies less than 5. The

minimum expected cell frequency was 8.1.

Age Range: 1 Sample Chi-Square Test Results. The test found χ^2 *(3)* = 5.667*,*

p = .129, with 0 cells (0.0%) having expected frequencies less than 5. The minimum

expected cell frequency was 30.0.

Gender: 1 Sample Chi-Square Test Results. The test found χ^2 *(1)* = 25.000, *p* = .000,* 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 60.5.

General Musculoskeletal Diagnosis: 1 Sample Chi-Square Test Results. The test found χ^2 *(1)* = .669, *p* = .413; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 60.5.

Pain Intensity: 1 Sample Chi-Square Test Results. The test found χ^2 *(12)* = 119.339, *p* = .000, with* 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 9.3.

Pain Interference: 1 Sample Chi-Square Test Results. The test found χ^2 *(15)* = 108.686, *p* = .000, with* 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 7.6.

Perceived Rejection: 1 Sample Chi-Square Test Results. The test found χ^2 *(30)* = 61.669, *p* = .001, with 31 cells (100.0%) having expected frequencies less than 5. The minimum expected cell frequency was 3.9.

Quality of Life: 1 Sample Chi-Square Test Results. The test found χ^2 *(10)* = 103.492[g], *p* = .000, with* 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 10.7 χ^2 *(10)* = 103.492[g], *p* = .000, with* 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 10.7.

Satisfaction with Life: 1 Sample Chi-Square Test Results. The test found χ^2 *(27)* = 46.600*, p* = .011, with 28 cells (100.0%) having expected frequencies less than 5. The minimum expected cell frequency was 4.

Preliminary Analyses: Representativeness in the Depression Survey Sample

To test for the representativeness in the sample of the Musculoskeletal Pain-related Depressed Mood Survey, I conducted a 1 Sample Chi-Square Test. The results for each of the survey's variables are summarized as follows.

Depressed Mood *Episodes:* 1 Sample **Chi-Square Test Results.** The test found χ^2 *(15)* = 45.973*, p* = .000; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 6.9.

Age Range: 1 Sample Chi-Square Test Results. The test found χ^2 *(3)* = 11.527*, p* = .009; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 27.5.

Gender: 1 Sample Chi-Square Test Results. The test found χ^2 *(1)* = .327*, p* = .567; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 55.0.

General Musculoskeletal Diagnosis: 1 Sample Chi-Square Test Results. The test found χ^2 *(1)* = 3.252*, p* = .071; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 55.5.

Pain Intensity: 1 Sample Chi-Square Test Results. The test found χ^2 *(11)* = 69.649*, p* = .000; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 9.3.

Pain Interference: 1 Sample Chi-Square Test Results. The test found χ^2 *(16)* = 49.964[f]*, p* = .000; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 6.5.

Perceived Rejection: 1 Sample Chi-Square Test Results. The test found χ^2 *(20)* = 60.126*, p* = .000; with 29 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 3.8.

Quality of Life: 1 Sample Chi-Square Test Results. The test found χ^2 (10) = 36.600, p = .000; with 0 cells (0.0%) having expected frequencies less than 5. The minimum expected cell frequency was 10.0.

Satisfaction with Life: 1 Sample Chi-Square Test Results. The test found χ^2 *(29)* = 38.798[i]*, p* = .106; with 30 cells (100.0%) having expected frequencies less than 5. The minimum expected cell frequency was 3.6.

Descriptive Statistics used in the Study

Univariate and bivariate analyses were conducted on the data from both surveys. The results of descriptive univariate analyses provided statistics on each variable's mean, standard deviation, and score range. In addition, a descriptive univariate analysis of the dependent variable in each survey provided tests of normality, a requirement for bivariate and multivariate analyses in both samples. The descriptive bivariate analyses included simple linear regression, Pearson's correlation, and 2-tailed tests of significance. And the descriptive multivariate analyses included Pearson's correlation and 2-tailed tests of significance in the hierarchical multiple regression analyses of data from both survey. The results of these analyses are presented as follows.

Results of Descriptive Analyses of Variables in the Anxiety Survey

Descriptive univariate analyses provided the following values for the mean, standard deviation, and the range of respondents' scores in scale-items measuring the dependent variable and independent variables in the Musculoskeletal Pain Distress Survey.

Frequency of Anxiety Episodes. Univariate analyses provided the following values for the mean, standard deviation, and the range of respondents' scores in scale-items measuring anxiety episodes. The results included a mean score of 12.65, a standard deviation of 2.72, and a score range of 16, or 4–20.

Perceived Rejection in Social Networks. The analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring perceived rejection indicated a mean score of 22.66, a standard deviation of 7.49, and a score range of 32, or 8–40.

Quality of Life in Daily Activity Level. Analyses on the mean, standard deviation, and the range of respondents scores in scale-items measuring quality of life revealed a mean score of 9.08, a standard deviation of 2.23, and a score range of 10, or 1–11.

Satisfaction with Life while living with Pain and Distress. Analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring current satisfaction with life found a mean score of 5.16, a standard deviation of 2.16, and a score range of 29, or 5–34.

Recent Pain Intensity Levels. The univariate analyses on the mean, standard deviation, and the range of respondents scores in scale-items measuring pain intensity in indicated a mean score of 5.16, a standard deviation of 2.16, and a score range of 12, or 3–15.

Extent of Recent Pain Interference. Univariate analyses on the mean, standard deviation, and the range of respondents scores in scale-items measuring pain interference revealed a mean score of 5.16, a standard deviation of 2.16, and a score range of 16, or 3–15.

General Type of Musculoskeletal Pain Diagnosis. The analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring general musculoskeletal diagnosis found a mean score of 1.45, a standard deviation of .50, and a score range of 1, or 1–2.

Age Range of Survey Participants. Univariate analyses on the mean, standard deviation, and the range of respondents scores in scale-items measuring Age Range indicated a mean score of 3.43, a standard deviation of 1.03, and a score range of 3, or 2–5.

Gender of Survey Participants. Analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring gender revealed a mean score of 1.45, a standard deviation of .50, and a score range of 1, or 1–2.

See Table 9 below.

Table 9
Descriptive Statistics for the Anxiety Survey

	N	Range	*Minimum*	Maximum	Mean	Std. Deviation
ANXIETY EPISODES	121	16.00	4.00	20.00	12.6529	2.72247
Age Range	120	3.00	2.00	5.00	3.4250	1.02623
Gender	121	1.00	1.00	2.00	1.7273	.44721
Pain Intensity	121	12.00	3.00	15.00	9.0826	2.23453
Pain Interference	121	16.00	4.00	20.00	13.6694	3.50806
Musculoskeletal Diagnosis	121	1.00	1.00	2.00	1.4628	.50069
Perceived Rejection	121	32.00	8.00	40.00	22.6612	7.48393
Quality Of Life	118	10.00	1.00	11.00	5.1610	2.16803
Satisfaction With Life	120	29.00	5.00	34.00	17.9000	6.97703
Valid N (List-wise)	116					

Results of Descriptive Analyses of Variables in the Depression Survey

Descriptive univariate analyses provided the following values for the mean, standard deviation, and the range of respondents' scores in scale-items measuring the dependent variable and independent variables in the Musculoskeletal Pain-related Depressed Mood Survey.

Frequency of Depressed Mood Episodes. The univariate analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring depressed mood episodes indicated a mean score of 12.43, a standard deviation of 3.57, and a range of 16, or 4–20.

Perceived Rejection in Social Networks. The analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring perceived rejection revealed a mean score of 23.56, a standard deviation of 7.24, and a range of 32, or 8–40.

Quality of Life in Daily Activity Level. Analyses on the mean, standard deviation, and the range of respondents scores in scale-items measuring quality of life revealed a mean score of 9.08, a standard deviation of 2.23, and a score range of 10, or 1–11.

Satisfaction with Life while living with Pain and Distress. Analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring current satisfaction with life indicated a mean score of 19.15, a standard deviation of 7.81, and a range of 30, or 5–35.

Recent Pain Intensity Levels. The analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring pain intensity revealed a mean score of 8.77, a standard deviation of 2.28, and a range of 12, or 3–15.

Extent of Recent Pain Interference. Univariate analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring pain interference found a mean score of 13.58, a standard deviation of 3.76, and a range of 16, or 4–20.

General Type of Musculoskeletal Pain Diagnosis. Analysis on the mean, standard deviation, and the range of respondents' scores in scale-items measuring general musculoskeletal diagnosis had a mean score of 1.41, a standard deviation of .49, and a range of 1, or 1–2.

Age Range of Survey Participants. Univariate analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring the demographic of participants' age range indicated a mean score of 3.40, a standard deviation of .997, and a range of 3, or 2–5.

Gender of Survey Participants. Analyses on the mean, standard deviation, and the range of respondents' scores in scale-items measuring the gender of survey participants revealed a mean score of 1.53, a standard deviation of .50, and a range of 1, or 1–2.

See Table 10 below.

Table 10
Descriptive Statistics for the Depressed Mood Survey

	N	Range	Minimum	Maximum	Mean	Std. Deviation
DEPRESSED MOOD EPISODES	111	16.00	4.00	20.00	12.4324	3.56911
Age Range	110	3.00	2.00	5.00	3.4000	.99724
Gender	110	1.00	1.00	2.00	1.5273	.50154
Pain Intensity	111	12.00	3.00	15.00	8.7748	2.27909
Pain Interference	111	16.00	4.00	20.00	13.5766	3.76237
Musculoskeletal Diagnosis	111	1.00	1.00	2.00	1.4144	.49485
Perceived Rejection	111	32.00	8.00	40.00	23.5586	7.24341
Quality of Life	110	10.00	1.00	11.00	5.7091	2.73390
Satisfaction With Life	109	30.00	5.00	35.00	19.1468	7.81241
Valid N (List-wise)	107					

Results of Bivariate Analyses of Variables in the Anxiety Survey

Bivariate analyses of the data from the anxiety episodes survey included simple linear regression analyses with Pearson's correlation coefficient and 2-tailed tests for significance. These results indicate the extent that the variables are interrelated with one another, the extent of their inter-correlations, and levels of significance. I present the results of these tests in the anxiety survey next.

Anxiety Episodes: **Significant & Nonsignificant Correlations.** Simple linear regression analyses and bivariate Pearson's correlation coefficient and 2-tailed tests for

significance found strong significant positive correlations between the anxiety episodes outcome variable and one of the psychosocial variables, viz., perceived rejection (r = .565, p = .000, p < .01), and two of the covariate variables, i.e., pain interference (r = .523, p = .000, p < .01) and pain intensity (r = .445, p = .000, p < .01). In addition, a weak significant correlation was found for the relationship between anxiety episodes and the demographic age range (r = -.177, p = .026, p < .05).

The remaining psychosocial variables, viz., quality of life (r = -.136, *sig*: .070, p < .05) and satisfaction with life (r = .084, p = .180, p < .05), were found not to be significantly correlated with anxiety episodes. Likewise, the remaining covariate variable, general musculoskeletal diagnosis (r = -.028, p = .381, p < .05) was found not to be correlated with anxiety episodes or significant. In addition, the demographic gender (r = .011, p = .454, p < .05) was found not to be significantly correlated.

Perceived Rejection: Significant & Nonsignificant Correlations. Perceived rejection was significantly correlated in an extremely strong positive relationships with anxiety episodes (r = -.565, p = .000, p < .01), and the covariates, pain intensity (r = -.341, p = .000, p < .01), pain interference (r = -.424, p = .000 p < .01). In addition, it was also was significantly correlated in a moderate inverse relationship with the demographic, age range (r = -.181, p = .048 p < .05). Perceived rejection was not significantly correlated in relationships with the predictors, quality of life (r = -.122, p = .187 p <, 05), satisfaction with life (r = -.010, p = .912 p < .05), the covariate, general musculoskeletal diagnosis (r = -.109, p = .234 p < .05), and the demographic, gender (r = .094, p = .304 p < .05).

Life Quality Correlations. Quality of life was significantly correlated in moderate inverse relationships with satisfaction with life ($r = -.202$, $p = .029$, $p < .05$) and gender ($r = -.260$, $p = .005$ $p < .01$). quality of life was not significantly correlated in relationships with the outcome variable, anxiety episodes ($r = -.136$, $p = .141$, $p < .05$), the predictor variable, perceived rejection ($r = -.122$, $p = .187$ $p < .05$), the covariates, pain intensity ($r = .035$, $p = .706$ $p < .05$), pain interference ($r = -.041$, $p = .656$ $p < .05$), and general musculoskeletal diagnosis ($r = -.032$, $p = .734$ $p < .05$), and the demographic, age range ($r = .155$, $p = .096$ $p < .05$).

Life Satisfaction Correlations. Satisfaction with life was significantly correlated in a moderate inverse relationship with quality of life ($r = -.202$, $p = .029$, $p < .05$). Satisfaction with life was not significantly correlated in positive relationships with the outcome variable, anxiety episodes ($r = .084$, $p = .360$, $p < .05$), the predictor variable, perceived rejection ($r = .010$, $p = .912$, $p < .05$), the covariates, pain intensity ($r = .094$, $p = .305$, $p < .05$), pain interference ($r = -.015$, $p = .870$ $p < .05$), and general musculoskeletal diagnosis ($r = -.148$, $p = .107$ $p <. 05$), and the demographic, age range ($r = -.087$, $p = .346$, $p < .05$) and gender ($r = -.116$, $p = .208$, $p < .05$).

Pain Intensity: Significant & Nonsignificant Correlations. Pain intensity was significantly correlated in strong positive relationships with the outcome variable, anxiety episodes ($r = -.453$, $p = .000$, p), the predictor variable, perceived rejection ($r = -.341$, $p = .000$, $p < .01$), and the covariate, pain interference ($r = -.686$, $p = .000$, $p < .01$). pain intensity was not significantly correlated in relationships with the predictors, quality of life ($r = .035$, $p = .706$ $p < .05$) and satisfaction with Life ($r = .094$, $p = .305$, $p < .05$), the

covariate, general musculoskeletal diagnosis ($r = -.042$, $p = .648$, $p < .05$), and the demographics, age range ($r = .1$ 67, $p = .068$, $p < .05$), and gender ($r = -.119$, $p = .194$, $p < .05$).

Pain Interference: Significant & Nonsignificant Correlations. Pain interference was significantly correlated in strong positive relationships with the outcome variable, anxiety episodes ($r = -.523$, $p = .000$, $p < .01$), the predictor variable, perceived rejection ($r = -.424$, $p = .000$, $p < .01$), and the covariate, pain intensity ($r = -.686$, $p = .000$, $p < .01$). Pain interference was not correlated in relationships with was not correlated in relationships with the predictors, quality of life ($r = -.041$, $p = .656$ $p < .05$) and satisfaction with life ($r = -.015$, $p = .870$ $p < .05$), the covariate, general musculoskeletal diagnosis ($r = -.012$, $p = .898$, $p < .05$), and the demographics, age range ($r = .022$, $p = .812$, $p < .05$), and gender ($r = .006$, $p = .950$, $p < .05$).

General Musculoskeletal Diagnosis: Significant & Nonsignificant Correlations. General musculoskeletal diagnosis was not significantly correlated with any of the variables in the study on pain-related anxiety episodes. More specifically, this variable was not significantly correlated in relationships with the outcome variable, anxiety episodes ($r = -.028$, $p = .761$, $p < .05$), the predictor variables, perceived rejection ($r = -.109$, $p = .234$ $p < .05$), quality of life ($r = -.032$, $p = .734$ $p < .05$), and satisfaction with life ($r = -.148$, $p = .107$ $p < .05$), the covariates, pain intensity ($r = -.042$, $p = .648$, $p < .05$), pain interference ($r = -.012$, $p = .898$, $p < .05$), and the demographics, age range ($r = .118$, $p = .200$, $p < .05$), and gender ($r = .010$, $p = .912$, $p < .05$).

Age Range: Significant & Nonsignificant Correlations. Age range was significantly correlated in a positive relationship with Perceived Rejection (r = -.181, p = .045, p < .05). Age range was not significantly correlated in relationships with the outcome variable, anxiety episodes (r = -.177, p = .052, p < .05), or with the predictors, quality of life (r = .155, p = .096 p < .05) and satisfaction with life (r = -.087, p = .346, p < .05), nor with the covariates, pain intensity (r =.1 67, p = .068, p < .05), pain interference (r = .022, p = .812, p < .05), and general musculoskeletal diagnosis (r = .118, p = .200, p < .05), or with the demographic, gender (r = .019, p = .839, p < .05).

Gender: Significant & Nonsignificant Correlations. Gender was significantly correlated in a weak inverse relationship with quality of life (r = -.181, p = .045, p < .01). Gender was not significantly correlated in relationships with the outcome variable, anxiety episodes (r = .011, p = .908, p < .05), the predictors, perceived rejection (r = .094, p = .304 p < .05) and satisfaction with life (r = -.116, p = .208, p < .05), nor with the covariates, pain intensity (r = -.119, p = .194, p < .05) and pain interference (r = .006, p = .950, p < .05), and general musculoskeletal diagnosis (r = .010, p = .912, p < .05), or with the demographics, age range (r = .019, p = .839, p < .05).

In Table 11 below, I present these statistical findings as follows.

Table 11

Descriptive Statistics & Pearson's Correlations between Variables in the
Musculoskeletal Pain Distress Survey (N = 121)

.	Variables	M	SD	Range	1	2	3	4	5	6	7	8	9
1.	Anxiety Episodes	12.65	2.72	4 – 20	--								
2.	Perceived Rejection	22.66	7.48	8 – 40	.565**	--							
3.	Quality of Life	5.16	2.16	1 – 11	-.136	-.122	--						
4.	Satisfaction with Life	17.90	6.97	5 – 34	.084	.010	.202*	--					
5.	Pain Intensity	9.08	2.23	3 – 15	.453**	.341**	.035	.094	--				
6.	Pain Interference	13.67	3.50	4 – 20	.523**	.424**	-.041	-.015	.686	--			
7.	General Pain Diagnosis	1.46	.50	1 – 2	-.028	-.109	-.032	-.148	-.042	-.012	--		
8.	Age Range	3.43	1.03	2 – 5	-.177	-.181*	.155	-.087	.167	.022	.118	--	
9.	Gender	1.73	.45	1 – 2	.011	.094	-.260*	-.116	-.119	.006	.010	.019	--

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* Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

Results of Bivariate Analyses of Variables in the Depression Survey

Bivariate analyses of the data from the depressed mood episodes survey included simple linear regression analyses with Pearson's correlation coefficient and 2-tailed tests for significance. These results indicate the extent that the variable are interrelated with one another, the extent of their inter-correlations, and levels of significance. I present the results of these tests in the depressed mood survey as follows.

Depressed Mood Episodes: Significant & Nonsignificant Correlations.

Simple Linear Regression Analyses and Bivariate Pearson's Correlation Coefficient and 2-tailed Tests for Significance found strong significant positive correlations between the outcome variable depressed mood episodes and one of the psychosocial variables, viz., perceived rejection ($r = .560$, $p = .000$, $p < .01$), and two of the covariate variables, i.e., pain interference ($r = .623$, $p = .000$, $p < .01$) and pain intensity ($r = .445$, $p = .000$, $p < .01$). Moderate significant inverse correlations were found for the relationship between

depressed mood episodes and both of the remaining psychosocial variables, i.e., quality of life ($r = -.217$, $p = .011$, $p < .05$) and satisfaction with life ($r = -.203$, $p = .017$, $p < .05$). In addition, a weak significant inverse correlations was found for the relationship between depressed mood episodes and the demographic, age range ($r = -.177$, $p = .026$, $p < .05$). The remaining covariate variable, general musculoskeletal diagnosis ($r = -.006$, $p = .474$, $p < .05$) was found not to be significantly correlated with depressed mood episodes. In addition, the demographic gender ($r = -.050$, $p = .301$, $p < .05$) was found not to be significantly correlated.

Perceived Rejection: Significant & Nonsignificant Correlations. Perceived rejection was significantly correlated in strong positive relationships with the outcome variable depressed mood episodes ($r = -.560$, $p = .000$), and two covariates pain intensity ($r = .312$, $p = .001$, $p < .01$) and pain interference ($r = -.423$, $p = .000$, $p < .01$). In addition, perceived rejection was significantly correlated in a moderate inverse relationship with age range ($r = -.209$, $p = .029$, $p < .05$). The predictor variables, quality of life ($r = -.169$, $p = .078$, $p < .05$) and satisfaction with life ($r = .002$, $p = .986$, $p < .05$) were found not to be significantly correlated with perceived rejection. In addition, the covariate variable, general musculoskeletal diagnosis ($r = .021$, $p = 826$, $p < .05$) and the demographic variable, gender ($r = .008$, $p = .930$, $p < .05$) were found not to be significantly correlated with perceived rejection.

Quality of Life: Significant & Nonsignificant Correlations. Quality of life was significantly correlated in a moderate inverse relationship with the outcome variable depressed mood episodes ($r = -.217$, $p = .023$, $p < .05$) and a moderate positive

relationship with the predictor variable satisfaction with life ($r = .209$, $p = .030$, $p < .05$) at the 0.05 level. The remaining predictor variable, perceived rejection ($r = -.169$, $p = .078$, $p < .05$), was not significantly correlated with quality of life; as were the three covariates pain intensity ($r = .140$, $p = .144$, $p < .05$), pain interference ($r = -.183$, $p = .056$, $p < .05$), and general musculoskeletal diagnosis ($r = -.183$, $p = .056$, $p < .05$), and the two demographics, age range ($r = -.024$, $p = .803$, $p < .05$) and gender ($r = .045$, $p = .642$, $p < .05$).

Satisfaction with Life: Significant & Nonsignificant Correlations. Satisfaction with life was significantly correlated in moderate inverse relationships with the outcome variable depressed mood episodes ($r = -.203$, $p = .035$, $p < .05$), and with the predictor variable quality of life ($r = .209$, $p = .030$, $p < .05$). The remaining predictor variable, perceived rejection ($r = .002$, $p = .986$, $p < .05$), was not significantly correlated with quality of life; as were the three covariates pain intensity ($r = .037$, $p = .706$, $p < .05$), pain interference ($r = -.142$, $p = .140$, $p < .05$), and general musculoskeletal diagnosis ($r = -.088$, $p = .364$, $p < .05$), and the two demographics, age range ($r = -.151$, $p = .119$, $p < .05$) and gender ($r = .067$, $p = .490$, $p < .05$).

Pain Intensity: Significant & Nonsignificant Correlations. Pain intensity was significantly correlated in extremely strong positive relationships with the outcome variable depressed mood episodes ($r = .458$, $p = .000$, $p < .01$), the predictor variable, perceived rejection ($r = .312$, $p = .001$, $p < .01$, $p < .01$), and the covariate pain interference ($r = -.496$, $p = .000$, $p < .01$) at the 0.01. The predictor variables, quality of life ($r = 140$, $p = .144$, $p < .05$) and satisfaction with life ($r = .037$, $p = .706$, $p < .05$)

were found not to be significantly correlated with pain intensity, as were the covariate variable, general musculoskeletal diagnosis ($r = .092$, $p = 339$, $p < .05$) and the demographic variables, age range ($r = -.018$, $p = .854$, $p < .05$) and gender ($r = .069$, $p = .473$, $p < .05$).

Pain Interference: Significant & Nonsignificant Correlations. Pain interference was significantly correlated in very strong positive relationships with the outcome variable depressed mood episodes ($r = .623$, $p = .000$, $p < .01$), the predictor variable, perceived rejection ($r = .423$, $p = .000$, $p < .01$), and the covariate pain interference ($r = -.496$, $p = .000$, $p < .01$). The predictor variables, quality of life ($r = -.183$, $p = .056$, $p < .05$) and satisfaction with life ($r = -.142$, $p = .140$, $p < .05$) were found not to be significantly correlated with pain interference, as were the covariate variable, general musculoskeletal diagnosis ($r = .154$, $p = 107$, $p < .05$) and the demographic variables, age range ($r = -.084$, $p = .383$, $p < .05$) and gender ($r = -.081$, $p = .397$, $p < .05$).

General Musculoskeletal Diagnosis: Significant & Nonsignificant Correlations. General musculoskeletal diagnosis was not significantly correlated with any of the variables in the study on pain-related depressed mood episodes. More explicitly, this variable was not significantly correlated with the outcome variable depressed mood episodes ($r = .011$, $p = .910$, $p < .05$), and with the predictor variables, perceived rejection ($r = .021$, $p = .826$, $p < .05$), quality of life ($r = -.183$, $p = .056$, $p < .05$) and satisfaction with life ($r = -.088$, $p = .364$, $p < .05$), nor with the covariates, pain intensity ($r = .092$, $p = 339$, $p < .05$), pain interference ($r = .154$, $p = 107$, $p < .05$), or

with the demographic variables, age range ($r = .130$, $p = .175$, $p < .05$) and gender ($r = .047$, $p = .625$, $p < .05$.

Age Range: Significant & Nonsignificant Correlations. Age range was significantly correlated in moderate inverse relationships with the outcome variable, depressed mood ($r = -.225$, $p = .018$, $p < .05$), and with the predictor variable, perceived rejection ($r = -.209$, $p = .029$, $p < .05$). Age range was not significantly correlated in relationships with the predictors, quality of life ($r = -.024$, $p = .803$, $p < .05$) and satisfaction with life ($r = -.151$, $p = .119$, $p < .05$), nor with the covariates, pain intensity ($r = -.018$, $p = .854$, $p < .05$), pain interference ($r = -.084$, $p = .383$, $p < .05$), and general musculoskeletal diagnosis ($r = .130$, $p = .175$, $p < .05$), or with the demographic, gender ($r = .033$, $p = .732$, $p < .05$).

Gender: Significant & Nonsignificant Correlations. Gender was not significantly correlated with any of the variables in the study on pain-related depressed mood episodes. More specifically, this variable was not significantly correlated with in relationships with the outcome variable, depressed mood ($r = -.050$, $p = .602$, $p < .05$),and with the predictor variables, perceived rejection ($r = .008$, $p = .930$, $p < .05$), quality of life ($r = .008$, $p = .930$, $p < .05$) and satisfaction with life ($r = .067$, $p = .490$, $p < .05$), nor with the covariates, pain intensity ($r = .069$, $p = .473$, $p < .05$), pain interference ($r = -.081$, $p = .397$, $p < .05$), general musculoskeletal diagnosis ($r = .047$, $p = .625$, $p < .05$), or with the demographic variable, age range ($r = .033$, $p = .732$, $p < .05$).

In Table 12 below, I present the results of these tests in the depressed mood survey

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Table 12

Descriptive Statistics & Pearson's Correlations between Variables in the
Musculoskeletal Pain Depressed Mood Survey (*N = 111*)

. Variables	M	SD	Range	1	2	3	4	5	6	7	8	9
1. Depression Episodes	12.43	3.57	4 – 20	--								
2. Perceived Rejection	23.56	7.24	8 – 40	.560**	--							
3. Quality of Life	5.71	2.73	1 – 11	-.217*	-.169	--						
4. Satisfaction with Life	19.15	7.81	5 – 35	-.203*	.002	.209*	--					
5. Pain Intensity	8.77	2.28	3 – 15	.458**	.312**	.140	.037	--				
6. Pain Interference	13.58	3.76	4 – 20	.623**	.423**	-.183	-.142	.496**	--			
7. General Pain Diagnosis	1.41	.49	1 – 2	.011	.021	-.183	-.088	.092	.154	--		
8. Age Range	3.40	.997	2 – 5	-.225*	-.209*	-.024	-.151	-.018	-.084	.118	--	
9. Gender	1.53	.50	1 – 2	-.050	.008	.045	.067	.069	-.081	.047	.033	--

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

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

Evaluation of Assumptions

Prior to the multiple regression analyses of the data in both surveys, the assumptions of linearity, normally distributed errors, and uncorrelated errors were investigated. These results are presented next.

Results of Tests of Linearity in the Anxiety Survey. Scatterplots showed a linear relationship between each independent variable and the dependent variable in the anxiety survey. Copies of the scatter-plots are available in the showed a linear relationship between each independent variable and the dependent variable in the anxiety survey.

Results of Tests of Linearity in the Depressed Mood Survey. Scatterplots showed a linear relationship between each independent variable and the dependent variable in the depressed mood survey.

Results of Tests of Normality in Anxiety Episodes. In the anxiety study, alpha = .05, and In the Kolmogorov-Smirnov Test the *p*-value = .000, therefore, because the *p*-value of significance is small or less than .001, we can assume the data is normally distributed, and reject the null hypotheses. In the Shapiro-Wilks Test of Normality, which is considered a better test of normality, the *p*-value = .043, therefore, because the *p*-value of significance is small or less than .05, we can presume the data is not normally distributed, and reject the null hypotheses. However, in the test for homoscedasticity the normality plot showed the observed residuals values lied closely to the diagonal line and indicated a normal distribution. Table 13 follows.

Table 13
Results of Tests of Normality in Anxiety Episodes

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ANX	.116	121	.000	.978	121	.043

a. Lilliefors Significance Correction

Results of Tests of Normality in Depressed Mood Episodes. In the depressed mood study, alpha = .05, in the Kolmogorov-Smirnov Test the *p*-value = .008, therefore, because the *p*-value of significance is small or less than .05, we can assume the data is normally distributed, and reject the null hypotheses. In the Shapiro-Wilks Test of

Normality the *p*-value = .092, therefore, because the *p*-value of significance is large or

more than .05, we can presume the data is normally distributed, and accept the null

hypothesis. In the test for homoscedasticity the normality plot showed the observed

residuals values lied closely to the diagonal line and indicated a normal distribution.

Table 14 follows.

Table 14
Results of Tests of Normality in Depressed Mood Episodes

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	*Statistic*	df	Sig.
Depression	.100	111	.008	*.980*	111	.092

a. Lilliefors Significance Correction

Multiple Regression Results for Multicollinearity in the Anxiety Survey. The

variance inflation factor (VIF) test indicated 6 of 8 independent variables (IV) were less

than 2.0, and the collinearity tolerance (CT) indicated 5 of 8 IVs were greater than .76,

thereby suggesting that those estimated *ßs* are well established. In addition, because the

VIF showed 8 IVs are more precisely less than 2.2, and this suggested there is no

multicollinearity. The CT level for age range was .855, which is greater than .76, and the

VIF level was 1.170, which is less than 2.0. The tolerance level for gender (.892) was

greater than .76, and the VIF level (1.052) was less than 2.0. The tolerance level for

general musculoskeletal diagnosis (.951) was greater than .76, and the VIF level (1.052)

was less than 2.0. Remarkably, the tolerance level for pain intensity (.458) was less than

.76, and the VIF level (2.182) was greater than 2.0. Likewise, the tolerance level for pain

interference (.470) was less than .76, and the VIF level (2.128) was greater than 2.0. The

tolerance level for perceived rejection (.757) was less than .76, however the VIF level

(1.320) was less than 2.0. The tolerance level for quality of life (.873) was greater than

.76, and the VIF level (1.145) was less than 2.0. And the tolerance level for satisfaction

with life (.905) was greater than .76, and the VIF level (1.105) was less than 2.0. See

Table 15 below.

Table 15
Multicollinearity Statistics of Independent Variables in the Anxiety Survey

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Independent Variable	Tolerance	VIF
Age Range	.855	1.170
Gender	.892	1.121
General Musculoskeletal Diagnosis	.951	1.052
Pain Intensity	.458	2.182
Pain Interference	.470	2.128
Perceived Rejection	.757	1.320
Quality of life	.873	1.145
Satisfaction with Life	.905	1.105

The variance inflation factor (6 of 8 independent variables are less than 2.0), collinearity
tolerance (5 of 8 IVs are greater than .76) suggest that those estimated βs are well
established. And the variance inflation factor (8 IVs are more precisely less than 2.2)
suggest there is no multicollinearity.

Multiple Regression Results for Multicollinearity in the Depressed Mood

Survey. The Variance Inflation Factor (VIF) test indicated all 8 independent variables

(IV) were less than 2.0, and the Collinearity Tolerance (CT) test found 5 of 8 IVs were

greater than .76), thereby suggesting that those estimated *βs* are well established. In

addition, because the VIF showed all IVs are more precisely less than 1.8, it suggested

there is no multicollinearity. The CT level for age range was .907, which is greater than

.76, and the VIF level was 1.102, which is less than 2.0. The tolerance level for gender (.973) was greater than .76, and the VIF level (1.028) was less than 2.0. The tolerance level for general musculoskeletal diagnosis (.928) was greater than .76, and the VIF level (1.077) was less than 2.0. Remarkably, the tolerance level for pain intensity (.650) was less than .76, however, the VIF level (1.538) was less than 2.0.   Likewise, the tolerance level for pain interference (.583) was less than .76, and the VIF level (1.716) was less than 2.0. The tolerance level for perceived rejection (.757) was less than .76, yet the VIF level (1.322) was less than 2.0. The tolerance level for quality of life (.834) was greater than .76, and the VIF level (1.198) was less than 2.0. And the tolerance level for satisfaction with ;ife (.909) was greater than .76, and the VIF level (1.100) was less than 2.0. Table 16 follows.

Table 16
Multicollinearity Statistics of Independent Variables Mood Survey *in the Depressed*

Independent Variable	Tolerance	VIF
Age Range	.907	1.102
Gender	.973	1.128
General Musculoskeletal Diagnosis	.928	1.077
Pain Intensity	.650	1.538
Pain Interference	.583	1.716
Perceived Rejection	.757	1.322
Quality of life	.834	1.198
Satisfaction with Life	.909	1.100

The variance inflation factor (all 8 independent variables are less than 2.0), collinearity tolerance (5 of 8 IVs are greater than .76) suggest that those estimated βs are well established. And the variance inflation factor (all IVs are more precisely less than 1.8) suggest there is no multicollinearity.

Hierarchical Multiple Regression Results in the Anxiety & Depression Surveys

A hierarchical multiple regressions (HMR) was conducted to determine the best linear combination of the three psychosocial issues; viz., (a) perceived rejection, (b) quality of life, and (c) satisfaction with life, for predicting the frequency of pain-related distress episodes (viz., four core anxiety and four core depression symptoms) during the first four months of survey respondents' musculoskeletal pain experience. Two demographics and three covariates variables were controlled. Prior to this analysis, the assumptions of linearity, normally distributed errors, and uncorrelated errors were checked and met. The mean, standard deviation, and inter-correlations from both surveys are in Table 2 (p. 187), the descriptive statistics for the anxiety survey in Table 9 (p. 204) and the depression survey in Table 10 (p. 206), and inter-correlations for the anxiety survey in Table 11 (p. 211) and the depression survey in Table 12 (p. 216).

Results of HMR Analyses in the Anxiety Survey. The first survey examined the influence of the three psychosocial issues, i.e., perceived rejection, quality of life, and satisfaction with life, on the frequency of pain-related anxiety episodes. To examine the unique contribution of these three pain-related psychosocial issues in the explanation of the frequency of anxiety episodes, a hierarchical multiple regression analysis was performed. Variables that explain the frequency of pain-related anxiety episodes were entered in three steps. In step 1, the outcome variable, anxiety episodes, and the demographics, (1) age range and (2) gender were entered into the model equation. In step 2, the total scores from scales of the covariates, i.e., (3) pain intensity, (4) pain interference, and (5) general musculoskeletal diagnosis, were entered into the step 1

equation. In step 3, the total scores from the scales for the psychosocial variables, i.e., (6) perceived rejection, (7) quality of life, and (8) satisfaction with life were entered.

The results of step 1 indicated that the variance accounted for the adjusted coefficient of determination (R^2) with the first two independent variables (age range, and gender) equaled .03 (adjusted R^2 = .02), which was significantly different from zero ($F_{(2, 113)}$ = 1.91, p <.05). In this step, age range was the only statistically significant independent variable, β = -.14, p = .03, p <.05. In step 2, the three covariates were entered into the regression equation. The change in variance accounted for (ΔR^2) was equal to .39, which was significantly different from zero ($F_{(5, 110)}$ = 14.01, p <.05). In this step, pain intensity (β = .18, p = .02, p < .05) and pain interference (β = .28, p = .01, p <.05) were the only statistically significant independent variables. In step 3, the three psychosocial issues were entered into the regression equation. The change in variance accounted for (ΔR^2) was equal to .51, which was significantly different from zero ($F_{(8, 107)}$ = 13.91, p <.05). The unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), for the full model are reported in Table 2. Only one of the psychosocial issues contributed significantly to the explanation of anxiety episodes; viz., perceived rejection (β = .38, p = .000, p < .001). Although they contributed to the prediction model, quality of life (r = -.14, p =, 070, p < .05) and satisfaction with life (r = .08, p =, 180, p < .05) were not significantly correlated with anxiety episodes, while perceived rejection (r = .57, p =, 000, p < .001) was significantly correlated.

The combination of psychosocial variables significantly predicted frequency of anxiety episodes, $F (8, 107) = 13.92$, $p < .001$, $R^2 = .51$. Perceived rejection, ($\beta = .38$, $p = .000$, $p < .001$), quality of life, ($\beta = -.07$, $p = .338$, $p < .05$), and satisfaction with life, ($\beta = .073$, $p = .305$, $p < .05$), contributed to the prediction. The adjusted r squared value was .473, indicating that 47.3% of the variance in the frequency of distress episodes was explained by the model. According to Cohen (1988), this is a moderate effect. The beta weights presented in Table 17 suggest that perceived rejection contributes more to predicting distress episodes than does quality of life and satisfaction with life.

Table 17
Results of HMR Analysis of Variables as Predictors of Pain-related Anxiety Episodes in the Musculoskeletal Pain Distress Survey (N = 121)

.Variables	B	β	t-value	p-value
INTERCEPT	5.775		3.707	.000
1. Perceived Rejection	.136	.383	4.930	.000
2. Quality of Life	-.087	-.070	-.963	.338
3. Satisfaction with Life	.028	.073	1.030	.305
4. Pain Intensity	.218	.184	1.845	.068
5. Pain Interference	.208	.275	2.785	.006
6. General Diagnosis	.086	.016	.231	.818
7. Age Range	-.348	-.135	-1.843	.068
8. Gender	.041	.007	.096	.923

Unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), t-values, and p-values for variables as predictors of anxiety episodes

Moreover, in the third regression model, in addition with perceived rejection, the hierarchical multiple regression analysis indicated that two covariates, pain intensity and

pain interference, were also strong predictors of anxiety episodes. Cohen's correlation and two-tailed test of significance suggest that perceived rejection ($r = .593$, $p = 000$, $p < .001$) contributes more to predicting distress episodes than does pain interference ($r = .562$, $p = 000$, $p < .001$) and pain intensity ($r = .486$, $p = 000$, $p < .001$).

Results of HMR Analyses in the Depression Survey. The second survey examined the influence of the three psychosocial issues, i.e., perceived rejection, quality of life, and satisfaction with life, on the frequency of pain-related depressed mood episodes. To examine the unique contribution of pain-related psychosocial issues in the explanation of the frequency of depressed mood episodes, a hierarchical multiple regression analysis was performed. Variables that explain depressed mood episodes were entered in three steps. In step 1, (1) the outcome variable, depressed mood episodes, and (2) the demographics, age range and gender, were entered into the model equation. In step 2, the total scores from scales of the covariates, i.e., (3) pain intensity, (4) pain interference, and (5) general type of pain, were entered into the step 1 equation. In step 3, the total scores from the scales for the psychosocial variables, i.e., (6) perceived rejection, (7) quality of life, and (8) satisfaction with life were entered.

The results of step 1 indicated that the variance accounted for (R^2) with the first two independent variables (age range, and gender) equaled .05 (adjusted $R^2 = .03$), which was significantly different from zero ($F_{(2, 104)} = 2.51$, $p < .05$). Age range was the only statistically significant independent variable, $\beta = .14$, $p = .047$, $p < .05$. In step 2, the three covariates were entered into the regression equation. The change in variance accounted for ($\Delta R2$) was equal to .18, which was significantly different from zero ($F_{(5, 101)} = 17.55$,

$p < .05$). In this step, pain intensity ($\beta = .17$, $p = .056$, $p < .05$) and pain interference ($\beta = .56$, $p = .000$, $p < .001$) were the only statistically significant independent variables. In step 3, the three psychosocial issues were entered into the regression equation. The change in variance accounted for (ΔR^2) was equal to .17, which was significantly different from zero ($F_{(8, 96)} = 17.36$, $p < .05$). The unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), for the full model are reported in Table 17, as previously presented above. Only two of the psychosocial issues contributed significantly to the explanation of depressed mood episodes, perceived rejection ($\beta = .31$, $p = .000$, $p < .05$), and satisfaction with life ($\beta = -.17$, $p = .02$, $p < .05$).

The combination of psychosocial variables significantly predicted frequency of depressed mood episodes, $F(8, 98) = 17.36$, $p < .001$, $R^2 = .59$. Perceived rejection, quality of life ($\beta = -.12$, $p = .095$, $p < .05$), and satisfaction with life contributed to the prediction model. The adjusted r squared value was .552, indicating that 55.2% of the variance in frequency of distress episodes was explained by the model. According to Cohen (1988), this is a strong effect. The beta weights presented in Table 18 suggest that perceived rejection contributes more to predicting distress episodes than does quality of life and satisfaction with life. Table 18 follows.

Table 18
Results of HMR Analysis of Variables as Predictors of Pain-related Depressed Mood Episodes
In the Musculoskeletal Pain Distress Survey (N = 111)

.Variables	B	β	t-value	p-value
INTERCEPT	6.463		3.443	.001
1. Perceived Rejection	.151	.307	4.108	.000
2. Quality of Life	-.156	-.120	-1.686	.095
3. Satisfaction with Life	-.076	-.169	-2.475	.015
4. Pain Intensity	.290	.187	2.319	.022
5. Pain Interference	.343	.371	4.354	. 000
6. General Diagnosis	-.493	-.069	-1.022	.309
7. Age Range	-.481	-.137	-2.008	.047
8. Gender	-.019	-.003	-.041	.968

Unstandardized regression coefficients (B) and intercept, the standardized regression
coefficients (β), t-values, and p-values for variables as predictors of depression episodes

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Furthermore, in the third regression model, in addition with perceived rejection,

the multiple regression analysis indicated that the covariates, pain intensity and pain

interference, were also strong predictors of depressed mood episodes. Remarkably

Cohen's correlation and two-tailed test of significance suggest that pain interference ($r =$

$.646, p = 000, p < .001$) contributes more to predicting depressed mood episodes than

does perceived rejection ($r = .568, p = 000, p < .001$) and pain intensity ($r = .442, p =$

$000, p < .001$). These findings suggest that these three variables have strong significant

correlated relationships with depressed mood episodes. In addition, Cohen's correlation

and two-tailed test of significance found quality of life ($r = -.219, p = 012, p < .05$) and

satisfaction with life ($r = -.217, p = 012, p < .05$) also contributes to predicting depressed

mood episodes and have moderate significant correlated relationships with it.

Summary of the Results from Anxiety and Depression Surveys. Remarkably the same independent / predictor variables in both surveys indicated their strong contributions in reliably predicting pain-related distress episodes, as stressors or trigger events in transitional musculoskeletal pain experience. However, there was a notable difference in the order of their unique strengths in contributing to the prediction of pain-related distress episodes. In the anxiety survey, the psychosocial issue of perceived rejection ($r = .593$, $p = 000$, $p < .001$) surpassed pain interference ($r = .562$, $p = 000$, $p < .001$) and pain intensity ($r = .486$, $p = 000$, $p < .001$) in predicting anxiety episodes. And in the depression survey, the covariate issue of pain interference ($r = .646$, $p = 000$, $p < .001$) surpassed perceived rejection ($r = .568$, $p = 000$, $p < .001$) and pain intensity ($r = .442$, $p = 000$, $p < .001$) in predicting depressed mood episodes. The results of the hierarchical multiple regression analyses in both surveys are found in Table 19 below,

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Table 19

Results of Hierarchical Multiple Regression (HMR) Analyses in Both Surveys
Pearson's Correlations and 2-Tailed Significance Tests

	r	sig.	p	Relationship
ANXIETY SURVEY				
Age Range	.179	.027	.05	Significant Weak Inverse
Gender	.027	.417	.05	Not Significant
General Diagnosis	-.058	.269	.05	Not Significant
Pain Interference	.562	.000	.001	Significant Strong Positive
Pain Intensity	.486	.000	.001	Significant Strong Positive
Perceived Rejection	.593	.000	.001	Significant Strong Positive
Quality of Life	-.123	.095	.05	Not Significant
Satisfaction with Life	.090	.170	.05	Not Significant
DEPRESSION SURVEY				
Age Range	-.211	.015	.05	Significant Moderate Inverse
Gender	-.051	.303	.05	Not Significant
General Diagnosis	.027	.393	.05	Not Significant
Pain Interference	.646	.000	.001	Significant Strong Positive
Pain Intensity	.442	.000	.001	Significant Strong Positive
Perceived Rejection	.568	.000	.001	Significant Strong Positive
Quality of Life	-.219	.012	.05	Significant Moderate Inverse
Satisfaction with Life	-.217	.012	.05	Significant Moderate Inverse

KEY: Results of HMR Pearson's Correlations and 2-Tailed Significance Tests of the Null Hypotheses

Pearson's Correlation Value of Relationship Strength (r):
Strong / Large = ± 0.50, Medium = ± 0.30, and Weak / Small = ± 0.10

Significance Levels Resulting from Analysis Calculations (sig.):
Small - A small p-value (≤ 0.05) = Strong evidence against the null hypothesis, and the null hypothesis is rejected.
Large - A large p-value (> 0.05) = Weak evidence against the null hypothesis, and the null hypothesis is accepted.
Marginal - A p-values very close to the cutoff (0.05) = It could go either way, and is generally considered to be marginal.

Probability Values (p): Results from HMR analysis calculations, where:
.05 = There is 05% chance for error in the findings, or conversely, there is a 95% level of confidence they are true.
.001= There is 001% chance for error, or a 99/9% level of confidence the findings are true, and it also indicates greater robustness of the findings.

Summary

The study investigated the extent of influence that eight pain-related factors, identified in the literature, have on episodes of core distress symptoms in the pain-related anxiety-depression spectrum during the first four months of musculoskeletal pain experience. In addition, it sought to identify the best predictors of the frequency of pain-related anxiety and depressed mood episodes during this transitional pain experience period.

The data was collected by two online surveys assisted by an online host who provided survey expertise, respondent recruitment, data gathering and data-set populating services. A series of trials refined the survey, resulting in shorter and more focused surveys, and better screening of respondents to meet the stringent eligibility criteria requirements for targeting the sampling population. A partner panel specializing in professional and educational research in healthcare was utilized.

Once the data was collected into a data set, it was filtered and then exported from *Survey Monkey's* Audience platform into IBM's Statistical Package for the Social Sciences (SPSS-25) software in a password secured computer. Data analysis included preliminary, descriptive, and multiple regression analyses. The results of these analyses assisted in answering the study's dozen lines of inquiries. Each of these twelve research questions is summarized as follows.

Answers to the First Research Question in the Anxiety Survey

The first set of research questions in the anxiety survey sought to determine whether the frequency of episodes of pain-related anxiety symptom are associated with

and influenced by respondents' perceived rejection in social support networks, quality of life in daily activities, and current satisfaction with life, while controlling for five potential confounding covariate predictor variables; viz., age range, gender, general musculoskeletal diagnosis, pain intensity, and pain interference. There were three research hypotheses that addressed the first research question in the anxiety survey.

The tests on the hypotheses served to answer the first line of inquiry in the anxiety survey. While previously I stated a single research question for the correlational inquiry, here I have broken the single correlational research question into a set of three research questions reflecting the null and alternative hypotheses for each psychosocial issue. I then answer each research question according to the findings of my analyses.

Perceived Rejection and the First Research Question in the Anxiety Survey: Does perceived rejection in social support networks level influence the relationship with episodes of pain-related anxiety symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Perceived Rejection Research Question: The findings from the study's data analyses found perceived rejection ($r = .593$, $p = 000$, $p < .001$) in social support networks is significantly correlated with the frequency of anxiety episodes during the first four months of musculoskeletal pain experience.

Quality of Life and the Second Research Question in the Anxiety Survey: Does quality of life in daily activity level influence the relationship with episodes of pain-related anxiety symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Quality of Life Research Question: The findings from the study's data analyses found quality of life (r = -.123, p = .095, p < .05) in daily functioning is not significantly correlated with the frequency of anxiety episodes during the first four months of musculoskeletal pain experience.

Satisfaction with Life and the Third Research Question Concerning in the Anxiety Survey: Does satisfaction with life influence the relationship with episodes of pain-related anxiety symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Satisfaction with Life Research Question: The findings from the study's data analyses found current satisfaction with life (r = .090, p = .170, p < .05) during musculoskeletal pain experience is not significantly correlated with the frequency of anxiety episodes during the first four months of musculoskeletal pain experience.

Answers to the Second Research Question in the Anxiety Survey

The second research questions sought to determine which of the three psychosocial predictor variables best predicted the frequency of the criterion variable (either anxiety or depressed mood episodes) from the regression equation. In each survey, there were a set of three research hypotheses that address the second research question. The tests on the hypotheses also served to answer the predictive line of inquiry in the anxiety survey. While previously I stated a single predictive research question, here I have broken the second research question into a set of three questions reflecting the

null and alternative hypotheses for each psychosocial issue. I then answer each research question according to the findings.

Perceived Rejection and the Fourth Research Question in the Anxiety Survey: Does the regression equation resulting from a subset of scores on perceived rejection in social networks significantly predict the frequency of anxiety symptom episodes?

The Answer to the Second Perceived Rejection Research Question: The findings from the study's data analyses found perceived rejection ($\beta = .38$, $p = .000$, $p < .001$) to be to be a very strong predictor of anxiety episodes, and the best predictor of episodes of pain-related anxiety among the eight independent / predictor variables investigated in the anxiety survey.

Quality of Life and the Fifth Research Question in the Anxiety Survey: Does the regression equation resulting from a subset of scores on quality of life in daily functioning significantly predict the frequency of anxiety symptom episodes?

The Answer to the Second Perceived Quality of Life Question: The findings from the study's data analyses found quality life ($\beta = -.07$, $p = .338$, $p < .05$) to be a poor predictor of anxiety episodes.

Satisfaction with Life and the Sixth Research Question in the Anxiety Survey: Does the regression equation resulting from a subset of scores on current satisfaction with life significantly predict the frequency of anxiety symptom episodes?

The Answer to the Second Perceived Satisfaction with Life Question: The findings from the study's data analyses found satisfaction with life ($\beta = .07$, $p = .305$, $p < .05$) to be a poor predictor of anxiety episodes.

Answers to the First Research Question in the Depression Survey

The first research question in the depressed mood survey sought to determine whether the frequency of episodes of pain-related anxiety symptom are associated with and influenced by respondents' perceived rejection in social support networks, quality of life in daily activities, and current satisfaction with life, while controlling for five potential confounding covariate predictor variables; viz., age range, gender, general musculoskeletal diagnosis, pain intensity, and pain interference. There were three sets research hypotheses that addressed the first research question in the survey.

The tests on the hypotheses served to answer the first line of inquiry in the depression survey. While previously I stated a single research question for the correlational inquiry, here I have broken the single research question into a set of three questions reflecting the null and alternative hypotheses for each psychosocial issue. I then answer each research question according to the findings of my analyses.

Perceived Rejection and the First Research Question in the Depression Survey: Does perceived rejection in social support networks influence the relationship with episodes of pain-related depressed mood symptoms, after controlling for age, gender, pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Perceived Rejection Research Question: The findings from the study's data analyses found perceived rejection ($r = .568$, $p = .000$, $p <$

.001) in social support networks is significantly correlated with the frequency of anxiety episodes during the first four months of musculoskeletal pain experience.

Quality of Life and the First Research Question in the Depression Survey: Does quality of life in daily activity level influence the relationship with episodes of pain-related anxiety and depressed mood symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Quality of Life Research Question: The findings from the study's data analyses found quality of life ($r = -.219$, $p = 012$, $p < .05$) in daily functioning is significantly correlated with the frequency of depressed mood episodes during the first four months of musculoskeletal pain experience.

Satisfaction with Life and the First Research Question in the Depression Survey: Does satisfaction with life influence the relationship with episodes of pain-related depressed mood symptoms, after controlling for age, gender, and scores for pain intensity, pain interference, and general musculoskeletal diagnosis?

The Answer to the First Satisfaction with Life Research Question: The findings from the study's data analyses found current satisfaction with life ($r = -.217$, $p = 012$, $p < .05$) during musculoskeletal pain experience is significantly correlated with the frequency of depressed mood episodes during the first four months of musculoskeletal pain experience.

Answers to the Second Research Question in the Depression Survey

The second research question sought to determine which of the three psychosocial predictor variables best predicted the frequency of depressed mood episodes from the

regression equation. In each survey, there were a set of three research hypotheses that address the second research question. The tests on the hypotheses served to answer the predictive line of inquiry in the anxiety survey. While previously I stated a single predictive research question, here I broke the second research question into a set of three questions reflecting the null and alternative hypotheses for each psychosocial issue. I then answer each research question according to the findings.

Perceived Rejection and the Second Research Question in the Depression Survey: Does the regression equation resulting from a subset of scores on perceived rejection in social networks significantly predict the frequency of depressed mood symptom episodes?

The Answer to the Second Perceived Rejection Research Question: The findings from the study's data analyses found perceived rejection (β = .31, p = .000, p <.05) to be one of the strongest and best predictors of depressed mood episodes among the eight independent / predictor variables investigated in the depression experience.

Quality of Life and the Second Research Question in the Depression Survey: Does the regression equation resulting from a subset of scores on quality of life in daily functioning significantly predict the frequency of depressed mood symptom episodes?

The Answer to the Second Quality of Life Research Question: The findings from the study's data analyses found quality of life (β = -.12, p = .095, p <.05) to be a moderate predictor of depressed mood experience.

Satisfaction with Life and the Second Research Question in the Depression Survey: Does the regression equation resulting from a subset of scores on current

satisfaction with life significantly predict the frequency of anxiety or depressed mood symptom episodes?

The Answer to the Second Satisfaction with Life Research Question: The findings from the study's data analyses found satisfaction with life (β = -.17, p = .02, p <.05) to be a moderate predictor of anxiety experience.

Additional Relevant Results in the Anxiety Surrey

Remarkably the data analyses in the anxiety revealed some unexpected results. These included the independent / predictor variables representing the covariates and demographics. A brief summary of these results follows.

The study's data analyses revealed that two of the covariates, pain interference (r = .562, p = .000, p < .001) and pain intensity (r = .486, p = .000, p < .001), have significant strong positive relationships with anxiety episodes. In addition, pain interference (β = .28, p = .01, p <.05) and pain intensity (β = .18, p = .02, p < .05) are reliable predictors of anxiety episodes during transitional musculoskeletal pain experience. Whereas general musculoskeletal diagnosis (r = -.058, p = .269, p < .05), had no significant correlation with anxiety episodes, nor in predicting anxiety episodes, β = .02, p = .23, p < .05.

In addition, the study's data analyses also revealed that age range (r = -.179, p = .027, p < .05) has a significant weak inverse relationships with anxiety episodes, and in predicting anxiety episodes, β = -.14, p = .03, p <.05. While, gender (r = .027, p = .417, p < .05) is not significantly correlated with anxiety episodes, nor can it reliably predicting anxiety episodes, β = .01, p = .823, p < .05.

Other Relevant Results in the Depression Survey

Likewise, the data analyses in the depression survey revealed some unexpected results as well. The study's data analyses revealed that two of the covariates, pain interference ($r = .646$, $p = .000$, $p < .001$) and pain intensity ($r = .442$, $p = .000$, $p < .001$), have strong significant positive relationships with depressed mood episodes. In addition, pain interference ($\beta = .37$, $p = .000$, $p < .001$) is a reliable predictor of depressed mood episodes during transitional musculoskeletal pain experience. Remarkably, despite its strong correlation with depressed mood episodes, pain intensity ($\beta = .28$, $p = .818$, $p < .05$) was found not to be a reliable predictor of depressed mood episodes. And general musculoskeletal diagnosis ($r = .027$, $p = .393$, $p < .05$), had no significant correlation with episodes of depressed mood, nor in predicting depressed mood, $\beta = .02$, $p = .823$, $p < .05$.

The study's data analyses also revealed that age range ($r = -.211$, $p = .015$, $p < .05$) has a significant moderate inverse relationships with depressed mood episodes, and in predicting episodes of depressed mood, $\beta = -.14$, $p = .047$, $p < .05$. Whereas, gender ($r = -.051$, $p = .303$, $p < .05$) is not significantly correlated with depressed mood episodes, nor can it reliably predicting episodes of depression, $\beta = -.003$, $p = .968$, $p < .05$.

<center>**Transitional Summary**</center>

The findings from this study have important implications for social change and future research. These are briefly summarized here.

Implications for Social Change

These finding suggest that to properly prevent chronic pain and minimize pain-related disability, greater attention needs to be directed toward the fourth and fifth vital

signs. This means paying greater attention toward not only the severity of pain intensity levels, but towards the severity of individuals' distress level and the sources of their distress beyond pain intensity; in particular towards emergent psychosocial issuers involving perceived rejection and the social domains involved with pain inference during the individual's transitional pain experience (i.e., the first four months of unresolved musculoskeletal pain). In addition with pain intensity, pain related issues such as perceived rejection and pain inference should be monitored closely by primary care providers, and early referrals to psychological-assisted interventions including pain education, pain self-management training, social support, wellness programs, health counseling, and rehabilitation as needed should be included along with pharmacotherapy and physical therapy during the transitional pain period. In the future, healthcare providers might also direct pain patients toward short-form surveys to document psychosocial issues that are too time consuming to explore during the patient examination visit. In addition to treatment documentation, such short-form surveys may serve healthcare providers by better informing them about which types of interdisciplinary and psychological-assisted interventions to refer patients-at-risk towards to optimize pain prevention goals. Therefore, the research for the development of psychological-assisted interventions that are aligned with psychosocial issues and short-form surveys for frontline healthcare providers deserve greater attention, encouragement, and funding.

Directions for Future Research

The findings from the study lays the ground work for other studies, and suggest a number of directions for future research. The present study was primarily designed as a

an exploratory within-subjects quantitative investigation involving two online surveys, both of which were designed to examine the extent of influence and contribution of the pain-related anxiety-depression spectrum, and in reliably predicting the frequency of anxiety and depressed mood episodes during the first four months of recurrent musculoskeletal pain experience.

In the future, studies designed as within-subjects investigations might examine other pain experience time-frames using time series studies, e.g., the 5 to 8 months and the 9 to 12 months periods in the musculoskeletal pain experience, to glean a better picture of chronic pain progression. In addition, between-subject investigations might explore the extent of similarities and differences in anxiety and depressed mood episodes. Likewise, other psychosocial issues might be investigated using a similar approach; thereby shedding light on pain self-efficacy and perceptions of injustice in pain experience. And other pain-related outcomes might be investigated using comparable approaches as well; thereby further informing us on the stress-related fatigue associate with pain, pain-related anger and negative emotions, sleep disturbance, periodic confusion, and cognitive impairment. Another area deserving greater research attention are the sources, extent of influence, and consequences of perceived rejection and avoidance, whether from spouses, family, and others comprising social networks.

In the next chapter, the implications for practice and social change are delineated and discussed in greater detail. In addition, the directions for future research are discussed more fully. And finally the results of the present study are integrated into a succinct research summary report.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction to the Interpretations of the Findings

The purpose of the study was to explore the extent that eight pain-related factors influenced and predicted episodes of core anxiety and depressed mood symptoms within the anxiety-depression spectrum during transitional musculoskeletal pain experience, and to describe these relationships statistically. As the primary investigator, I designed the study as a within-subjects descriptive exploratory quantitative investigation of the extent that these pain-related factors influence and predict episodes of (a) anxiety and (b) depressed mood during the first four months of unresolved musculoskeletal pain experience. The eight pain-related factors included (a) age range, (b) gender, (c) general musculoskeletal diagnosis, (d) pain intensity, (e) pain interference, (f) perceived rejection, (g) quality of life, and (h) satisfaction with life.

In the study, I utilized an online host to recruit respondents and collect data. The study included two separate online surveys. The Musculoskeletal Pain Distress Survey (MPDS) investigated anxiety episodes, and the Musculoskeletal Pain-related Depressed Mood Survey (MPDMS) examined episodes of depression symptoms. Both datasets were then analyzed to determine the extent that episodes of anxiety and/or depressed mood are influenced by these eight factors, and to identify which of these factors were the most reliable predictors of anxiety and depressed mood episodes. The analyses of the two datasets included preliminary analyses, descriptive statistics, bivariate correlations and significance tests, and hierarchical multiple regression.

In the anxiety survey, or Musculoskeletal Pain Distress Survey (MPDS), the strongest factors were perceived rejection, pain interference, and pain intensity, with age range as a weak factor influencing anxiety episodes. Perceived rejection was the most reliable predictor of anxiety episodes, followed by pain interference, and pain intensity. Whereas, in the depression survey, or Musculoskeletal Pain-related Depressed Mood Survey (MPDMS), the strongest factors were pain interference, perceived rejection, and pain intensity, with age range, quality of life, and satisfaction with life as moderate influencing factors. Pain interference was the most reliable predictor of depressed mood episodes, followed by perceived rejection. While on the one hand, pain intensity was found to be a reliable predictor of episodes of anxiety, it was not for depressed mood.

Interpretation of the Findings

The study's findings brings some clarity to the peer-reviewed literature on the eight factors associated with episodes of pain-related distress within the context of the anxiety / depression spectrum. The eight pain-related factors investigated by the study included age range, gender, general musculoskeletal diagnosis, pain intensity, pain interference, perceived rejection, quality of life, and satisfaction with life. Specifically the findings from the study provide us with a better understanding of the effects of these eight factors on episodic core symptoms in the anxiety-depression spectrum, by describing statistically the extent that each factor influences and predicts episodes of anxiety and depressed mood during the first four months of recurrent musculoskeletal pain experience.

In addition, the use of hierarchical multiple regression analyses in the study provided a means of ranking each of the pain-related factors according to the magnitude of its effect on episodes of core symptoms in the anxiety-depression spectrum. The present study's findings clearly indicate that episodes of pain-related distress are influenced more by some psychosocial factors, and not by others, than by the severity of pain intensity levels alone. These findings have important interdisciplinary implications for the development of psychological-assisted pain assessment and intervention resources that complement pharmacological and physical therapy protocols in frontline healthcare pain prevention. The findings from the present study also have important implications for the research and development of short-form scales designed to measure the extent specific psychosocial issues influence and predict episodes of pain-related distress symptoms. The development of both of these resources may assist frontline healthcare providers in addressing, assessing, treating, and preventing recurrent musculoskeletal pain and comorbid pain-related distress.

Interpreting the Results from the Hypotheses Tests

The data analyses in both surveys included tests for validation of the study's hypotheses. In the anxiety survey, the findings indicated that only the hypotheses concerning perceived rejection were validated, while those hypotheses for quality of life and satisfaction with life were not. The findings in the depression survey substantiated the hypotheses pertaining to perceived rejection, quality of life, and satisfaction with life. However perceived rejection was shown to have a significantly stronger effect in influencing depressed mood episodes and was a more reliable predictor of episodes of

depression, than either quality of life or satisfaction with life, both of which had a moderate influence on depressed mood episodes, and were rated as moderate predictors.

The Amazing Strong Showing of Two Pain-related Covariates

Two of the pain-related covariate factors showed a strong significant positive relationship with both anxiety and depressed mood episodes, despite efforts to control the extent of their influence using hierarchical multiple regression (HMR) analyses. These two factors included pain interference and pain intensity respectfully. Both pain interference and pain intensity floated to the surface in the HMR analyses as formidable pain-related factors in their own right.

The Ranking of the Two Covariates in the Surveys. In the anxiety survey, pain interference was ranked second in the extent of influencing and predicting anxiety episodes. While in the depression survey, pain interference was ranked first in influencing and predicting episodes of depressed mood. In both surveys, pain intensity consistently ranked third in influencing episodes of anxiety and depressed mood and ranked third in predicting anxiety episodes. However, pain intensity was found not to be a reliable predictor of episodes of depressed mood. Other pain-related issues, aside from the severity of pain intensity, fuel depression and serve as better predictors of depressed mood, e.g., pain interference and perceived rejection.

Identifying the Most Influential Factors and Best Predictors

These findings provide a means of discerning those pain-related factors that have the strongest influence on anxiety and depressed mood episodes amongst people who report moderate-to-severe episodes of distress during their acute, subacute and early

chronic pain experience. In both surveys, the findings indicate the most influential factors were pain interference and perceived rejection, both of which were shown to be more influential than severity of pain intensity levels. In addition, pain interference and perceived rejection were found to be the best predictors of episodes of both anxiety and depressed mood during the transitional musculoskeletal pain experience.

Differences in the Survey Results. Between the surveys' findings, in terms of the order of influence by pain-related factors, the differences were subtle between anxiety and depressed mood episodes. For instance, the study found anxiety episodes were most influenced by (a) perceived rejection and then by (b) pain interference followed by (c) pain intensity, while depressed mood episodes were influenced by (a) pain interference and (b) perceived rejection, followed by (c) pain intensity. In addition, these same factors, in the same order, were found to be reliable predictors of anxiety and depressed mood, with the exception of pain intensity, which was found to be a reliable predictor of anxiety, but not of depressed mood.

The Role of Pain-related Issues in Distress Episodes. In line with the theoretical and empirical literature on the importance of the influences of psychosocial factors on pain and pain-related distress, as articulated by the biopsychoecological diathesis-stress process model of pain pathogenesis, these findings suggest that psychosocial factors have powerful influences on pain-related distress episodes. In the case of the findings in this study, pain-related issues involving (a) limitations in normal everyday physical and social functioning resulting from pain interference, and (b) episodes of perceived rejection in social support networks have been shown to have

strong influences on the frequency of anxiety and depressed mood episodes during the transitional musculoskeletal pain experience period. Specifically, the behavioral limitations associated with pain interference included (a) day-to-day activities, (b) work around home, (c) ability to participate in social activities, and (d) household chores. And perceived rejection included episodes where: (a) significant others did not listen when individuals with protracted pain asked for help, (b) significant others dismissed their problems as being unimportant, (c) individuals with pain felt let down by others whom they depended upon, (d) others did not have time for them, (e) others do not want to hear about their problems, (f) others seemed not to care about their wellbeing, (g) others do not want to be bothered by them, and (h) others avoid talking with them. Clearly, while the findings need to be explored further and the results of this study replicated, based on the study's findings, it can be concluded that for the sake of chronic pain prevention, the influence of pain-related issues on episodic distress symptoms deserves greater attention in our frontline healthcare system and research communities.

Factors with Moderate and Weak Levels of Influences on Distress Episodes

In addition to identifying the most influential pain-related factors influencing episodes of distress, the data analyses in the study ranked each factor according to their level of influence and the extent that they reliably predicted distress episodes. In the anxiety survey, age range was found to have a very weak significant correlated relationship with episodes of anxiety, while in the depression survey, age range, quality of life, and satisfaction with life were found to have a moderate significant correlated relationships with depressed mood episodes.

In addition, some pain-related factors were found not to have any statistically significant correlations with distress episodes. In the anxiety survey, quality of life, satisfaction with life, gender, and general musculoskeletal diagnosis were found not to have significant correlations with anxiety episodes. While in the depression survey, gender and general diagnosis were found not to have significant correlations with depressed mood episodes.

Interpreting the Frequencies of Encountered Psychosocial Issues

One set of findings in the study involved the participants' responses to a multiselection screening item that asks them to identify all of the psychosocial issues they encountered during their current pain experience. One would expect these responses to line-up with the results of the data analyses of the study. However, they did not share any similarities in their relationships with distress episodes.

Frequency of Psychosocial Issues Encountered in the Anxiety Survey. In the anxiety survey, the frequencies for the multiselection item found 29.2% of participants encountered perceived rejection episodes, 65.3% encountered quality of life issues, 56.2% experienced issues regarding their current satisfaction with life, and only 51.2% reported the observation that stress increased their pain level. Based on these responses, one would logically anticipate quality of life (65%) and satisfaction with life issues (56%) to be among the most influential factors for anxiety episodes, and to be among the best predictors. However, perceived rejection (29%) turned out to be the most influential factor for anxiety episodes, as well as the best predictor.

Frequency of Psychosocial Issues Encountered in the Depression Survey. In the depression survey, the frequency for the multiselection item found 36.9% of participants encountered perceived rejection episodes, 65.8% encountered quality of life issues, and 62.2% experienced issues regarding their satisfaction with life, but only 54.1% reported that stress increased their pain level. Once again, based on these responses, one would anticipate quality of life (66%) and satisfaction with life issues (62%) to be among the most influential factors for depression episodes, and to be among the best predictors. However, perceived rejection (37%) turned out to be one of the most influential factors, as well as one of the best predictors of depressed mood episodes.

An Explanation for the Discrepancy. The question remains, how to explain this seemingly illogical discrepancy? One plausible explanation might have to do with the variance in the strength of the eight factors' level of influence upon distress episodes. In other words, although only 29% of the participants in the anxiety survey encountered episodes of perceived rejection, the data analyses show it has a stronger level of influence on episodes of anxiety than does quality of life and satisfaction with life. Likewise, although only 37% of the participants in the depression survey encountered episodes of perceived rejection, it has a stronger level of influence on episodes of depressed mood than does quality of life and satisfaction with life. The robust results of the study's data analyses on pain-related issues as stressors or trigger events influencing distress episodes lends support to this explanation, and provides confirmation of the biopsychoecological / diathesis-stress process model of pain-related distress episodes.

Recognizing the Role of Stress in Pain Intensity Level Elevation. The study's theoretical foundation rests on the biopsychosocial diathesis-stress process model, which purports that pain-intensity levels and pain-related distress are influenced by emergent stressors during the transitional pain experience. Yet only about half of the study's participants reported they encountered episodes where stress increased their pain levels. In the anxiety survey, only 51.2% reported that stress increased their pain level. While in the depression survey, 54.1% reported that stress increased their pain level.

An Explanation for the Low Response Rates in the Pain/Distress Item. The question remains: how to explain these low percentage of responses to the pain-stress item? One plausible explanation may be that most people tend to view pain as strictly a sensory phenomenon, and fail to fully recognize and comprehend pain's cognitive, emotional, environmental, and social components, as pain has been defined by a number of empirical-based reports across several decades (de C Williams & Craig, 2016; Institute of Medicine, 2011; International Association for the Study of Pain / European Federation of IASP Chapters, 2002; Merskey & Bogduk, 1994; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008). Therefore, by extension, this explanation, if valid, suggests there is clearly a need for supportive universal pain education and pain self-management training, a position that has been articulated in numerous scholarly reports on chronic pain prevention (Bair, Matthias, Nyland, et al., 2009; Chou & Huffman, 2007; Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007; Fricton, 2015; Fricton, Anderson, Clavel, et al., 2015; Institute of Medicine, 2011; Jensen & Karoly, 2010; Lorig, Sobel, Stewart, et

al., 1999; Macea, Gajos, Daglia Calil, & Fregni, 2010; Paul, Carey, Sanson-Fisher, Houlcroft, & Turon, 2013; The Mayday Fund, 2009).

Jensen and Karoly (2010) reported early pain-related distress involves complex multiple and often overlapping affective, cognitive and environmental dimensions and causes. According to Jensen and Karoly, people's thoughts, perceptions, and emotional responses to the events comprising their pain experience can be uniquely mixed because of individual differences and their unique sets of circumstances and life events. Thus psychosocial issues during transitional pain experience presents a formidable complex challenge to patients and healthcare providers alike. And earlier psychological-assisted interventions such as pain education, pain self-management training, and supportive psychosocial interventions are essential to quell the chronic pain conundrum.

Interpreting the Participants' Demographics and Eligibility Profiles

The demographics and the strict eligibility criteria used in the screening of respondents provides a profile of the surveys' participants. To begin with, the participants in both surveys can best be described by the study's stringent eligibility criteria. To participate in the study, respondents had to be 18 years of age or older, they had to have sustained a recent musculoskeletal injury or were recently diagnosed with a musculoskeletal condition, their pain experience did not exceed the first four months since pain onset, they experienced moderate to severe pain and pain-related distress episodes resulting from their pain, and they experienced one or more episodes of the three pain-related psychosocial issues. Respondents who did not meet this eligibility criteria were disqualified.

Profile of Participants in the Anxiety Survey. The data-set derived from the Musculoskeletal Pain Distress Survey (MPDS) is comprised of a total of 121 participants out of 540 recruited respondents, who were contacted by the online host to complete the MPDS. The survey completion rate was 22.4%. Most respondents were disqualified because they failed to meet the survey's stringent eligibility criteria, while others simply abandoned the survey. The participants' age range spanned 21.5% in the 18-29 years of age range, 32.2% in the 30-44 years of age range, 27.3% in the 45-60 years of age range, and 18.2% were older than 60 years of age. The survey respondents included 72.7% females and 27.3% males. The percentages of respondents with recurrent pain resulting from a musculoskeletal injury was 53.7%, and 46.3% from recently diagnosed musculoskeletal conditions. These results indicate the majority of the pain-related anxiety survey participants were female (72.7%), between 30 to 60 years of age (59.5%), and suffered recurrent pain resulting from a musculoskeletal injury (53.7%).

Profile of Participants in the Depression Survey. The data-set derived from the Musculoskeletal Pain-related Depressed Mood Survey (MPDMS) is comprised of a total of 111 participants out of 534 recruited respondents by the online host, who were contacted to complete the MPDMS. The survey completion rate was 22.3%. Most respondents were disqualified because they failed to meet the survey's stringent set of eligibility criteria, while others abandoned the survey. The participants' age range spanned 23.6% in the 18-29 years of age range, 26.3% in 30-44 years of age range, 36.4% in the 45-60 years of age range, and 13.6% were older than 60 years of age. Survey participants included 52.7% females and 47.3% males. The percentages of

survey respondents with recurrent pain resulting from a musculoskeletal injury was 58.6%, and 41.4% from musculoskeletal conditions. These results indicate the majority of the pain-related depression survey participants were female (52.7%), between 30 to 60 years of age (62.7%), and suffered recurrent pain resulting from a musculoskeletal injury (58.6%).

Breaking down the Importance of the Findings

What possible importance might these findings from this study be? To begin with, the findings from this study have important implications for social change and future research. These will be summarized later. However, before we delineate these implications, it is helpful to breakdown the importance of the study's findings. To understand the significance of the study's findings, it is helpful to categorize the components, including the importance of the study's time-frame, descriptive statistics, the correlation hypotheses tests, prediction analyses, and the outcomes.

The Importance of the Time-frame. To begin with, we might inquire, what importance are the findings on the time-frame of this study? The surveys in the study focused on the first four months of recurrent musculoskeletal pain experience since the onset of pain. This time-frame includes the acute, subacute, and early chronic pain period, a period of time referred to as the transitional pain experience. It is during this period of time when pain pathogenesis is presumed to occur (Institute of Medicine, 2011; International Association for the Study of Pain / European Federation of IASP Chapters, 2002, 2004; Flor, Braun, Elbert, & Birbaumer, 1997; Sheng, Liu, Wang, Cui, & Zhang, 2017; The Mayday Fund, 2009; White House, 2000, 2002; World Health Organization,

2003, 2005; Woolf & Salter, 2006). It is believed the central nervous system is rewired during this period of time (Flor, Braun, Elbert, & Birbaumer, 1997; Sheng, Liu, Wang, Cui, & Zhang, 2017; Woolf & Salter, 2006; Yunus, 2007; Zhuo, 2008). Moreover, brain imaging research indicates that both physical pain and psychosocial distress share neural pathways in the human brain (Eisenberger, 2012a, 2012b; Eisenberger & Cole, 2012; Eisenberger & Lieberman, 2004; Eisenberger, Lieberman, & Williams, 2003; Kross, Berman, Mischel, Smith, &Wager, 2011). And remarkably, the scientific research literature supports all of these contentions (Eisenberger, 2012a, 2012b; Eisenberger & Cole, 2012; Eisenberger & Lieberman, 2004; Eisenberger, Lieberman, & Williams, 2003; Flor, Braun, Elbert, & Birbaumer, 1997; Kross, Berman, Mischel, Smith, &Wager, 2011; Sheng, Liu, Wang, Cui, & Zhang, 2017; Woolf & Salter, 2006; Yunus, 2007; Zhuo, 2008).

Therefore, to prevent the physiological processes underlying chronic pain pathogenesis, our scientific research informing and directing treatment must be conducted within the same time-frame. And that time frame is the transitional pain experience, comprising the first four months of recurrent musculoskeletal pain experience. If it is assumed that pain and pain pathogenesis are merely the results of a sensory phenomenon, then pharmacotherapy and physical therapy suffice as our treatments of choice. However, current research literature reveals that this rather myopic focused approach seriously limits our efforts at effective chronic pain prevention. The findings in current clinical research literature indicate psychosocial factors as early as 10 days following pain onset are reliable predictors of pain chronicity and disability at 12

months (Gatchel & Gardea, 1999; Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Turk, Wilson, & Cahana, 2011). Subsequently psychological and social issues associated with pain have an important effect on prognosis (Gatchel & Gardea, 1999; Institute of Medicine, 2011; Øyeflaten, Hysing, & Eriksen, 2008; The Mayday Fund, 2009; Williams, 2013; Turk, Wilson, & Cahana, 2011). Thus, early on in the transitional musculoskeletal pain experience these emerging pain-related psychosocial issues must be addressed, considered, and included in all patients' pain management treatment plans.

The Importance of the Correlations. In addition, we may ask, what possible importance might the findings on the correlations between the pain-related factors and the outcome factors be? Correlations indicate the existence of a relationship between two or more factors. In this case, the eight pain-related factors are the independent / predictor variables, and the outcome factors, anxiety and depressed mood, are the dependent / criterion variables. However, correlations do not indicate causality; i.e., whether or not the independent variable causes an effect on the dependent variable. Correlations merely indicate the existence of a relationship.

While all of the pain-related factors have relationships with the outcome variables, the results of the study indicate some factors are not significantly correlated with distress episodes. The factors with the strongest relationships with anxiety episodes include: perceived rejection, pain interference, and pain intensity, while age range has a weak relationship, and quality of life, satisfaction with life, gender and general musculoskeletal diagnosis have no statistical significant relationship with anxiety episodes. Whereas the factors with the strongest relationships with depressed mood

episodes include: pain interference, perceived rejection, and pain intensity, and factors with moderate relationships include quality of life, satisfaction with life, and age range, while gender and general musculoskeletal diagnosis have no statistical significant relationship with anxiety episodes.

It should be pointed out here that in the present study correlations were tested by bivariate, simple linear regression, and hierarchical multiple regression analyses. These tests revealed that the same pain-related factors were ranked according to the same order of the magnitude of their effect on the distress episodes. In other words, while their values may have differed slightly between these three types of correlation analyses, their rank order remained essentially the same across these tests. Perceived rejection was consistently ranked first in the anxiety survey, and pain interference was unfailingly ranked first in the depression survey. The rank order carried across similarly with the second and third ordered pain-related factors in each survey.

The Importance of the Predictors. Likewise, we may inquire, what possible importance are the findings on the prediction between the pain-related factors and the outcome factors? In regression analyses, the independent / predictor variables are assumed to be the cause of the dependent / outcome variable. One of the purposes of multiple regression analyses is to determine whether a specific independent variable actually influences the dependent variable, and to estimate the magnitude of its effect on the dependent variable (Allison, 1999, 2014).

The findings from the study found the same pain-related psychosocial factors are the most reliable predictors of distress episodes. These psychosocial factors include pain

interference and perceived rejection. And both of these factors were more reliable predictors of distress episodes than pain intensity.

The Importance of Ranking the Pain-related Factors. Multiple regression allows researchers to estimate the magnitude of each predictor variable's effect on the outcome variable. In turn, these estimates provide a means of ranking each predictor variable's effects upon the outcome variable. Correlations tests may indicate some independent variables may have strong significant relationships with an outcome variable, while others may have moderate, weak, or no significant relationship. And likewise, in prediction analyses, there are differences in the extent that each pain-related factor predicts changes in the outcome variable.

Of the eight pain-related factors examined in the online survey study, pain interference, perceived rejection, and pain intensity were found to be more reliable predictors of distress episodes at greater level of confidence than any of the others. In the anxiety survey, perceived rejection had the greatest effect on anxiety episodes, and was the best predictor. And in the depression survey, pain interference had the greatest effect on depressed mood episodes, and was the best predictor.

The Importance of the Outcomes in the Anxiety-Depression Spectrum. The present study found pain-related anxiety and depression included frequent episodes of core symptoms during the first four-month transitional pain experience. The pain-related anxiety episodes included: (a) feeling fearful, (b) difficulty focusing on anything other than one's anxiety, (c) feeling overwhelmed by worries, and (d) feeling uneasy. The pain-related depressed mood episodes included: (a) feeling helpless, (b) feeling

depressed, (c) feeling hopeless, and (d) feeling worthless. These findings confirm and lend support to the findings of existing studies reported in the clinical literature.

The clinical literature on pain is replete with studies on the pain-related anxiety-depression spectrum. The research literature indicates episodes of anxiety and depression are very prevalent distress symptoms during human pain experience (de Heer, Gerrits, Beekman, et al., 2014; Hoffelt & Zwack, 2014; Institute of Medicine, 2011; Linton, Nicholas, Macdonald, & Boersma, 2010; Nakagawa, Yamaguchi, Kimura, et al., 2017; Orenius, Koskela, Koho, et al., 2013; Sherbourne, Asch, Shugarman, et al., 2009; Snyder & Handrup, 2018; Woo, 2010). According to the biopsychoecological diathesis-stress process model of chronic pain, pain has cognitive, emotional, environmental, and social components, in addition with its sensory component (Hazeldine-Baker, Salkovskis, Osborn, & Gauntlett-Gilbert, 2018; Institute of Medicine, 2011; Merskey & Bogduk, 1994; Nielson, Weir, Smith, & Gribbin, 2001; Peleg & Carluccio, 2018; The Mayday Fund, 2009). Moreover, pain intensity levels and pain-related distress are influenced by emergent psychosocial issues during the course of unrelieved pain (Hazeldine-Baker, Salkovskis, Osborn, & Gauntlett-Gilbert, 2018; Institute of Medicine, 2011; Orenius, Koskela, Koho, et al., 2013; Peleg & Carluccio, 2018; Woolf & Salter, 2006).

The present study identified two pain-related psychosocial issues that strongly influence and reliably predict anxiety and depressed mood episodes above and beyond pain intensity. These issues include pain interference and perceived rejection. This finding, found in both surveys, lends robust support to the conceptualization of pain as having cognitive, emotional, environmental, and social components, thereby providing an

empirical-based explanation on the importance of pain-related distress episodes during the transitional pain experience. Therefore, to better understand the anxiety and depressed mood episodes associated with musculoskeletal pain, we must take into consideration the emergent pain-related issues that trigger and fuel distress episodes. The findings from this study confirm and lend strong support to the biopsychosocial diathesis-stress process model of chronic pain.

Limitations of the Study

There are several limitations in the study that deserve attention here. To begin with, the study was designed to be a within-subjects exploratory descriptive quantitative investigation of the extent that eight pain-related factors influence and reliably predict distress episodes during the first four months of recurrent musculoskeletal pain experience, and to describe these relationships statistically. The limitation of the study are delineated next.

Limitation of Sample Sizes

The sample sizes in the present study are more than adequate for an exploratory descriptive investigation of distress episodes, but not for a thorough examination of the pain-related factors to draw a solid conclusion. Nevertheless, the robust findings on perceived rejection and pain interference are enticing, and worthy of investigating further in the future.

Limitations to Generalizability

Caution is recommended in generalizing the findings from the study to the larger population of individuals who are experiencing recurrent musculoskeletal pain during the

first four months since pain onset. To begin with, the participants in the present study were recruited online, and may only be representative of people in the transitional pain population with Internet access. In addition, more research on pain-related issues is needed to shed light on the role these emergent issues play in distress episodes during the course of human transitional pain experience.

Internal Validity of the Study

The internal validity of the study was assured and facilitated by employing hierarchical multiple regression in the research design and the data analyses. In addition, the standardized short-form measures of the key factors employed in the study also were instrumental in assuring internal validity. Thus both hierarchical multiple regression and the standardized short-form questionnaire items were efficacious in assuring the internal validity of the study.

Internal Validity and Hierarchical Multiple Regression. Hierarchical multiple regression allows researchers to examine sets of factors of interest, while controlling sets of extraneous and/or potentially confounding factors. In the present study, the extraneous facts included age range and gender, and the potentially confounding factors included general musculoskeletal diagnosis (injury or condition) pain intensity, and pain interference. In both surveys, the psychosocial factors of interest included perceived rejection, quality of life, and satisfaction with life.

The hierarchical multiple regression analytic method minimizes systematic errors in the study, and assures that the factors that were intended to be examined are in fact the ones affecting the outcomes, and not some other factors. Thus internal validity indicates

the extent that a valid significant causal relationship between the independent/predictor variables and the dependent/outcome variables exists. Hierarchical multiple regression also allows the magnitude of the effect to be determined, and the extent that each factor can reliably predict the effect on the outcome variable.

It deserves to be pointed here that although regarded as a psychosocial issue, in both surveys, pain interference was placed among the set of potentially confounding covariate variables to be controlled. This placement was arranged this way, mainly because pain interference is often closely monitored along with pain intensity during the transitional pain period by primary healthcare providers during patient examinations. Remarkably, both pain interference and pain intensity, as covariates, could not be controlled in the hierarchical multiple regression analyses, thereby suggesting, as well as indicating, the extent of their strength in influencing and predicting both pain-related anxiety and depressed mood episodes.

Internal Validity and the Short-form Measures. In addition with hierarchical multiple regression, the short-form questionnaire items used in both surveys in the study were chosen primarily because of the reported robust results of their validity tests during their development. The survey items from the Patient-Reported Outcome Measurement Information System (PROMIS) questionnaires were particularly effective in measuring the pain-related issues of pain intensity, pain interference, and perceived rejection, as well as the pain-related outcomes of anxiety and depressed mood episodes. In addition, the items from the standardized measures for quality of life (Cowan & Kelly, 2003), satisfaction with life (Diener, Emmons, Larsen, & Griffin, 1985) were selected because

of their validity tests results during their development. And the demographic data on participants' age range and gender were collected during respondent recruitment by the online host.

Internal Reliability of the Study

In psychological research, internal reliability refers to the consistency that a standardized measure can accurately measure itself over and over again. The findings in the study suggest internal reliability by consistently indicating the same factors influence and predict both anxiety and depressed mood episodes, i.e., pain interference, perceived rejection, and pain intensity influence and predict the distress episodes. While there is a difference involving the order of pain interference and perceived rejection on anxiety and depressed mood episodes as first or second of the ranking of the magnitude of their effects, remarkably pain intensity is consistently ranked third in order of its effects on both distress episodes. This finding suggests that some psychosocial factors may have a stronger effect on distress episodes than pain intensity levels, and also may serve as better predictors.

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Recommendations

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A number of recommendations for future research deserve to be presented here. As an exploratory descriptive quantitative investigation of the extent that pain-related factors influence and predict episodes of distress symptoms, the findings in the present study can be utilized to encourage further research. These recommendations for future research are delineated and discussed here.

Survey Participants Follow-up Studies

In the future, a follow-up study on the participants in both surveys may shed light on how well they fared during the course of their musculoskeletal pain experience, the extent their pain-related distress was resolved, and the extent of their pain chronicity and pain-related disability. Such information is helpful in understanding the consequences of the transitional pain process, the healthcare attention given participants' psychosocial issues and pain-related distress episodes, and the importance of these issues and episodes during the transitional pain period. Follow-up studies on the survey participants can provide a clearer picture of the role emergent psychosocial issues and distress episodes play in recurrent musculoskeletal pain experience.

Larger Sample Size

The present study was an exploratory descriptive investigation of the extent pain-related factors influence and predict distress symptom episodes during the first four months of recurrent musculoskeletal pain experience. As such, a minimum sample size was employed, albeit the study was slightly oversampled above and beyond the recommended minimum sample. It is recommended that future studies designed to test the replication of the findings of the present study use a larger sample size.

Recruiting Respondents with No Internet Access

In the future, a larger study may want to also recruit respondents who do not have internet access. This may involve making the survey available to primary care providers who agree to participate in such a study. However, based on the respondent recruitment experience of the present study, this may prove to be an extremely challenging task, as

many frontline healthcare providers and medical directors are not always cooperative with such local and regional independent interdisciplinary research requests.

Post-hoc Analyses

The research design of the present study may be characterized as basically a foot-in-the-door descriptive exploratory endeavor. However, a number of post-hoc analyses are optional. These post-hoc analyses may include: (a) estimating the values of missing items in the dataset, (b) resolving the normality issue in the distribution of scores on anxiety episodes, (c) creating dummy scores for distress episodes for conducting hierarchical multiple regression analyses, and (d) the general use of Likert scores for conducting hierarchical logistical regression analyses.

Exploring Other Pain-related Issues

Aside from perceived rejection, quality of life, and satisfaction with life, there are other pain-related psychosocial issues that deserve to be investigated. The research literature indicates that individuals with painful musculoskeletal injuries or conditions may experience episodes resulting in perceptions of unfairness during the course of their pain experience. In addition, individuals may also experience issues of self-efficacy in managing their pain, distress, and coping. Therefore it is recommended that these psychosocial issues be explored, examined, and described in much the same line as the present study.

The Issues of Catastrophizing, Perceptions of Unfairness, and Self-efficacy. In the future, several other pain-related psychosocial issues deserve similar research attention as was given to those in the present study. These issues include episodes of

catastrophizing, perceptions of unfairness, and self-efficacy in the pain experience. In their review of the research literature, Linton, Nicholas, Macdonald, and Boersma (2010) reported on the importance of the role that catastrophizing plays with depressed mood episodes in musculoskeletal pain experience. According to Linton et al., negative thinking about the pain experience is closely associated with depression and deserves greater research attention.

Remarkably, perceptions of unfairness in the pain experience is closely associated with anger and catastrophizing (Sullivan, Stanish, Sullivan, & Tripp, 2002). According to Scott, McCracken, and Trost (2013), individuals with recurrent pain often experience a number of losses that they perceive as unjust and ascribe external blame, and include a number of negative emotions, including anger and disgust, as well as episodes of anxiety and depressed mood. Perceptions of injustice has important implications for successful treatment outcomes (McParland, Hezseltine, & Serpell, 2011; McParland, JL, Whyte, 2008; Scott, McCracken, & Trost, 2013; Sullivan, Adams, & Horan, et al., 2008).

In a recent study conducted by Hazeldine-Baker, Salkovskis, Osborn, and Gauntlett-Gilbert (2018), mental defeat during the course of recurrent pain experience was found to be strongly correlated with pain-related self-efficacy. This finding has important implications for pain self-management training programs (Bair, Matthias, Nyland, et al., 2009; Börsbo, Gerdle, & Peolsson, 2010; Hazeldine-Baker, et al., 2018, Tang, Goodchild, & Hester, 2010; Tang, Shum, & Leung, 2013, Woby, Urmston, & Watson, 2007). It is highly recommended that these pain-related psychosocial receive research attention in the near future.

Examining Other Pain-related Distress Symptoms

Likewise, in addition with core symptoms in the pain-related anxiety-depression spectrum, there are other pain-related distress symptoms that deserve to be explored. According to findings in the research literature, individuals with painful musculoskeletal injuries or conditions may experience fatigue from chronic stress, negative emotions including anger, impatience, and irritability sleep disturbance, cognitive impairment, and periodic confusion. Subsequently, it is recommended that episodes of these five pain-related distress symptoms be further explored, examined, and described in the same the line as the present study.

Developing Early Pain Wellness Programs that Align with Psychosocial Issues

In order for pain prevention programs to be efficacious, early pain wellness programs need to be more fully developed and aligned with those psychosocial issues that have the greatest magnitude of effect upon pain-related distress episodes. Remarkably, one fairly recent innovative development has come by way of online programs (Fricton, Anderson, Clavel, et al., 2015; Macea, Gajos, Daglia Calil, & Fregni, 2010; Paul, Carey, Sanson-Fisher, Houlcroft, & Turon, 2013). In addition, according to Foster, Taylor, Eldridge, Ramsay and Griffiths (2007), communities can also organize local pain wellness programs led by lay leaders. The use of self-report scales for pain assessment and pain-self-management training has long been advocated for pain prevention (Jensen & Karoly, 2010; Fricton, 2015).

<div align="center">**Implications**</div>

The findings from this study have important implications for social change and future research. Social change refers to the application of empirical findings to everyday life, whether on the individual, group, organization, community, national, and/or global levels. And the implications for future research refers to studies that are driven by findings from current studies that deserve further scrutiny and exploration. The implications from the findings in the present study are succinctly summarized here.

Implications for Positive Social Change

We may inquire, what are the implications of the study's findings for positive social change? The present study's findings have implications for pain prevention, pain healthcare, and the development of short-form surveys to assist healthcare providers in pain assessment, treatment interventions plans, and interdisciplinary referrals. These implications for social change are delineated and briefly discussed next.

Implications for Pain Prevention. The findings from the present study suggest that to properly prevent chronic pain and minimize pain-related disability, greater attention needs to be directed toward the psychosocial issues that emerge during the course of individuals' transitional pain experience. A growing body of research literature has found many of these emergent issues become clearly evident during the first four months of recurrent musculoskeletal pain experience (Hoogendoorn, van Poppel, Bongers, Koes, & Bouter, 2000; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008). In addition, a number of empirically supported scholarly reports advocate that pain prevention efforts need to include emergent pain-related issues and psychosocial

distress episodes into risk assessment, intervention strategies, and treatment planning (da Costa & Ramos Vieira, 2010; Hoffelt & Zwack, 2014; Institute of Medicine, 2011; Jensen & Karoly, 2010; Øyeflaten, Hysing, & Eriksen, 2008; Weinrib, Azam, Birnie, et al., 2017; Williams, 2013; Young Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008).

Implications for Pain Healthcare. In addition with pain intensity, pain related issues such as perceived rejection and pain inference should be monitored closely by primary healthcare providers, and early referrals to psychological-assisted interventions should be included along with pharmacotherapy and physical therapy during the transition pain period (i.e., the first four months of unresolved musculoskeletal pain). Furthermore, frontline healthcare may stand to benefit from the use of short-form surveys to offset the time limits of psychosocial evaluations during patient examinations. These may not only save healthcare providers time, but also may provide documentation of pain-related psychosocial monitoring, and provide a basis for justifying interdisciplinary referrals to psychological-assisted interventions; including pain education, pain self-management training, transitional pain support groups, and related wellness programs.

Implications for the Development of Patient Short-form Surveys. In the future, healthcare providers might direct pain patients toward short-form surveys to document issues that are too time consuming to explore during the patient examination visit. The development of such short-form surveys for healthcare providers deserve encouragement. The findings in the present study provide an impetus for further

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investigations exploring the development of short-form patient-reported surveys for guiding frontline healthcare pain assessments, treatments, and prevention.

Towards this end, currently there are resources that are well along their way in providing frontline healthcare providers with these types of short-form patient-reported scales. These include the wonderful resources provided by the Patient Reported Outcome Measurement Information System (PROMIS) and the National Institute of Health (NIH) Toolbox. Both of these resources allow researchers to design their own patient outcome surveys. In addition, online hosts, such as *Survey Monkey* and its partner panel, *Cint*, make surveying easier and affordable. These resources deserve greater attention and usage by the pain research community and frontline healthcare providers.

Implications for the Development of Pain Wellness Programs. Research on the development of pain wellness programs needs to be encouraged. Currently there are a number of promising options. The development of innovative online pain education, pain self-management training, and wellness programs looks promising (Fricton, Anderson, Clavel, et al., 2015; Macea, Gajos, Daglia Calil, & Fregni, 2010; Paul, Carey, Sanson-Fisher, Houlcroft, & Turon, 2013). In addition, another feasible option involves organizing and developing local community pain wellness programs led by lay leaders (Foster, Taylor, Eldridge, Ramsay & Griffiths, 2007). And the development of short-form self-report scales for pain risk assessment and pain-self-management training has long been advocated and currently encouraged for pain prevention (Jensen & Karoly, 2010; Fricton, 2015). All of these type of pain prevention resources stand to benefit from research that clarifies and aligns psychosocial issues with pain-related distress episodes.

Directions for Future Research

The findings from the study lays the ground work for other studies, and suggests a number of directions for future research. The present study was primarily designed as a an exploratory within-subjects quantitative investigation involving two online surveys examining the extent of influence and contribution of the same eight independent / predictor variables in predicting the frequency of anxiety and depressed mood episodes during the first four months of recurrent musculoskeletal pain experience.

Time Series Studies. In the future, studies designed as within-subjects investigations might examine other pain experience time-frames using time series studies, e.g., the 5 to 8 months and the 9 to 12 months periods in the musculoskeletal pain experience, to glean a better picture of chronic pain progression.

Comparative Studies. In addition, between-subject investigations might explore the extent of similarities and differences in anxiety and depressed mood episodes. The results from such research may shed more light on those psychosocial issues that have the most influence on these types of distress episodes and upon the role of the pain-related anxiety-depression spectrum in promoting pain chronicity and disability. In addition, comparison studies will serve to inform and guide frontline pain healthcare assessment, interventions, and prevention, as well as further research.

Exploration of Other Psychosocial Issues. Likewise, other psychosocial issues might be investigated using a similar approach; thereby shedding light on other pain-related psychosocial issues, such as pain self-efficacy and perceptions of injustice in pain experience. Having a clearer picture on the extent of the effects of a variety of emergent

pain-related psychosocial stressors upon episodes of distress symptoms may assist us in identifying effective strategies and interventions in ameliorating suffering, chronicity, and disabilities. Knowing more about the effects of each type of psychosocial issues on a variety of pain-related distress symptoms will better inform pain healthcare assessment, interventions, and prevention. This may assist in promoting better healthcare provider-pain patient relationships and successful treatment outcomes. In addition, empirically based knowledge will also serve in guiding further research.

Examination of Other Distress Symptoms. Other pain-related outcomes might be investigated using comparable approaches as well; thereby further informing us on the stress-related fatigue associate with pain, pain-related anger and negative emotions, sleep disturbance, periodic confusion, and cognitive impairment. Access to such knowledge may assist frontline healthcare providers in making informed decisions in patient care, thereby promoting better healthcare provider-pain patient relationships, as well as more successful treatment outcomes. Such empirically based knowledge will also serve in guiding future research.

Identification of the Sources of Rejection and Avoidance in Social Networks. Research in the future may seek to identify the sources of avoidance and rejection within individuals' social support networks. The sources of perceived rejection may include the person's interpersonal relationships with their spouse, family members, friends, and acquaintances. In addition, based upon the reports by participants in chronic pain support groups, this line of inquiry may even extend to the individual's coworkers and employers, and members of their healthcare team. Empirical based knowledge identifying the

sources of rejection and avoidance may serve in (a) clarifying such perceptions and resolving such psychosocial issues, thereby optimizing the outcome efficacy in meeting individuals' pain-related needs, as well as (b) assuring that the person can successfully meet their treatment and pain prevention goals and objectives.

Development of Pain Wellness Programs. Further research can contribute to, as well as guide and inform, the development of patient-friendly and supportive pain education, pain-self-management training, and pain wellness programs. Particularly the development of (a) web-based assessment and psychological assisted intervention programs that complement traditional pharmacological and physical therapy protocols (Fricton, Anderson, Clavel, et al., 2015; Macea, Gajos, Daglia Calil, & Fregni, 2010; Paul, Carey, Sanson-Fisher, Houlcroft, & Turon, 2013), (b) community based wellness programs led by lay leaders (Foster, Taylor, Eldridge, Ramsay & Griffiths, 2007), and (c) the development of short-form patient self-report scales for pain assessment, pain-self-management training, and pain wellness programs (Jensen & Karoly, 2010; Fricton, 2015). Clearly the development of pain education, pain self-management training, and pain wellness programs needs to be encouraged and actualized, as advocated in many reports across decades (Bair, Matthias, Nyland, et al., 2009; Chou & Huffman, 2007; Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007; Fricton, 2015; Fricton, Anderson, Clavel, et al., 2015; Institute of Medicine, 2011; Jensen & Karoly, 2010; Lorig, Sobel, Stewart, et al., 1999; Macea, Gajos, Daglia Calil, & Fregni, 2010; Paul, Carey, Sanson-Fisher, Houlcroft, & Turon, 2013; The Mayday Fund, 2009).

The healthcare, insurance, and pharmaceutical industries stand to benefit from the development of such pain prevention resources. First, it will provide healthcare with an array of effective early psychological-assisted pain assessment and psychosocial interventions that they can refer patients towards, based on their needs, whether that be pain education, pain self-management training, and/or patient supportive wellness programs. Second, it will lower the costs of pain healthcare in our nation. And third, and most importantly, it will assure the likelihood of greater treatment outcome success.

However, realistically, it must be recognized that the healthcare, insurance, and pharmaceutical industries are currently prevented from whole-heartedly advocating, endorsing, and supporting the development of efficacious psychological-assisted pain prevention and wellness resources, primarily due to their own self-interests. Changing these perceptions remains a formidable task. Nevertheless, such positive social change may best be facilitated when the benefits of the development of psychological-assisted resources are fully demonstrated by empirical-based evidence derived from applied research.

Preventive Pain Healthcare Social Policy. In the past, psychosocial issues were given tertiary attention in terms of prevention. Individuals with psychological issues were directed to expensive psychiatric pain interventions after a chronic pain diagnosis. Despite a number of high profile reports recommending earlier intervention, our current approach to pain prevention still struggles with providing many pain patients with the psychological-assisted interventions they may need to minimize and reduce their pain-

related distress and suffering. The use of relatively inexpensive wellness programs deserves greater attention and development.

Conclusion

In the present study, pain interference and perceived rejection were found to have a strong influence and effect on anxiety and depressed mood episodes, in addition to being reliable predictors of pain-related distress symptom episodes. Perhaps the "take home" message of the study may best be presented by "stepping into the shoes" of the findings to examine the extent that they may make sense experientially. Towards this end, a couple suppositions are helpful and illuminating.

Suppose you had a painful musculoskeletal injury or condition, and you began to encounter episodes within your social support networks where you experienced the placing of constraints upon sharing your pain experience with others, and upon the extent you received social support from your significant others. Wouldn't you begin feeling a little anxious about such rejection and avoidance? And likewise, suppose you had a painful musculoskeletal injury or condition, and you encountered episodes within your everyday lives where you experienced behavioral and architectural limitations in completing the necessary daily activities involving the maintenance chores of your home, as well as limitations in your daily social activities. Wouldn't you begin to feel a bit depressed about your situation? Both of these suppositions provide us with some key insight into what individuals with recurrent musculoskeletal pain may experience during the course of their transitional pain experience.

By definition pain is a distressful experience with cognitive, emotional, social, and sensory domains (International Association for the Study of Pain, de C Williams & Craig, 2016). Unequivocally, as evident in the findings of the present study, and from other clinical research, including medical studies, distress comprises an array of psychosocial factors, including episodic core anxiety and depressed mood symptoms and emergent pain-related issues, aside from pain intensity levels. Moreover, because distress is the fifth vital sign, when appraising this vital sign with individuals suffering moderate-to-severe pain and distress during the acute, subacute, and early chronic pain transitional period, healthcare providers need to inquire about the other sources of the person's distress beyond their pain intensity, and document such inquiries, including the extent of pain interference and perceived rejection and avoidance the individual experiences. When this line of inquiry on the sources of distress is incorporated into the distress vital sign, it may assist in identifying those individuals who are most at risk of pain chronicity, impairment, and disability. These individuals should then be referred to the appropriate psychological-assisted interventions as part of their chronic pain prevention treatment plan. Given that a growing robust body of clinical research has demonstrated that pain degenerative pathology is a complex multidimensional phenomenon, I believe it is reasonable to predict that both medicine and nursing, as healthcare disciplines, will invariably have to become much more interdisciplinary during the 21st century. To assure greater success in chronic pain prevention, the American healthcare system must address and treat all the biopsychosocial determinants of pain-related distress comprising the transitional pain experience.

The present study begins to bring some clarity to and fills a gap in the clinical research literature on pain-related distress episodes and the psychosocial issues that often emerge during the course of the first four months of protracted musculoskeletal pain experience. An extension in our knowledge and understanding of pain-related distress episodes and the psychosocial issues that trigger and fuel them may assist us in effectively preventing much of the suffering associated with recurrent musculoskeletal pain. Such knowledge will inform and empower pain patients, frontline healthcare providers, health care counselors, pain specialists, pain prevention experts, pain researchers, and preventive pain health social policy.

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Appendix A: Key Search Terms

A number of key words and phrases were used when conducting search surveys for the proposed study. These terms are listed as follows.

> Activity level, adjustment disorders, attenuated symptoms, behavioral medicine, biomedical model, biopsychology, biopsychosocial theory, biopsychoecology, chronic pain, chronic pain disorders, collaborative care, comorbidity, diathesis-stress heuristic, disability, distress, distress symptoms, early pain experience, emergency care, epidemiology, etiology, functional impairment, general self-efficacy, healthcare system, health psychology, healthcare relationships, integrated healthcare, medical history, medical psychology, medical science, pain attitudes, pain beliefs, pain control, pain disclosure, pain distress, pain education, pain intensity, pain pathogenesis, pain patterns, pain-prone personality, pain-related distress, pain-related self-efficacy, pain science, pain severity, patient science, psychosocial factors, psychosocial issues, psychosomatic, quality of life, self-education, perceptions of credibility, perceptions of injustice, perceptions of unfairness, primary care, psychogenic, psychological distress, psychological management training, social constraints, social impairment, social support, sub-clinical, subjective well-being suffering, symptoms, unexplained illnesses, and well-being.

These terms and grammatical units were employed in a Boolean search format when using the databases. Search findings were then collated into files categorized as either theoretical or evidence according the study's variables. Peer-reviewed materials were separated from editorials, news releases and the like; however, the latter when used are readily identified in the text of this proposal. After these survey searches were completed, a literature review matrix was used to help further organize collated peer-reviewed articles and other documents. The surveyed literature was then collated and sorted according to the following lines of organization for this review.

Appendix B: Computerized Survey Components

THE MUSCULOSKELETAL PAIN EXPERIENCE SURVEY STUDY
Survey Introduction Page, Informed Consent Statement, & Consent Agreement Statement

INTRODUCTION PAGE & CONSENT AGREEMENT STATEMENT – (p. 1 of survey)
NOTE: Basically the same for both surveys,

Welcome to the Musculoskeletal Pain Distress Survey (Anxiety) OR Musculoskeletal Pain-related Depressed Mood Survey (Depression).

Thank you for your interest in this special survey on pain-related distress. Your participation in this study is greatly appreciated. The findings from this study may help improve the quality of pain health care.

This survey is on the distress and related issues that may arise during the course of the first four months of prolonged musculoskeletal pain experience. Common distress symptoms often include anxiety and depressed mood. Pain-related issues may include: (1) diminishing levels of our satisfaction with life, (2) rejection and loss of comforting support within our social networks, and (3) limitations in our normal daily activities and quality of life.

Individuals who have experienced any of these distress symptoms and issues during this four month time frame are welcomed to participate.

OVERVIEW – The survey is completely anonymous. No personal identifiers are requested. Most people complete this survey in less than 5 minutes. Please Note: This survey is comprised of a total of 32 multiple choice items. It is recommended you complete it in a setting where there are no distractions.

INFORMED CONSENT – Before you decide to participate in the survey study, please take some time and read the survey's Informed Consent Statement in the textbox. This statement is part of an ethical process called "informed consent" to allow you to understand the study before deciding whether to take part in it. Please save or print a copy for your records.

INDICATION OF YOUR CONSENT – Your consent as a research participant is indicated when you chose the "Yes" response option to the Consent Agreement Statement. The "No" response option will take you out of the survey.

Q1. CONSENT AGREEMENT STATEMENT: "I accept the invitation to contribute to this study as a survey respondent. I certify that I am 18 years of age or older, and that my reoccurring pain does not exceed 4 months since it began. I also certify that I have experienced "moderate to severe" episodes of distress symptoms, and/or have experienced at least one of the pain-related issues outlined in the survey's Introduction and Informed Consent Statement."

- Yes
- No

Appendix B: Computerized Survey Components – (Continued)

DISTRESS & PAIN PROFILE – Screening / Disqualification Page – (p. 2 of survey)

To begin with, please tell us about your distress experience, and your recent pain intensity levels.

Q2 – Please confirm that your current anxiety OR depressed mood episodes does not exceed the first 4 months since your pain started.

- Yes, as I certified above, my current distress experience does not exceed this first 4 months pain period.
- No, actually my distress experience exceeds this 4 month period. **(Disqualify)**

Q3 – Have you experienced reoccurring episodes of depressed mood since your pain started?

- Yes
- No (**Disqualify**)

Q4 – Select all the options that apply to your current pain-related distress experience.

- Thoughts that your satisfaction with life has been diminished.
- A rejection episode, or episodes, where significant others placed constraints on listening to you talk about your pain, and/or the extent you received their comforting support.
- Some limitations in completing your normal daily activities, including household chores, shopping, work-related activities, and family and social life.
- Pain intensity level increased when you were stressed.
- **Occasional episodes of dizziness, light-headiness, nausea, and vomiting. (Disqualify)**
- **None of these. (Disqualify)**

Q5. **In the past 7 days, how intense was your pain at its worst? – (Select one)**

- Slight / Mild / Moderate / Severe / Extremely Severe

Q6. In the past 7 days, how intense was your average pain? – (Select one)

- Slight / Mild / Moderate / Severe / Extremely Severe

Q7. What is your level of pain right now? – (Select one)

- Slight / Mild / Moderate / Severe / Extremely Severe

Appendix B: Computerized Survey Components – (Continued)

DISTRESS & PAIN PROFILE – Second page of the profile – (p. 3 of survey)
To continue, please tell us more about your pain diagnosis, the extent that you felt depressed, and your pain interference experience.

Q8. What General Musculoskeletal Diagnosis has your doctor given as the source of your pain condition?
- Musculoskeletal Injury with or without Complications.
- Recent Diagnosed Musculoskeletal Health-related Condition.

ANXIETY ITEMS – Musculoskeletal Pain Distress Survey
Q9. In the past 7 days, I felt fearful.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q10. In the past 7 days, I found it hard to focus on anything other than my anxiety.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q11. In the past 7 days, my worries' overwhelmed me.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q12. In the past 7 days, I felt uneasy.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

DEPRESSED MOOD ITEMS - Musculoskeletal Pain Depressed Mood Survey
Q9. In the past 7 days, I felt helpless.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q10. In the past 7 days, I felt depressed.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q11. In the past 7 days, I felt hopeless.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q12. In the past 7 days, I felt worthless.
- __ Never / __ Rarely / __ Sometimes / __ Often / __ Always

Q13. In the past 7 days, how much did your pain interfere with your day-to-day activities? – (Select one)
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very Much

Q14. In the past 7 days, how often did pain interfere with work around home? – (Select one)
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

Appendix B: Computerized Survey Components – (Continued)

DISTRESS & PAIN PROFILE – Second page of the profile – (Continued p. 3)

Q15. In the past 7 days, how often did pain interfere with your ability to participate in social activities? – (Select one)
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

Q16. In the past 7 days, how often did pain interfere with your household chores? – (Select one)
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

(Continued On Next Page)

Appendix B: Computerized Survey Components – (Continued)

PAIN EXPERIENCE PROFILE – Second survey profile component – (p. 4 of survey)

Rejection in Social Support Networks – Please tell us about the extent you may have experienced the following constraints in your social support networks during your pain experience.

In the past month, please describe how often people in your life:

Q17. Don't listen when I ask for help.
Never / Rarely / Sometimes / Usually / Always

Q18. Act like my problems aren't that important.
Never / Rarely / Sometimes / Usually / Always

Q19. Let me down when I am counting on them.
Never / Rarely / Sometimes / Usually / Always

Q20. Act like they do not have time for me.
Never / Rarely / Sometimes / Usually / Always

Q21. Act like they do not want to hear about my problems.
Never / Rarely / Sometimes / Usually / Always

Q22. Act like they do not care about me.
Never / Rarely / Sometimes / Usually / Always

Q23. Act like they can't be bothered by me or my problems.
Never / Rarely / Sometimes / Usually / Always

Q24. Avoid talking to me.
Never / Rarely / Sometimes / Usually / Always

Appendix B: Computerized Survey Components – (Continued)

PAIN EXPERIENCE PROFILE – Second page of the profile – (p. 5 of survey)
Current Satisfaction with Life & Quality of Life – Please, tell us about your current state of satisfaction with life. And then indicate your quality of life in your level of daily activities and functioning with pain.

Q25. In most ways my life * is close to ideal.
1 - Strongly Disagree
2 - Disagree
3 - Slightly Disagree
4 - Neutral
5 - Slightly Agree
6 - Agree
7 - Strongly Agree

Q26. The conditions in my life are excellent.
1 - Strongly Disagree
2 - Disagree
3 - Slightly Disagree
4 - Neutral
5 - Slightly Agree
6 - Agree
7 - Strongly Agree

Q27. I am satisfied with my life.
1 - Strongly Disagree
2 - Disagree
3 - Slightly Disagree
4 - Neutral
5 - Slightly Agree
6 - Agree
7 - Strongly Agree

Q28. So far I have gotten the important things I want in life.
1 - Strongly Disagree
2 - Disagree
3 - Slightly Disagree
4 - Neutral
5 - Slightly Agree
6 - Agree
7 - Strongly Agree

Q29. If I could live my life over, I would change almost nothing
1 - Strongly Disagree
2 - Disagree
3 - Slightly Disagree
4 - Neutral
5 - Slightly Agree
6 - Agree
7 - Strongly Agree

Appendix B: Computerized Survey Components – (Continued)

PAIN EXPERIENCE PROFILE – Last item of the profile – (p. 6 of survey)

Q30. Select the level that best describes your everyday activities during the past 7 days, ranging from "Non-functioning" to "Normal Quality of Life".

0 - **Non-functioning:** Stay in bed all day. Feel hopeless and helpless about life.

1 - Stay in bed at least half the day. Have no contact with outside world.

2 - Get out of bed, but do not get dressed. Stay at home all day.

3 - Get dressed in the morning. Minimal activities at home. Contact with friends via phone or e-mail.

4 - Do simple chores around the house. Minimal activities outside the home two days a week.

5 - Struggle but fulfill daily home responsibilities. No outside activity. Not able to work / volunteer.

6 - Work / Volunteer limited hours. Take part in limited social activities on weekends.

7 - Work / Volunteer for a few hours daily. Can be active at least five hours a day. Can make plans to do limited activities on weekends.

8 - Work / Volunteer for at least six hours daily. Have energy to make plans for an evening of social activity during the week. Active on weekends.

9 - Work /Volunteer for at least eight hours daily. Take part in family life, outside social activities limited.

10 - **Normal quality of life:** Go to work /volunteer each day. Normal daily activities each day. Have a social life outside of work. Take an active part in family life

Appendix C: Permission Requests Correspondence

The following appendix documents the written correspondence to-and-from the five progenitors of pre-published standardized psychological measures, requesting permission to use their scales in the proposed study. This correspondence was addressed to Michael Nicholas, Ph.D., Michael Sullivan, Ph.D., Chris Pasero, M.S., R.N.-B.C., FAAN, Penny Cowan, Executive Director of the American Chronic Pain Association, and Ed Diener, Ph.D. During the late summers of 2014 and 2015 e-mails were sent to each author requesting their written permission to use their instrument in the proposed dissertation research study. Their responses are documented here. In addition, where permission is given for two of the measures for public use, this has been documented accordingly. These measures include the National Institute of Health's Toolbox Perceived Rejection Survey (PRS) scale, and the customized PROMIS Pain Behavior Scale with Supplemental Items Early Pain-related Distress Survey (PROMIS-PBSSI) instrument assembled from validated PROMIS research resources by this proposal's author.

Appendix C: Permission Requests Correspondence – (Continued)

Permission for Use of the PROMIS Pain Behavior Scale with Supplemental Items

(PROMIS-PBSSI)

GENERAL PERMISSION STATEMENT – (Clarification Currently Underway)

PROMIS measures are copyrighted. All English and Spanish PROMIS measures are publicly available for use in one's individual research, clinical practice, educational assessment, or other application without licensing or royalty fees. Commercial users must seek permission to use, reproduce, or distribute measures. Integration into proprietary technology requires written permission

Patient Reported Outcomes Measurement Information System (PROMIS), funded by the NIH, is a system of highly reliable, precise measures of patient–reported health status for physical, mental, and social well–being. PROMIS tools measure what patients are able to do and how they feel by asking questions. PROMIS' measures can be used as primary or secondary endpoints in clinical studies of the effectiveness of treatment.

The **Assessment Center** is an online research management tool that can be used to collect PROMIS data. The system enables researchers to create study-specific websites for capturing participant data securely. **Studies can include measures within the Assessment Center library as well as custom instruments created or entered by the researcher.** Any PROMIS measure can be downloaded for administration on paper or be included in an online study. Assessment Center enables customization of item or instruments (e.g., format, randomization, skip patterns), scoring of short forms and computerized–adaptive tests (CATs), storage of protected health information in a separate, secure database, automated accrual reports, data export, graphing of scores, and the ability to capture endorsement of online consent forms.

Appendix C: Permission Requests Correspondence – (Continued)

Permission for Use of the Perceived Rejection Survey (PRS)

GENERAL PERMISSION STATEMENT

NIH Toolbox Perceived Rejection Survey -- Permission for Research
Permission is not needed for research by individuals who are qualified to use and administer the tests.

As of January 2016 www.AssessmentCenter.net will no longer be available for new **NIH Toolbox Cognition, Motor or Sensation studies.** This decision was made given the existence of the new (and improved) NIH Toolbox administered using an iPad App, and due to the increasing costs of maintaining the web-based version of the NIH Toolbox. **If necessary, ongoing NIH Toolbox studies may continue to use www.AssessmentCenter.net through at least August 2017.** However, do note that starting **September 1, 2016**, ongoing NIH Toolbox studies using www.AssessmentCenter.net will be assessed $5,000 per year to offset the cost of operating the website.

Appendix C: Permission Requests Correspondence – (Continued)

Permission for Use of the Quality of Life Scale (QOLS)

REQUEST SENT: Friday, September 19, 2015

From: Ahlstrom, Gary / To: Cowan, Penny

Greetings Penny Cowan:

My name is Gary Ahlstrom, and I am a doctoral student at Walden University, and I also help co-facilitate a chronic pain support group in Grass Valley with Jeanne Spring.

I am requesting your permission to use the American Chronic Pain Association's **Quality of Life Scale (QOLS; Cowan & Kelly, 2003)** in my dissertation research project. I am conducting a survey on psychosocial issues associated with patients' early musculoskeletal acute pain experience, and would like to use your measure in my proposed study. Thank you.

Sincerely,

Gary R. Ahlstrom, M.S.
Graduate Student
Clinical Psychology Program
School of Psychology
Walden University

Reference:
Cowan, P. & Kelly, N. (2003). American Chronic Pain Association Quality of Life Scale, A Measure of Function for People with Pain. Available online at:
http://theacpa.org/uploads/documents/Quality_of_Life_Scale.pdf.

PERMISSION RECEIVED: Tuesday, September 22, 2015

From: American Chronic Pain Association, Cowan, Penny / To: Ahlstrom. Gary

Hello Gary,

You have permission to use the Quality of Life scale from our website at
http://www.theacpa.org/uploads/documents/Life_Scale_3.pdf in its entirety with no changes and we request you note "Printed by permission of ACPA 201x" year depending on completion.

Good luck in the future and thanks for helping Jeanne to help others.

Regards,
ACPA

Appendix C: Permission Requests Correspondence – (Continued)

Permission for Use of the Satisfaction with Life Scale (SWLS)

<u>**REQUEST SENT: Friday, September 19, 2015**</u>

From: Ahlstrom, Gary / To: Diener, Ed

Greetings Professor Diener:

My name is Gary Ahlstrom, and I am a doctoral student at Walden University.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. Journal of Personality Assessment, 49(1), 71-75.

I am requesting your permission to **use Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985)** in my dissertation research project. I am conducting a survey on psychosocial issues associated with patients' early musculoskeletal sub-acute pain experience, and would like to use your measure in my proposed study. Thank you.

Sincerely,

Gary R. Ahlstrom, M.S.
Graduate Student
Clinical Psychology Program
School of Psychology
Walden University

Reference:
 "The scale is copyrighted but you are free to use it without permission or charge by all professionals (researchers and practitioners

<u>**PERMISSION RECEIVED: Tuesday, September 2, 2015**</u>

From: Online Web Site - Diener, Ed

Online Permission to Use**) as long as you give credit to the authors of the scale: Ed Diener, Robert A. Emmons, Randy J. Larsen and Sharon Griffin as noted in the 1985 article in the *Journal of Personality Assessment*."**

Available online at Professor Ed Diener's General Illinois University "Subjective Well-being" and "Satisfaction with Life Scale" Permissions websites are addressed as follows:

http://internal.psychology.illinois.edu/~ediener/scales.html

http://internal.psychology.illinois.edu/~ediener/SWLS.html