Examining the Efficacy of a Cognitive Behavioural Intervention in Reducing Anxiety Sensitivity and Functional Impairment in Chronic Pain Patients

Christina Iorio, M.A., Ph.D. (Candidate)

Lakehead University

A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Clinical Psychology

September 22, 2015

Co-supervisors:	Dr. Dwight Mazmanian and Dr. Martin A. Katzman
Second Reader:	Dr. Michel Bédard
Internal:	Dr. Mirella Stroink
External:	Dr. Margo Watt

Acknowledgements

There are a number of people who have contributed greatly to this project, and to each I am truly grateful. Thank you to my supervisors, Dr. Mazmanian and Dr. Katzman, who have provided their knowledge, guidance, and encouragement throughout this process, and have furthered my growth as a researcher. I would also like to thank Dr. Bédard for his insightful feedback, which has challenged my thinking and resulted in the improvement of this project. Dr. Mirella Stroink and Dr. Margo Watt, I wish to extend my gratitude for your willingness to devote your time and provide constructive feedback. Sincere appreciation to the participants and clinics that volunteered their time and space to this project, and to the research assistants who were involved in the collection of the data.

To my friends, both near and far, who have supported me through this process, I am forever grateful. To my parents, who have instilled in me the values necessary to pursue my goals, thank you for your never-ending support and encouragement. To my siblings and other family members, thank you for being my biggest cheerleaders. Lastly, a very special thank you to my husband. You have made many sacrifices over the years in order to allow me to achieve my goals. Words cannot express the gratitude I have for your unwavering support, continuous words of encouragement, and the strength of your belief in me.

Abstract

Comorbid psychological factors affect the experience and prognosis of chronic pain, as comorbidity is associated with poor treatment outcomes and greater levels of disability (Burns, Johnson, Mahoney, Devine, & Pawl, 1998; Holzberg, Robinson, Geisser, & Gremillion, 1996; Tunks, Crook, & Weir, 2008). Cognitive variables, such as anxiety sensitivity (AS) and fear of pain, have been associated with functional impairment (e.g., Gheldof et al., 2010; Plehn, Peterson, & Williams, 1998). One theory put forward is that AS is a vulnerability factor for the development of fear of pain (Keogh & Asmundson, 2004). The present study examined whether a cognitive-behavioural intervention that included a component targeting AS led to a reduction in functional impairment in participants with chronic pain. Ninety-six participants were recruited from several pain clinics. Following a screening procedure, eligible participants were assigned to either the 12-week treatment group or the control group, and completed questionnaire packages pre-treatment, post-treatment, and at a three month follow-up. Results partially supported the hypotheses made. Although there was no direct relationship between change in AS or fear of pain and functional impairment, participants did report a reduction in fear of pain following treatment. Exploratory analyses were conducted examining the relationship between therapeutic alliance (TA) and treatment outcome, and initial hypotheses made were supported, as participants who completed measures at all three time points demonstrated that higher levels of TA were associated with more self-control over pain and less catastrophizing. Strengths and limitations, along with clinical implications of the findings and directions for future work are discussed.

Table of Contents

Page

Acknowledgements i

Abstract ii

Table of Contents iii

Introduction 1

Defining Pain 1

Prevalence Rates of Chronic Pain 3

Assessment of Chronic Pain 4

Prognosis of Chronic Pain 5

Sex Differences in Pain 7

Pain Theories 9

Chronic Pain and Mental Health 11

Anxiety Sensitivity 14

Fear of Pain 20

Management of Chronic Pain 23

Cognitive Behavioural Therapy (CBT) 24

Evaluating the Efficacy of CBT in Chronic Pain 27

Mindfulness-Based Interventions and Chronic Pain 35

The Present Study 37

Hypotheses 38

Method 40

Recruitment of Participants 40

Training of Research Assistants 42

Procedure 42

The Cognitive Behavioural Therapy Procedure 45

Measures 47

Demographic Questionnaire 47

Mini International Neuropsychiatric Interview (MINI) Plus 48

West Haven-Yale Multidimensional Pain Inventory (MPI) 48

Pain Anxiety Symptoms Scale-20 (PASS-20) 49

Anxiety Sensitivity Index (ASI) 50

Beck Depression Inventory II (BDI II) 51

Patterns of Activity Measure - Pain (POAM-P) 51

Working Alliance Inventory-Short Revised (WAI-SR) 52

Mindful Attention Awareness Scale (MAAS) 53

The Intolerance of Uncertainty Scale – 12 (IUS-12) 53

Coping Strategies Questionnaire Revised (CSQ-R) 54

Pain Catastrophizing Scale (PCS) 55

The Homework Compliance Scale 55

Results 56

Sample Characteristics 56

Statistical Analytic Strategy 59

Pre-Analysis Issues 61

Missing data and number of cases 61

Univariate and multivariate outliers 63

Normality, linearity and homoscedasticity 63

Group Equivalency 64

Pre-Post Completer Analyses 64

Multivariate Analysis of Co-Variance (MANCOVA) 64

Analysis of Co-Variance (ANCOVA) 65

Correlations 65

Regression 66

Paired *t*-test 66

Supplementary Analyses 66

Follow-up Completer Analyses 67

Multivariate Analysis of Co-Variance (MANCOVA) 67

Analysis of Co-Variance (ANCOVA) 67

Correlations 67

Regression 67

Paired *t*-test 67

Supplementary Analyses 68

Confounder Analyses 68

Controlling for Disability Status and Current Pain 68

Homework Completer Analyses 69

Discussion 70

Review of Original Hypotheses 70

Main Findings 71

Supplementary Findings ……..... 77

Strengths and Limitations ……..... 79

Conclusions and Future Directions ……. 83

References ……..... 86

List of Tables ……

1. Demographic Characteristics by Sex and Pooled Sample ……... 117

2. Frequency of Psychological Disorders as Assessed with the M.I.N.I Structured Clinical Interview …… 119

3. Descriptives for Skewness and Kurtosis ……..... 122

4. Determining Group Equivalency Using the *t*-Test for Outcome Measures …… 126

5. Determining Group Equivalency Using the *t*-Test for Demographic Measures 128

6. Determining Group Equivalency Using the Chi-Square Test for Demographic Measures …….. 129

7. Analysis of Covariance for all Outcome Measures ……. 134

8. Bivariate Correlations Among Change Scores in Outcome Variables for the Pre-Post Completer Sample (n = 60) ……...……... 136

9. Linear Regressions from the WAI Pre-Post Completer Sample (Client Scores) 137

10. Linear Regressions from the WAI Pre-Post Completer Sample (Therapist Scores) ……...…. 139

11. Paired *t*-tests for the Pre-Post Completer Sample: Time 1 and Time 3 …… 141

12. Paired *t*-tests for the Pre-Post Completer Sample: Time 2 and Time 3 ……... 143

13. Paired *t*-tests for the Pre-Post Completer Sample: Treatment Group Only ….. 145

14. Bivariate Correlations Among Change Scores in Outcome Variables for the Follow-Up Completer Sample (n = 16) 147

15. Linear Regressions from the WAI Follow-Up Analyses Sample (Client Scores) 148

16. Linear Regressions from the WAI Follow-Up Analyses Sample (Therapist Scores) 150

17. Paired t-tests for the Follow-up Completer Sample: Treatment Group Only ... 152

18. Repeated Measures Analyses for the Follow-up Completer Sample 154

19. Analysis of Covariance for Outcome Measures: Covarying Disability Status and Current Pain 155

20. Repeated Measures Analysis of Variance: Therapist Ratings of Homework Compliance 157

21. Repeated Measures Analysis of Variance: Client Ratings of Homework Compliance 158

List of Appendices .....

A. Cognitive Behavioural Therapy 12-Week Group Treatment Protocol 159

B. Informed Consent Form 162

C. Participant Debriefing Form 169

D. Crisis Intervention Protocol 172

E. Demographic Questionnaire 174

Examining the Efficacy of a Cognitive Behavioural Intervention in Reducing Anxiety Sensitivity and Functional Impairment in Chronic Pain Patients

Defining Pain

Pain is a complex and unique experience, as there are times when the experience proves to be useful and adaptive in providing warning of danger (such as when one grasps a hot skillet), and there are other times when the experience of pain does not appear to be adaptive (such as the constant throbbing of a headache). The complexity of pain is further revealed by the fact that its experience is completely subjective, varying substantially from one individual to the next.

The International Association for the Study of Pain (IASP) defines pain as an unpleasant experience, encompassing both sensory and emotional factors that are either associated with potential tissue damage, or described in terms of such tissue damage (IASP, 1986). However, there are differences in the conceptualization and presentation between acute and chronic pain. Acute pain describes pain which serves as an indicator that something is wrong with the body arising from some form of trauma to the body, whether it is rooted in an injury, illness, or surgery (Schneider, 2004). The conceptualization of acute pain is quite mechanistic in that the body is viewed as a biochemical machine separate from the mind. The assumption is that treating the symptoms of pain will in turn cure the underlying injury or disease, thus relieving the perceived pain (e.g., Drum, 1999).

Contrary to commonly held beliefs, chronic pain is not simply a longer duration of acute pain. One of the ways in which the two diverge is in the finding that they involve different signal processing pathways in the brain. For example, in comparison to normal controls, chronic pain patients tend to display decreased sensory processing and enhanced emotional/cognitive processing with respect to the areas of the brain which appear to be active during experimental

pain. Specifically, in chronic pain patients, prefrontal cortex activity appears to increase and the occurrence of activity across the anterior cingulate, primary and secondary somatosensory cortices, insular cortices, and thalamus appears to be lower when compared to controls (Apkarian, Bushnell, Treede, & Zubieta, 2005). Thus, acute pain perception in normal individuals appears to be different from that in chronic pain patients, suggesting that activation of differing regions of the brain may be one of the distinguishing factors between acute and chronic pain. Additionally, the treatment goal for acute pain is to diagnose and remove the source of the pain, whereas for chronic pain it involves managing the condition, thereby, maximizing the individual's functioning (Sams, 2006). With chronic pain, complete elimination of the pain is rare. Thus, the objective of the treatment is to decrease the pain to a tolerable level, and provide the individual with the opportunity to improve his or her daily functioning (Schneider, 2004).

Due to the complex nature of chronic pain, there has been difficulty in formulating a universally acceptable definition of chronic pain. The IASP defines chronic pain in terms of the persistence of pain beyond normal tissue healing time (IASP, 1986), which on average has been deemed to be approximately three to six months following the initial pain episode (Birse & Lander, 1998). This definition is limiting because it focuses solely on the time course of the injury, and it overlooks the neurological components of pain (Apkarian et al., 2005), as well as the multidimensional nature of chronic pain (Turk & Rudy, 1987). Examining chronic pain without taking into account additional factors besides tissue damage proves difficult when attempting to explain situations that involve pain in the absence of physical injury, or pain which persists following the apparent healing of tissue damage (Novy, Nelson, Francis, & Turk, 1995).

Other definitions of chronic pain tend to incorporate a multidimensional view of chronic pain, which moves beyond simply defining chronic pain in terms of duration (Von Korff & Dunn, 2008; Von Korff, Dworkin, & Le Resche, 1990). These different definitions are linked to specific theoretical perspectives. For example, the sensory-physiological model of pain views pain as linked directly to the presence of some form of organic pathology within the body (Turk & Rudy, 1987). In contrast, the gate control theory of pain describes pain as stemming from a number of factors that include sensory, motivational, affective, and cognitive factors (Melzack & Wall, 1965). Along the same lines, the more recent neuromatrix theory of pain (Melzack, 2001) proposes that each individual has an innate network of neurons termed the "body-self neuromatrix", and this network of neurons is influenced by the individual's unique physical, psychological, and cognitive traits, as well as their experience.

Despite the different definitions of chronic pain, the one universal understanding is that pain is what the patient says it is. In other words, the experience of pain is subjective and the patient is the expert on his or her own pain (Fishman & Berger, 2000). However, despite the specific manner in which chronic pain is defined, those who suffer with this condition tend to share a number of commonalities, including the sensory experience of pain and the adverse effects of chronic pain on one's ability to function (Katz & Melzack, 2001; McCarberg & Passik, 2005).

Prevalence Rates of Chronic Pain

The reported point prevalence rate of chronic pain within Canada ranges anywhere from 29% to 44% (Birse & Lander, 1998; Moulin, Clark, Speechley, & Morley-Forster, 2002). The wide range in prevalence rates may be a function of several methodological differences between research studies, including differences in the operational definition of chronic pain employed,

variation in sample characteristics such as sex or age, and method of collecting data (e.g., telephone surveying, interviews, or medical examinations) (Tunks et al., 2008). Although many individuals are affected by chronic pain, the burden imposed by this condition goes beyond the single sufferer because it can impact society as a whole. In Canada, the annual cost estimate for each chronic pain patient is $14,744 (Jovey, 2005), which is in part related to the loss of productivity, increased utilization of health care, and substantial amount of health care expenditures (Turk, Loeser, & Monarch, 2002).

Assessment of Chronic Pain

A review article by Latham and Davis (1994) examined the socioeconomic impact of chronic pain and revealed that a diagnosis of chronic pain affected many aspects of an individual sufferer's life. With respect to employment, more than half of the individuals claim that chronic pain has affected their ability to work, with the percentage of individuals returning to work decreasing steeply after six months. Restrictions were also reported in terms of both physical functioning (e.g., restricted walking ability, difficulty bending or lifting, increased time lying down) and psychological functioning (e.g., depressed mood, anger, social maladjustment). There is also an impact on family members, including loss of physical activities with children, changes in responsibilities and roles (Strunin & Boden, 2004), adverse effects on spousal relationships (Öhman& Söderberg 2004), and emotional distress reported by family members (West, Usher, Foster, & Stewart, 2012).

Due to the multidimensional nature of chronic pain, a comprehensive assessment of pain is often employed. The various dimensions of pain that are commonly assessed include physical, functional, behavioural, cognitive, emotional, economical, and social factors. The physical assessment of pain relies on verbal reports and symptom checklists (e.g., The McGill

Pain Questionnaire; Melzack, 1975). Functional measures examine factors such as self-care, disability, productivity, and uptime (the amount of time a patient is functional within a 24 hour period) (Turk & Melzack, 2011). Behavioural (e.g., behavioural observation; Keefe & Block, 1982) and cognitive measures (e.g., Coping Strategies Questionnaire; Rosenstiel & Keefe, 1983) examine verbal and non-verbal pain behaviours, sleep disturbances, coping strategies, cognitive processes, self-efficacy, number of visits to the physician, hospitalizations, surgeries, somatic concern, and drug usage. Emotional measures typically look specifically at depression and anxiety (e.g., The Hospital Anxiety and Depression Scale; Zigmond, & Snaith, 1983). A number of economic factors such as cost of treatments, hospitalizations, medications, compensation, insurance, disability payments are also assessed (Williams, 1988). Sociocultural factors examined include age, sex, ethnicity, marriage, social support, and quality of life (e.g., The Short Form-36; Ware & Sherbourne, 1992). All factors described are generally assessed through the use of standardized measures or self-report questionnaires (Norris, 2000; Williams, 1988).

Comprehensive assessment and treatment modalities are often required, as chronic pain does not occur in a vacuum. Treatments that not only target a reduction in pain directly, but also other domains of the patient's life typically provide better outcomes than those with a more restricted focus (Scascighini, Toma, Dober-Spielmann, & Sprott, 2008; Sullivan, Reesor, Mikail, & Fisher, 1992; Turk, Swanson, & Tunks, 2008).

Prognosis of Chronic Pain

In a 12-year follow-up study of a cohort of individuals (n = 214) either with or without chronic pain, one third of the participants who were without pain at the start of the study reported chronic pain. In addition, of those with chronic pain from the start, 85% maintained a diagnosis

of chronic pain at follow-up (Andersson, 2004). The number of painful areas reported was the best predictor of chronic pain level 12 years later. In addition, social factors (such as having a close friend) were found to decrease the risk of maintaining chronic pain. The onset of chronic pain was also related to physical workload, specifically, those who reported engaging in bent positions at work were more likely to experience chronic pain at follow-up.

In a Canadian sample of 340 chronic pain sufferers, it was revealed that the average duration of pain in the sample at that point in time was 10.7 years (Moulin et al., 2002). With respect to treatment options, 49% were prescribed one or more anti-inflammatory agents, 22% were taking an opioid analgesic, 18% were taking adjuvant analgesics (e.g., antidepressants or anticonvulsants), 30% were taking over the counter medication in addition to prescribed medication, and 8% could not name their prescribed analgesics. Almost all patients sampled were receiving some form of nonpharmalogical treatment; 74% were involved in an exercise program, 43% engaged in relaxation therapy, 28% participated in physiotherapy, 22% in massage therapy, 12% were receiving transcutaneous electrical nerve stimulation, and 9% were undergoing acupuncture treatment.

Overall, it appears that for many individuals who report chronic pain, it tends to be a long-standing condition. However, there are a number of factors which may affect prognosis of the disorder including previous physical exercise (Enthoven, Skargren, Carstensen, & Oberg, 2006), psychosocial factors (Grotle et al., 2005), poor self-reported health, additional regional pain at the time of assessment (Thomas et al., 1999), employment status, and compensation claims (Joel, Gérard, Francis, & Jacques, 2004; Sanderson, Todd, Holt, & Getty, 1995). Thus, chronic pain does not appear to follow one specific typical course.

Sex Differences in Pain

The literature examining sex differences in prevalence rates of chronic pain demonstrates that women tend to report higher prevalence rates than men in a number of pain conditions (Crook, Rideout, & Browne, 1984; Tsang et al., 2008; Wijnhoven, de Vet, & Picavet, 2006). Researchers have proposed several explanations for the sex differences in prevalence of chronic pain observed between the sexes, including genetic or hormonal factors such as pain surrounding menstruation, pregnancy, or childbirth (Mailis-Gagnon & Israelson, 2003); gender related psychological and sociological factors such as social role expectations (Unruh, 1996); and health care professional attitudes, which may be influenced by social factors such as the greater tendency of women to seek help for their pain (Unruh, 1996). Differences in age, education, and income levels may also explain the differences between the sexes in reported prevalence rates, as women were found to have lower income levels, less education, and represent a larger portion of the older age group, all factors which have been found to be associated with chronic pain (Meana, Cho, & DesMeules, 2004).

Although there appears to be a discrepancy between the sexes with respect to the prevalence rates of pain, levels of pain intensity experienced by chronic pain patients suffering with a variety of pain conditions appears to be consistent across the sexes (Meana et al., 2004). One explanation for the discrepancy in sex differences between prevalence rates and pain intensity reported may be that men and women in fact do not differ in their subjective experience of pain. Rather, social factors, such as women displaying a greater tendency than men to report pain (Bendelow, 1993), or factors related to the assessment of pain, such as physician bias (Marquié et al., 2003), may contribute to the differences in prevalence rates observed. The

discrepancy between sex differences in prevalence versus intensity of pain indicates that prevalence alone is not a sufficient indicator of the pain experienced by men and women.

Researchers have also examined sex differences in pain perception, illustrating the manner in which men and women interpret painful stimuli. Within this domain, pain sensitivity and pain tolerance have specifically been examined, where pain sensitivity refers to the point at which pain is first detected and pain tolerance being the length of time one is able to endure painful stimuli (Aslaksen, Myrbakk, Høifødt, & Flaten, 2007; Berkley, 1997; Edwards, Haythornthwaite, Sullivan, & Fillingim, 2004; Fillingim, 2003; Lowery, Fillingim, & Wright, 2003; Kállai, Barke, & Voss, 2004; Levine, & De Simone, 1991; Nayak, Shiflett, Eshun, & Levine, 2000). In general, results from these studies reveal that women appear to be more sensitive to painful stimuli (including thermal and cold pain), and less able to tolerate pain than men (Edwards et al., 2004; Lowery et al., 2003; Fillingim, 2003; Nayak et al., 2000). Findings from some studies however, report no sex differences in relation to pain perception (Berkley, 1997). These conflicting results may be due to methodological or sampling differences. It has been found, for example, that the experimenter's sex may affect induced pain responses (Aslaksen et al., 2007; Kállai et al., 2004; Levine & De Simone, 1991), such as men demonstrating a greater tolerance for pain when tested by a female experimenter, and women exhibiting greater tolerance when tested by a male (Kállai et al., 2004). It is important to account for biological, social and cultural factors when examining the sex differences in pain perception, as the nature of the divergence between the sexes appears to be multifactorial (see Berkley, 1997; Keogh, Mounce, & Brosnan, 2007; Riley, Robinson, Wise, & Price, 1999; Unruh, 1996).

Lastly, men and women appear to diverge with respect to the strategies they engage in to cope with their chronic pain; men tend to utilize problem solving strategies, while women tend to

utilize a variety of coping strategies that focus on their emotional responses and to rely more on social and emotional support (Affleck et al., 1999; Mailis-Gagnon & Israelson, 2003). It has also been discovered that in comparison to men, women tend to be less tolerant of pain and experience higher levels of pain intensity when they cope with their pain on their own versus interacting with another individual (Jackson, 2007).

Sex differences in pain have been observed in the literature examining prevalence rates of pain, pain perception, and coping strategies in response to pain. Overall, it appears that women tend to report experiencing higher rates of pain, greater pain sensitivity, and decreased pain tolerance, and tend to utilize more emotion-focused coping strategies in comparison to men. However, these sex differences do not appear to translate into the literature examining pain intensity, as men and women tend to report fairly similar levels of pain intensity experienced. Some proposed explanations for this discrepancy include physician bias in rating men as having less pain than women (Marquié et al., 2003), and socialization factors such as women being more willing to disclose their pain (Bendelow, 1993). At this point, the literature examining sex differences in chronic pain is not clear-cut. More research is required to clarify whether the differences observed are valid and reliable, and if so, the next step is to determine the underlying factors responsible for the discrepancy in the pain experience between men and women.

Pain Theories

Over the years a number of theories of pain have been proposed to explain the source of chronic pain. Historically, pain was considered to be the result of a physical pathology and based purely upon sensory experience. This pathologically-based view of pain links the experience of pain to the extent of tissue damage or organ pathology (Turk & Rudy, 1987). The relatively more recent gate control theory of pain, conceptualized by Ronald Melzack and Patrick Wall in 1965,

postulates that there is a neurological gate at the entrance to the brain and spinal cord. Certain neurochemical signals have the ability to open and close this gateway to the brain, allowing only certain pain signals to pass through at certain times. This theory provides an explanation of how an individual's brain is not constantly being bombarded by vast amounts of sensations, emotions, or thoughts. An individual rubbing an injured area and feeling less pain is an example of the gate control theory at work. Two sensations compete for the brain's attention: the painful sensation and the rubbing sensation. The gatekeeper processes each sensation and overrides the painful sensation with the rubbing sensation, leading to less pain.

According to the gate control theory, the experience of pain can be conceptualized along three dimensions: the sensory-discriminative, the motivational-affective, and the cognitive-evaluative. These dimensions relate to the sensation of pain, as signals sent down from the brain (along the efferent brain fibers) are also believed to be involved in increasing or decreasing pain. The discriminative dimension refers to the brain's ability to discriminate where the pain originates, and the experiential nature of the pain (stabbing, aching, throbbing, etc.). Motivational-affective elements include the action, which is taken in response to pain (such as escape from pain, taking positive action, etc.), along with the emotions that accompany the pain (such as anger, depression, fear, guilt, etc.). Lastly, cognitive-evaluative elements include rational and mental aspects of the self (attitudes toward one's self, one's focus of attention, perception of life events, etc.), along with how one evaluates the experience of pain (Drum, 1999). With greater acceptance of the gate control theory, a more comprehensive view of pain was recognized, incorporating both biological and psychological aspects of pain and pain management. This conceptualization of pain coincided with the biopsychosocial model of health and disease proposed by Engel in the 1970s (Crossley, Nicolson, & Owens, 2001). The

biopsychosocial model posits that biological, psychological, and social factors all contribute to the development and maintenance of both physical and mental illness (Engel, 1977). This model continues to be well represented within the chronic pain literature.

An extension of the gate control theory, the more recent neuromatrix theory of pain (Melzack, 2001), proposes that each individual has an innate network of neurons termed the "body-self neuromatrix". This "body-self neuromatrix" is both genetically determined and modified by sensory information. There is a repeated cyclical flow of nerve impulses through the neuromatrix, which Melzack states conveys a pattern which he calls the neurosignature. Conversion of the flow of neurosignatures into awareness happens in the sentient neural hub in the brain, and neurosignature patterns also work to activate an action neuromatrix in order to bring about a pattern of movements. Melzack incorporates Selye's (1950) theory of stress and proposes that prolonged stress and efforts to restore homeostasis can lead to suppression of the immune system and activation of the limbic system, which is involved in emotion, motivation, and cognitive processes. Overall, this theory postulates that the neurosignature for pain can be modulated in different ways: through the nerve patterns within the neuromatrix produced by genetic and sensory information, by sensory inputs, by cognitive events, or by physical or psychological stressors that act on stress regulation systems and cause tissue damage which leads to chronic pain. This model takes us toward the multidimensional nature of pain, which maintains that pain is produced by multiple influences.

Chronic Pain and Mental Health

Numerous studies have found chronic pain to be associated with psychological disorders, including depression as well as anxiety, somatoform, substance use, and personality disorders (Dersh, Polatin, & Gatchel, 2002; White et al., 2008). Polatin, Kinney, Gatchel, Lillo, and Mayer

(1993) discovered that 77% of individuals suffering with low back pain met lifetime diagnostic criteria for at least one psychological disorder, and 59% met criteria for current symptoms, with the more prevalent psychological disorders being major depression, anxiety disorders, and substance abuse disorders. Comorbid psychological factors affect the experience of pain, along with the prognosis of chronic pain, as prognosis is reportedly worse when comorbid psychological conditions are present (Tunks et al., 2008). Comorbid psychological disorders have been associated with poor treatment outcomes and greater levels of disability (Burns, Johnson, Mahoney, Devine, & Pawl, 1998; Holzberg, Robinson, & Geisser, 1996). Thus, the psychological aspects of pain management are integral to the multidimensional perspective of treatment.

Tunks et al. (2008) conducted a review based on epidemiologic and population studies examining the relationship between and effects of chronic pain and psychological comorbidities. Their review found that various mood and anxiety disorders were two to seven times more prevalent in chronic pain sufferers than in individuals not suffering with chronic pain. The majority of studies examining the relationship between psychological factors and chronic pain have focused on depression (e.g., Buenaver, Edwards, Smith, Gramling, & Haythornthwaite, 2008; Haythornthwaite, Sieber, & Kerns, 1991; Jann & Slade, 2007), as a large proportion of chronic pain patients also suffer from some form of depression (Banks & Kerns, 1996; Miller & Cano, 2009). In addition, it has been discovered that individuals who are depressed and suffering with chronic pain report greater pain intensity, greater interference due to pain, and more pain behaviours (Haythornthwaite et al., 1991). In fact, following treatment for depression, those with comorbid chronic pain and depression report improved psychological functioning, and reduced interference of their pain on work functioning (Farmer Teh, Zaslavsky, Reynolds, & Cleary,

2010; Schoenbaum et al., 2002). Due to the high comorbidity between chronic pain and depression, a number of models have been proposed in attempts to explain their co-existence, including Beck's model of cognitive distortions, the learned helplessness model, the behavioural model, and the diathesis-stress model (Banks & Kerns, 1996; Sullivan & Turk, 2001). Although there has been empirical support for the models listed, no one model clearly explains the relationship between depression and chronic pain. Further making the interpretation more difficult is the large overlap in symptomatology for chronic pain and depression including symptoms of fatigue, loss of motivation, lack of sleep, and change in weight (Jann & Slade, 2007).

Although the majority of the literature examining comorbid psychological conditions associated with chronic pain tends to focus on depression, investigations directed at studying the relationship between anxiety and chronic pain are beginning to emerge. In a research study examining the prevalence of psychological disorders in individuals suffering with chronic pain, a strong comorbidity between chronic pain and the anxiety disorders was reported (Iorio, Tsirgielis, Pawluk, Vermani, & Katzman, 2010). The prevalence of anxiety disorders is approximately two times higher in individuals suffering with chronic pain than is reported in the general population (Asmundson & Katz, 2009), even after adjusting for effects of sociodemographics (McWilliams, Goodwin, & Cox, 2004).

There are some considerations which require attention when examining the prevalence of comorbid anxiety and chronic pain. One consideration is that individuals suffering with an anxiety disorder may display increased vigilance for pain and somatic sensation, leading to a greater propensity to misinterpret ambiguous sensations (Derakshan & Eysenck, 1997; van der Kolk et al., 1996). Thus, these individuals may have a tendency to report pain more frequently

than individuals who do not suffer with a comorbid anxiety disorder. Another consideration is that aspects of the pain experience may affect symptoms of anxiety. For example, persistent pain following a traumatic event may act as a reminder of the trauma experienced, and thus, influence the development of Post-Traumatic Stress Disorder (PTSD) symptoms (Schreiber & Galai-Gat, 1993). Cohen and Rodriguez (1995), propose a model which states that persistent physical disorders, such as chronic pain, influence the risk of developing a psychological disorder, such as anxiety or depression. The authors outline various biological (e.g., hormonal, neurochemical, and metabolic disturbances), behavioural (e.g., use of prescribed medications, sick role behaviour, maladaptive coping strategies), cognitive (e.g., irrational thought patters, psychological stress, loss of control), and social factors (e.g., decreased social interactions, interference in role function) that are presumed to link physical disorders with the development of affective disturbances. One final consideration is that there may be a bidirectional relationship between pain and anxiety, whereby they mutually maintain one another, or hold shared vulnerability factors (e.g., Asmundson, Coons, Taylor, & Katz, 2002; Sharp & Harvey, 2001). The relationship between chronic pain and the anxiety disorders is complex, and requires further elucidation. Cognitive factors have been linked with both anxiety disorders and chronic pain in an attempt to explain the development and maintenance of these conditions. One such construct, which is beginning to receive greater recognition in the chronic pain literature, is anxiety sensitivity (AS).

Anxiety Sensitivity

Anxiety sensitivity (AS) is a cognitive individual difference variable conceptualized as a fear of anxiety-related sensations (Reiss, 1991). An individual with high levels of AS would, for example, interpret a pounding heart as an indication of an impending heart attack. Anxiety

sensitivity has been identified as a predictor of the development of anxiety disorders (Reiss, Peterson, Gursky, & McNally, 1986), and is most commonly understood and investigated within this context. However, some researchers have started to examine the role of AS in the development and maintenance of chronic health conditions, including chronic pain (Asmundson & Norton, 1995; Asmundson, Wright, & Hadjistavropoulos, 2000; Asmundson, Wright, & Hadjistavropoulos, 2005).

One may question how a construct implicated in the development and maintenance of anxiety disorders can also be implicated in the development and maintenance of chronic pain. Appreciation of the factors outlined within the expectancy model of fear (Reiss & McNally, 1985), which differentiates between fundamental and common fears, may provide further clarification of the important role of AS in chronic pain conditions. Fundamental fears are understood as being inherently aversive to many individuals (e.g., fear of illness or death). Whereas common fears are not inherently aversive, and arise through the interaction between fundamental fears and learned experiences (e.g., fear of spiders). Thus, the expectancy model of fear claims that an individual with high levels of one or more fundamental fears is more likely than a person without these fears to display fear in response to a range of commonly encountered stimuli and situations. According to this model, AS is considered a fundamental fear. The literature examining AS indicates that the construct can be reduced to three lower-order components: fear of social concerns, fear of physical catastrophe, and fear of mental incapacitation (Zinbarg, Barlow, & Brown, 1997). The three components of AS have been empirically examined in relation to the various aspects of the experience of pain including pain severity, and the cognitive, behavioural, and emotional factors. Results from these investigations reveal that the three components of AS are uniquely related to the experience of pain. Fears of

somatic symptoms have a stronger relationship with pain severity, behavioural responses specific to pain (such as avoidance), and catastrophic cognitions related to pain such as fear of pain. Whereas the fear of cognitive and emotional factors is related to negative affect, vitality, and social functioning (Asmundson, Frombach, & Hadjistavropoulos, 1998). In a recent investigation of an AS-targeted telephone CBT intervention, Olthuis, Watt, Mackinnon, Potter and Stewart, (2015) found that physical and cognitive concerns were associated with pain-related fear and arousal, and the relationship between physical concerns and pain-related fear and arousal remained strong even after accounting for emotional distress. Taking these findings into consideration, AS can be associated with conditions beyond the anxiety disorders, because it represents not only fear of anxiety symptoms but also one or more fundamental fears that may underlie these conditions (Asmundson et al., 2000; Plehn et al., 1998).

Researchers have investigated the role of AS in both acute and chronic pain. Evidence has been reported in support of the role of AS in acute and experimental pain. One investigation demonstrated AS to have a relationship with labour pain, as higher levels of AS mid-pregnancy were related to maximum pain during labour (Lang, Sorrell, Rodgers, & Lebeck, 2006). Higher levels of AS reported by individuals suffering with acute pain have also been associated with greater sensory and affective pain (Keogh & Mansoor, 2001). In the context of experimental pain, the association between AS and pain was examined in a sample of undergraduate students (Uman, Stewart, Watt, & Johnston, 2006). Participants included in the investigation were classified as exhibiting either high or low levels of AS. The study involved participants engaging in a cold-pressor task, while measures of pain threshold, tolerance, and recovery were obtained. Participants who scored high on a measure of AS reported higher levels of fear and more pain than those who scored lower on a measure of AS. Based on these findings, a mediational model

was constructed, with AS being the independent variable, pain severity being the dependent variable and fear rating being the mediator. The model was supported when tested, as the relationship between AS and pain severity ($r = 0.20$) no longer remained significant once fear was controlled for ($r = 0.07$). These findings suggest that fear may mediate the relationship between AS and pain severity. However, results should be understood in light of the sample under investigation, as participants in this study were individuals who did not suffer with chronic pain. Thus, findings may not be generalizable to the chronic pain population. A model presented by Kennedy et al. (2011), complements the findings above, as it outlines the relationship between physical concerns sensitivity, an aspect of AS, and event expectancy, as cognitively integrated in an additive system to determine an individual's anxiety about physical pain.

Investigations of AS have been undertaken using participants suffering with chronic pain, and similar findings to acute and experimental pain studies have been reported. Particularly, AS has been found to significantly predict functional status in chronic pain patients over and above typical correlates of the disorder, such as age, gender and employment status (Plehn et al., 1998). The specific areas of functioning that AS predicted include social functioning, vitality, and mental health functioning. In an effort to further examine whether AS influences cognitive, affective, and behavioural factors in patients suffering with chronic low back pain, Asmundson and Norton (1995) examined individuals classified as exhibiting high, medium, and low AS. These researchers discovered that the three groups of AS severity did not differ in pain severity, however, there were significant differences among groups on measures of cognitive, affective, and behavioural responses to pain. Specifically, those classified as high on AS reported greater cognitive disruption and anxiety in response to pain, greater fear of the negative consequences of pain, greater negative affect, and greater use of analgesic medications to aid in managing their

pain. Although not significant, a trend was discovered by the researchers, demonstrating that patients who were high on AS tended to avoid pain and pain-related activities, indicating that AS may be associated with increased avoidance behaviour.

One study that found a different relationship between AS and disability, as compared to the results described above, was a study conducted by Keogh, Book, Thomas, Giddins, and Eccleston (2010). These investigators reported a negative relationship between AS and disability, suggesting that AS may be related to decreased functional disability. Still these reported findings should be appreciated in light of the fact that participants were suffering with an acute injury (hand fracture), which had occurred within two weeks of the research study, which differed from the population reported by Asmundson and Norton (1995). Thus, participants in Keogh et al.'s (2010) study may not have had the opportunity to experience AS or avoidance behaviours due to the limited time range they had been injured. Furthermore, in response to an acute injury, it may be more adaptive in the short-term to engage in protective behaviours as a means of reducing the chance of further injury or re-injury. If this is the case, AS would be a protective factor in the short term for acute pain, but may be less adaptive to employ when pain becomes chronic. Although the studies outlined earlier examining AS as it relates to the acute pain population have not reported AS to be beneficial, this may be a function of the outcome measures explored within the studies. The previous studies focused on sensory and affective factors and examined differences in these variables in those with high and low AS, but they did not examine how AS relates to disability in their samples.

Attention to pain serves an adaptive function as it promotes survival. However, when taking into account cognitive and physiological factors, chronic pain patients tend to display an information processing system which selectively attends to pain-related stimuli. The research

domain examining AS and chronic pain suggests that AS plays an important role in a chronic pain patient's attention to pain-related stimuli. In a selective attention task to pain-related cues, it was discovered that chronic pain patients did not differ overall in their performance on a Stroop task in comparison to a control group, even after controlling for depression (Asmundson, Kuperos, & Norton, 1997). However, when participants were divided into high and low AS, those who were classified as low AS displayed the ability to attend less to pain-related stimuli, whereas those who were high on AS displayed no differences in attention with both pain-related and neutral stimuli. These findings suggest that the system by which information is processed may differ depending on the individual's level of AS. Participants with low levels of AS were more likely to shift their attention away from sensory and affective dimensions of pain. Carleton, Asmundson, Collimore, and Ellwanger (2006) provided further support for selective attentional differences associated with AS, finding a decreased ability to disengage attention quickly from health catastrophe stimuli, in those suffering with chronic pain and displaying higher levels of AS. This area of research demonstrates that AS may play a role in chronic pain patients being more attuned to their experiences of pain, leading to higher levels of reported pain, avoidance of activity, and impairment in functioning overall.

The literature discussed above suggests that individuals suffering from chronic pain and reporting high levels of AS tend to display increased levels of functional impairment, with the suggestion that AS may play a role in the development and the maintenance of the disorder itself.

Another construct that has been linked to both AS as well as functional impairment is the fear of pain. Researchers have discovered that fear of pain is best predicted from AS and pain severity (Asmundson & Taylor, 1996). This investigation also discovered that fear of pain went on to predict negative coping behaviours such as avoidance and greater analgesic use. Even after

controlling for the effect of pain severity, AS continues to demonstrate an association with fear of pain, and is indirectly linked to increased pain related avoidance behaviours. Using structural equation modeling, Norton and Asmundson (2004) demonstrated that AS and severity of headache pain directly predicted fear of pain, and indirectly predicted pain-related escape and avoidance through fear of pain. It has been suggested that AS may be a vulnerability factor in the development of fear of pain in chronic pain patients (Keogh & Asmundson, 2004). Fear of pain has been associated with decreased levels of functioning in chronic pain patients (Crombez, Vlaeyen, Heuts & Lysens, 1999; Gheldof et al., 2010; Heuts et al., 2004; McCracken, Gross, Aikens, & Carnrike Jr., 1996). Hence, an intervention which reduces fear of pain may in turn increase functioning in those suffering with chronic pain.

Fear of Pain

The transition from a seemingly "healed" acute injury to a chronic pain condition is a process which has perplexed clinicians and researchers for many years. In an effort to clarify the transition from acute to chronic pain, the fear avoidance model was proposed. This model, first proposed by Lethem, Slade, Troup, and Bentley in 1983, suggests that it is fear of pain and avoidance behaviours that perpetuates the development of chronic pain conditions. The claim is that individuals who are fearful of pain or are fearful of re-injury become hypervigilant in regards to their pain. This hypervigilance in turn leads to avoidance of various activities, which can contribute to the maintenance of chronic pain and related disability. The fear and avoidance behaviours are suspected to have a greater influence on disability experienced by an individual suffering with chronic pain than the severity of the pain itself (Asmundson, Norton, & Norton, 1999).

The literature examining fear of pain within a chronic pain population appears to support the fear avoidance model of pain. Researchers have examined the ability of fear of pain to predict functional impairment within the chronic pain population. Investigations have discovered that fear avoidance beliefs related to physical activity and work, account for a significant proportion of the variance (23% - 26%) in disability as well as work loss (Waddell, Newton, Henderson, Somerville, & Main, 1993), even beyond the effects of pain severity (Woby, Watson, Roach, & Urmston, 2004). In a prospective study investigating the components of the fear-avoidance model in relation to chronic pain using path analytic techniques, investigators discovered that fear of pain at baseline was predictive of disability at follow-up, which occurred 12 to 18 months after baseline (Gheldof et al., 2010). Furthermore, the construct was found to be a better predictor of disability in comparison to pain intensity or general negative affect (Crombez et al., 1999). Fear of pain has also been significantly associated with decreased physical functioning in patients suffering with osteoarthritis (Heuts et al., 2004). When comparing measures of fear and anxiety specific to the chronic pain population in their predictive ability of pain and disability, it was discovered that pain severity, fears related to escape and avoidance behaviour, as well as fear avoidance beliefs together best predicted disability, accounting for 54% of the total variance (McCracken et al., 1996). Interestingly one can imagine the potential value of conducting a similar study but with the added value of including a measure of AS, in order to examine the dynamic between fear of pain and AS, as they both relate to functional impairment associated with chronic pain.

In a comparison of prevalence rates of fear of pain across individuals suffering with various psychological disorders, those suffering with chronic pain, and members of the general public, Carleton, Abrams, Asmundson, Antony, and McCabe (2009) discovered that reported

rates between those meeting criteria for a psychological disorder and individuals suffering with chronic pain were similar. Interestingly, these researchers also discovered that those in the chronic pain group endorsed escape and avoidance behaviours to a greater degree than those in the clinical disorders group. Hence, these factors may be unique to the development of chronic pain and related functional impairment in those suffering. More research is required to clarify these preliminary findings.

Investigations surrounding the fear of pain construct have also focused on the effects of exposure to painful stimuli, in an effort to determine whether this exposure in turn has any effect on pain tolerance. One investigation of the effects of exposure to a potential pain-inducing stimulus (high pitched noise) was undertaken with individuals suffering with persistent migraines (Philips & Jahanshahi, 1985). Results revealed that those who engaged in the exposure task displayed higher levels of tolerance following the exposure activity. In contrast, those who did not engage in exposure showed decreases in tolerance to an aversive auditory stimulus. These results suggest that avoidance of activities, which have the potential to increase pain experienced, may in fact increase the pain related effects (such as reduced tolerance to pain). In response to these findings, exposure treatment has been proposed as a potentially beneficial option aimed at reducing avoidance behaviour in individuals suffering with chronic pain. The intervention addresses functional limitations experienced by individuals who display high levels of fear and avoidance related to their chronic pain (Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2001). This exposure-based treatment has been investigated in patients suffering with low back pain (Boersma et al., 2008; Vlaeyen, de Jong, Onghena, Kerckhoffs-Hanssen, & Kole-Snijders, 2002; Woods & Asmundson, 2008) as well as those suffering with post-traumatic neck pain (de Jong et al., 2008). Findings from these investigations support the use of this treatment in

reducing a number of factors related to the experience of chronic pain, including fear of movement and re-injury, fear of pain, fear avoidance beliefs, pain intensity, and disability in chronic pain patients.

Taken together, the literature examining fear of pain in those suffering with chronic pain demonstrates that fear of pain accounts for a large proportion (26-46%) of the variance in the prediction of impairment in functioning. The literature on AS as it relates to the experience of chronic pain suggests that AS may be a vulnerability factor to fear of pain, and hence, have an indirect association with functional impairment. The literature to date has not examined whether cognitive-based interventions targeting these cognitive variables leads to a reduction in impairment in functioning in those suffering with various chronic pain conditions.

Management of Chronic Pain

The biopsychosocial model of pain, the model upon which many pain management programs today are built, drew substantially on the work of Fordyce (1976), who initiated the integration of behavioural factors to the study of pain. Fordyce applied operant principles to the development of his behavioural theory of pain, which distinguishes between the original cause of pain and the reports of pain or pain behaviours (displays of pain such as rubbing, limping, grimacing, etc.). The essence of the operant model of pain surrounds the notion that pain behaviours are no different than any other behaviour, and are subject to the same influences of conditioning. Furthermore, if pain behaviours are reinforced they may continue past their normal expected healing time. Fordyce, Fowler, and DeLateur (1968) believe that through modification of environmental contingencies, pain behaviours can be managed. Although there appears to be literature to support the operant-conditioning model of pain management, there have been concerns raised with regard to the efficacy of this approach. Turk and Genest (1979) argue there

are several methodological flaws in the research studies conducted to examine the efficacy of operant conditioning on pain behaviours, including lack of control groups for comparison, inconsistent length of treatment, potential biases in sampling procedures, and the reliability of retrospective questionnaires utilized at follow-up. Additional criticisms of the operant approach in general involve questionable validity and lack of specificity of the pain behaviour construct, assumed maladaptiveness of the observed behaviours, potential detrimental consequences of underreporting with respect to pain, lack of acceptance of the treatment by patients, reliance on motor behaviours, and difficulties generalizing and maintaining behaviours following successful treatment (Turk, 1996). The lack of strong support for continued use of strictly behavioural treatment modalities for chronic pain, along with the emergence of other areas of psychological theory, led to the development of a cognitive-behavioural model of pain management (Sharp, 2001).

Cognitive Behavioural Therapy (CBT)

One of the first Cognitive Behavioural Therapy (CBT) models of pain was presented by Turk, Meichenbaum, and Genest (1983). This model drew on Beck's (1976) cognitive triad, and demonstrated how both cognitive and affective factors contribute to chronic illness and cannot be separated from purely physiological factors. Inclusion of cognitive factors into the treatment of chronic pain is reasonable if one accepts the notion that individuals are not passive recipients of physiological sensations. Rather, they attempt to make sense of their experiences often through reliance on general attitudes and beliefs, based upon past experiences, and prior learning (Turk & Monarch, 2002). Incoming stimuli are interpreted based on patients' idiosyncratic beliefs surrounding their subjective representation of illness and symptoms. Beliefs surrounding pain and one's ability to function in spite of the pain, aid in the formation of the individual's cognitive

schema (Turk, 1996). The CBT model suggests that it is cognitive factors rather than conditioning principles, which are central to pain management. Learning theory and contextual factors are not disregarded in this model; they are simply viewed through the understanding of cognitive schemas. So-called conditioned reactions are understood as being activated by the individual, based on past experiences and expectations rather than being automatically induced. Moreover, through the CBT model a patient's behaviour is thought to elicit responses from significant others as well as health care professionals which reinforces their maladaptive (or adaptive) beliefs, emotions, and behaviours (Turk, 2002).

A CBT approach to pain management takes into account several principles which underlie how chronic pain patients respond to treatment. The first involves the notion that perceptions tend to influence behaviours. There is a tendency for patients suffering with chronic pain to maintain negative perceptions of the world, which in turn influences their behaviour, such as not engaging in activities due to the belief that their condition will worsen if they do so. The second principle revolves around behaviours and their influence on the patient's environment. As patients tend to do less, they often isolate themselves which may lead to feelings of depression and loneliness, reinforcing their belief that they are alone in their suffering. The third principle states that pain and environmental factors are continuously influencing perceptions and behaviours. Through treatment, it is possible to influence patients' beliefs surrounding their pain as well as provide them with more effective coping strategies, which is the fourth principle. Lastly, movement away from a purely biomedical approach to treatment allows for greater patient involvement in their own healing (Jamison, 1996).

The main premise of the CBT approach to chronic pain management is that through the examination and termination of negative and maladaptive thought patterns, individuals will adopt

more adaptive behaviours which will lead to greater self-management of their pain. Several components are central to a CBT approach for chronic pain, including: cognitive restructuring, relaxation training, time-based activity pacing, activity scheduling, and graded homework assignments (Otis, 2007). Although individual treatment of chronic pain is common in clinical settings, research has examined the efficacy of group-based treatments as they offer inclusion of group dynamics which may be beneficial (Morley & Williams, 2002). Utilizing CBT for chronic pain in a group-based format has several potential advantages over individual treatment including: normalization of experiences through exposure to other individuals enduring similar problems, support received from other group members, group processes facilitating behaviour change through the interaction of members, encouragement from members may increase motivation, and lastly a larger number of individuals are able to be treated in a more cost-effective manner (Keefe, Beaupre, Gil, Rumble, & Aspnes, 2002; Jamison, 1996).

There are a number of factors that influence the ability to provide effective CBT in a group format for chronic pain patients, and must be considered prior to the initiation of treatment. These factors include group size and meeting room, leadership style, and group format (Jamison, 1996). In terms of the size of the group, seven to eight members is optimal (Yalom & Leszcz, 2005), as limiting the size allows for greater facilitation of interaction among group members while providing each member an opportunity to be heard (Thorn & Kuhajda, 2006). The manner in which the room is arranged along with the equipment in the room are factors which must also be taken into consideration in order to provide ample space for patients as well as comfortable seating arrangements. Structure and focus are key elements which should be implemented by the leader, as there is the possibility that discussions within the group will begin to centre on complaints regarding pain which is not conducive to the advancement of the group.

It is suggested that the manner in which the group will run should be clearly discussed upon commencement of the group and touched upon at the start of each session. The maximum length of time for any session should be no longer than 1.5 hours, as pain sufferers have a low tolerance for remaining stationary. It is important to inform group members that if they feel uncomfortable, they should stand and stretch as needed to avoid irritability and decreased concentration (Jamison, 1996).

Evaluating the Efficacy of CBT in Chronic Pain

Overall, the literature examining CBT models for the management of chronic pain appears promising. Research has demonstrated these models have been effective for individuals suffering from a variety of chronic pain conditions, such as chronic back pain, rheumatoid arthritis, chronic headache, and chronic temporomandibular disorder (TMD) (Evers, Kraaimaat, van Riel, & de Jong, 2002; Hoffman, Papas, Chatkoff, & Kerns, 2007; Reid, Otis, Barry, & Kerns, 2003; Thorn et al., 2007; Turner, Mancl, & Aaron, 2006). In some cases, however, long-term effects following treatment were not sustained (Reid et al., 2003). A meta-analytic review compared the efficacy of individual CBT treatment for chronic pain conditions with wait-list controls (Morley, Eccleston, & Williams, 1999), and found significant positive changes in the experience of pain (pain intensity, sensation and unpleasantness) [Mean Effect Size (ES) = 0.33], mood or affective state (Mean ES = 0.38 – 0.41), cognitive coping and appraisal (positive coping measures) (Mean ES = 0.41– 0.58), pain behaviours (overt behavioural acts associated with pain) (Mean ES = 0.49), activity level (such as distance walked) (Mean ES = 0.48), and social role functioning (impact of pain on ability to function in four domains; work, leisure, marital, and family) (Mean ES = 0.61). Upon comparison with other forms of treatment and with active treatment controls, CBT has also demonstrated efficacy, although to a lesser degree than when

compared to wait-list controls. Outcome factors found to be positively affected in this comparison were restricted to pain experience, positive coping, and social role function. Scrutiny of the 25 randomized clinical trials (RCTs) utilized within the meta-analysis raised several methodological concerns deemed important to consider when conducting future research in this domain. These concerns surrounded use of valid control groups, explication of the treatment employed, and exclusion of process variables. With respect to the control group, the authors stated attempts should be made to document any ongoing treatment individuals within this group are undergoing, as this may confound results obtained. The authors also placed value in investigating process variables in future research endeavours, such as patients' expectations of change and adherence to treatment.

Similar to the literature examining individually based CBT treatment, group-based CBT has demonstrated positive results in reducing pain and increasing psychological and physical functioning for a number of chronic pain conditions (Keefe et al., 2002). Turner-Stokes et al. (2003) conducted comparison of the efficacy of a CBT pain management program delivered in an individual versus group format. Participants (n =113) were randomized to receive either individual or group-based CBT for pain management over an eight-week period. Both treatment interventions were multidisciplinary in nature, comprised of a psychologist, physician, physiotherapist, and an occupational therapist (group intervention only). Outcome measures were assessed at baseline, post-treatment, 6-month and 12-month follow up visits. Overall, results demonstrated no significant differences between the ways the treatment modalities were delivered, in terms of efficacy at managing chronic pain. Both patients in the individual and group intervention demonstrated similar results with respect to primary (pain interference, control over pain, and depression) and secondary (state anxiety, analgesic medication

consumption, general activities and pain severity) outcome measures. Although gains observed were encouraging, due to the absence of a control group in this investigation, efficacy of CBT as a treatment modality relative to null treatment could not be confirmed. Another limitation of this study involved determining suitability of participants. Assessors evaluated whether the individual stated a clear preference for either individual or group treatment, and those who did were excluded from participation in the trial. Although exclusion of these individuals may have been necessary for research purposes, it is unclear as to the effect this may have on the results obtained. According to the investigators, this exclusion criterion was warranted as they argued these patients had not accepted that their condition was chronic. While this may be the case, it still remains important to include such patients, as the primary aim in a CBT approach to pain management is to transform such beliefs. Exclusion of these individuals may compromise the generalizability of these findings.

Further investigation of group CBT was conducted by Basler, Jäkle, and Kröner-Herwig, (1997) in a study, which sought to determine the outcome of implementing group CBT as an adjunct to medical treatment. Patients were randomly assigned to either the experimental condition, receiving group CBT alongside medical treatment, or to the control condition receiving medical treatment alone. The CBT group intervention consisted of 12 weekly, 2.5 hour sessions that were based on a manualized treatment for chronic pain. In comparison to the control group, those receiving medical plus group CBT treatment reported decreases in pain, disability, and maladaptive coping strategies (avoidance and catastrophizing), as well as increases in activity level, self-control over pain, and pleasurable activities and emotions through to the 6-month follow-up visit. It should be indicated that confirmation biases may have affected results obtained, as the nature of the study and treatment condition were not concealed from

physicians or participants. Although it would be difficult to maintain a double-blind design in this circumstance, it is worth noting that the experimenter and/or participant may have unknowingly behaved differently between the experimental and control groups, thus, influencing results. Another variable that was uncontrolled for in this experiment is the amount of time spent with patients. It is possible that the results obtained are a reflection of amount of face-to-face contact with a treatment provider, since this was a variable consistent across the treatment and control group, as opposed to the treatment itself. However, the outcomes of this study appear promising in terms of application of a combined treatment modalities, which combine both group CBT principles with standard medical treatment. This may be a viable option for patients, as they may be more open to psychological treatment when not having to relinquish medical treatment.

Although evidence-based practices are espoused by the medical community, Morley, Williams, and Hussain (2008) contend that treatments found to demonstrate efficacy through RCTs can be problematic when attempting to implement their use in the clinical setting, as a number of factors are not necessarily accounted for within the controlled environment of a RCT. As such, Morley et al. (2008) examined the effectiveness, defined as "whether the treatment provides a measurable beneficial effect when delivered to patients in other service contexts" (p. 671), of a group CBT intervention for chronic pain. They employed a reliable change index (RCI)/clinically significant change (CSC) methodology of statistical analysis to evaluate a 4-week, inpatient CBT program for chronic pain patients. Utilization of RCI/CSC methodology allows investigators to rule out measurement error as an agent of change, and it also provides information regarding clinically significant improvements. The multidisciplinary program was conducted over a span of ten years (1988-1998) within a hospital setting, and included over 800 participants. Results revealed that although a large number of outcome measures remained

unchanged post-treatment, a significant minority of participants achieved a 30% reduction in scores from baseline. These findings demonstrate some clinically significant changes obtained. However, the causes which induced the changes remain unclear. The issue in utilizing this form of analysis is that while beneficial in terms of clinical significance, it is unknown whether results are indicative of specific treatment effects, non-specific treatment effects or simply the passage of time.

Although not utilizing a CSC approach to analyses, clinically relevant findings have been discovered with respect to patient improvement in work functioning. Following their diagnosis of chronic pain, a number of individuals find they are unable to function at work, leading to a high rate of unemployment among chronic pain patients (Turk et al., 1983). Thus, examination of interventions that improve patients' functional abilities, allowing them the opportunity to return to regain employment, can be beneficial. Richardson, Richardson, Williams, Featherstone and Harding (1994) investigated the change in employment status following a group CBT program for chronic pain management in 109 patients within a hospital setting (either inpatient or outpatient). Outcome measures included: overall impact of pain on quality of life, depression, anxiety, self-efficacy in performing a range of activities, level of support from significant others, average pain intensity and distress, and physical performance. Participants were evaluated pre-treatment and followed up at 1 month, 6 months and 12 months post-treatment. Results revealed that of participants who were unemployed for 3 to 4 years at the start of the program, 30% returned to work at some point during the one-year follow-up period. Interestingly, for those who did return to work, employment status fluctuated throughout the follow-up period. This may be due to a number of factors, which were not examined as part of this investigation, including returning to full time work too soon, re-evaluating their choice to return to work, or availability

of suitable employment opportunities. Participants who were working at the start of the program also demonstrated improvements, as their work impairment due to pain decreased by approximately 35% following the treatment program. As with many investigations examining the efficacy of group CBT for chronic pain, results must be examined with the understanding that a control group was not utilized as part of this investigation. Thus, efficacy of this form of treatment with respect to increasing work function is not able to be determined at this time, although results obtained do indicate promise.

In response to the literature identifying specific cognitive factors associated with chronic pain, a brief cognitive behavioural therapy (CBT) treatment that targets AS has been developed and investigated in a sample of female undergraduate students (Watt, Stewart, Lefaivre, & Uman, 2006). Solely women were recruited in this investigation as a means of controlling for confounding factors related to gender. Participants were randomly assigned to either the treatment (active CBT) or control (non-specific treatment) group, and all participants completed pre- and post-treatment (or after a specific time duration for the control group members) measures of AS and fear of pain. The brief CBT intervention followed a treatment manual (see Watt, Stewart, Conrod, & Schmidt, 2008), and was conducted over three sessions, each targeting a specific component; psychoeducation, cognitive restructuring, and interoceptive exposure (i.e., running). Results revealed that across all participants, there was a significant relationship between high AS scores and high scores on a measure of fear of pain. A mixed model ANOVA was conducted with AS group (high vs. low) and treatment condition (CBT vs. non-specific treatment) as between-subjects variables and time (pre- vs. post-intervention) as the within-subjects variable, with fear of pain as the outcome measure. There was a significant treatment condition by time effect for those who endorsed high AS. When explored further, the significant

reduction of fear of pain from pre- to post-treatment was only significant in the CBT group, and the effect size of this change was moderate to large ($d = 0.65$). Those who were high on AS and in the control (or non-specific treatment) group did not show a significant reduction in their fear of pain scores. In addition, participants in the CBT condition who were high on AS also showed greater change from pre- to post-treatment on a measure of AS, and this was a moderate to large effect size ($d = 0.67$). When controlling for the change in AS, the relationship between the effects of the CBT treatment and fear of pain was no longer significant, implying that AS may mediate the effects of fear of pain on the experience of chronic pain. Some of the limitations of this research study include the brevity of the intervention (lasting only three sessions), and the non-clinical sample. Future research would benefit from addressing these shortcomings.

It appears that CBT models aimed at pain management are effective in decreasing pain, maladaptive coping, psychological symptoms, and at increasing control over pain, adaptive coping, and overall function. Yet, there remains uncertainty with regards to the particular form and delivery method of treatment, which result in maximum benefit. Research trials investigating the efficacy of this intervention have produced positive results, however, factors within the model, which lead to the results obtained, remain to be clarified. Recently, non-specific treatment factors such as group composition, leadership style, and responses to group dynamics were discussed by Newton-John and Geddes (2008) in an article written to bring awareness to these factors when examining efficacy of CBT interventions for chronic pain. While focusing research efforts on investigating improvement in pain and function attributed to the treatment intervention utilized is important, examination of non-specific factors also holds merit as these factors may contribute to positive outcomes.

One non-specific variable that has been identified through research as playing an important role in predicting treatment outcome is therapeutic alliance (TA). The therapeutic alliance is defined in a general sense to be the quality of the relationship between the therapist and the patient (Constantino, Castonguay, & Schut, 2002). Investigations of TA have demonstrated that it is a predictor of therapeutic efficacy across different psychotherapies and clinical presentations (see Castonguay, Constantino, & Holtforth, 2006; Constantino, Manber, Ong, Kuo, & Huang, 2007; Horvath & Bedi, 2002). Previous research also seems to demonstrate a strong association between TA and treatment outcome when the alliance is evaluated by the patient and at an early stage in treatment (see Castonguay et al., 2006; Horvath & Bedi, 2002). Although TA has been explored in the literature examining the efficacy of CBT interventions, there is only one recent study that has explored TA with the chronic pain population (Burns et al., 2014). Burns and colleagues examined the relationship between TA and treatment outcome and discovered that TA was significantly related to changes in pain intensity and interference post-treatment. However, this research project looked at outcomes following a course of individual CBT and not group CBT. There has been no study to date which has examined the relationship between TA and outcome following a group intervention. Results from investigations of CBT for chronic pain suggest it is an efficacious intervention (e.g., Morley et al., 1999), but exploration of the non-specific factors that may play a role in the effects observed has been limited (Newton-John & Geddes, 2008). Examination of the non-specific factors, which include TA, would allow for greater understating of whether these factors are responsible for effects above and beyond the treatment alone. Newton-John and Geddes (2008) argue that future investigations should strive to develop research designs which evaluate non-specific factors (e.g., through validated measures such as the Working Alliance Inventory), as well as evaluating

effects of group processes on maintaining treatment gains. Variables related to the therapeutic relationship, which have been disregarded within the chronic pain literature, may in fact play an important role in achieving the significant results that have been reported.

Another variable that has been largely neglected within the chronic pain literature is engagement in treatment. A fundamental component of any CBT intervention is the homework assignments (Kazantzis, Deane, & Ronan, 2000), and when clients are more engaged in the homework they tend to experience more positive outcomes (Burns & Spangler, 2000). However, CBT practitioners report noncompliance with homework as an issue (Huppert & Baker-Morissette, 2003; Leahy, 2001). It has been estimated that clients engaged in CBT comply with the homework assignments only half of the time (Detweiler & Whisman, 1999). Although it is prudent to examine homework compliance when evaluating outcome in trials that involve a CBT intervention, to our knowledge this variable has not yet been explored within the chronic pain literature and therefore, warrants investigation.

Mindfulness-Based Interventions and Chronic Pain

In addition to CBT, another psychological intervention that has been employed with chronic pain patients is that which is based on the principles of mindfulness. Mindfulness is defined as "moment-to-moment awareness", which is fostered by "purposefully paying attention to things we ordinarily never give a moment's thought to" (Kabat-Zinn, 1990, p.2). Mindfulness-based interventions have been examined in a number of populations. Findings from investigations with individuals diagnosed with chronic pain suggest that mindfulness-based interventions lead to improvements in coping with pain, psychological functioning, and overall quality of life. A CBT-based intervention, which included aspects of mindfulness therapy, was found to produce reductions in fear of pain, hypervigilance, and interference of pain on daily

activities in chronic pain patients both at the end of treatment and six months post-treatment (Elomaa, Williams, & Kalso, 2009). A comparison of a CBT intervention, a mindfulness-based intervention, and a control group revealed that adults with rheumatoid arthritis who were diagnosed with recurrent depression benefited more from a mindfulness-based intervention which included an emotion-regulation aspect (Zautra et al., 2008). McCracken and Thompson (2009) examined the cognitive and behavioural processes underlying mindfulness in a chronic pain sample. These investigators discovered that the components of acting with awareness and engaging in a present-focus mindset displayed significant associations with pain, pain-related distress, disability, depression, pain-related anxiety, medication use and physician visits. Mindfulness-based interventions have also been associated with higher levels of acceptance of pain (Cusens, Duggan, Thorne, & Burch, 2010; Morone, Greco & Weiner, 2008), which is an important aspect of pain management.

A study conducted by Cho, Heiby, McCracken, Lee, and Moon (2010) utilized structural equation modelling to determine that fear of pain is a mediator in the relationship between mindfulness-based interventions and physical and psychosocial functioning in chronic pain patients. These findings suggest that engaging in mindful practice may contribute to a decrease in fear of pain, which in turn may lead to better physical and psychosocial functioning. With respect to the relationship between mindfulness and coping strategies employed by chronic pain patients, mindfulness has been found to significantly and uniquely predict catastrophizing, while controlling for other variables related to the chronic pain experience (Schütze, Rees, Preece, & Schütze, 2010). Overall, mindfulness appears to significantly influence the experience of chronic pain, in a positive manner. Thus, it would be valuable to include a mindfulness component when

creating and implementing a psychological intervention aimed at the management of chronic pain.

The Present Study

Past research has demonstrated a strong relationship between psychological factors and chronic pain. The literature examining the psychological variables related to the experience of chronic pain has identified both fear of pain and AS as important variables. Higher levels of fear of pain endorsed by an individual is predictive of greater impairment in functioning (e.g., Crombez et al., 1999; Gheldof et al., 2010; Heuts et al., 2004; Waddell et al., 1993; Woby et al., 2004). Anxiety sensitivity has also been associated with higher levels of impairment in functioning within the chronic pain population (e.g., Plehn et al., 1998). When examining these two variables simultaneously, AS is found to significantly predict fear of pain, which in turn predicts avoidance behaviour and impairment in functioning (Asmundson & Taylor, 1996; Norton & Asmundson, 2004). One theory put forward is that AS is a vulnerability factor for the development of fear of pain (Keogh & Asmundson, 2004). Taking these findings together, if we are able to target AS through treatment, reductions in fear of pain and impairment in functioning should follow.

Following completion of a brief CBT intervention that involved a component targeting AS, reductions in AS in a sample of undergraduate students was observed (Watt et al., 2006). Results from this investigation, however, do not indicate the efficacy of the intervention with a clinical population of chronic pain sufferers, or whether the decrease in AS is in turn associated with reduced impairment. The present research project extended the design outlined in Watt et al.'s study by investigating the efficacy of a CBT protocol which included an AS component within a chronic pain sample. The purpose of the present study is to clarify the role of AS and

fear of pain in avoidance behaviour and functional impairment in chronic pain patients. Since a large number of individuals suffering with chronic pain report increased functional impairment both in relation to general and work-related functioning, results may have implications at the individual and societal level. The literature examining psychological interventions with those diagnosed with chronic pain supports the use of both CBT and mindfulness-based interventions. Hence, the present project examined a CBT protocol that included a mindfulness-based component (see Appendix A).

Hypotheses

There were several hypotheses made at the start of the current study. The first hypothesis was that there will be a significant difference between the intervention group and control group from pre-treatment (Time 1) to post-treatment (Time 2), with the intervention group demonstrating a greater decline on the following outcome variables: (i) fear of pain, (ii) AS, (iii) general interference in daily functioning due to pain, (iv) interference in work functioning due to pain, (v) current pain severity, (vi) suffering due to pain, (vii) overdoing activity level, (viii) avoidance activity level, and (ix) depressive severity. The intervention group will also demonstrate a greater increase in the following outcome variables: (i) self-control over pain, and (ii) pacing activity level.

The second hypothesis was that in the treatment group, decreases in AS will be positively correlated with decreases in general functional impairment. In addition, it was predicted that change in AS will be an independent predictor of general functional impairment beyond the change in current pain severity.

The third hypothesis was that in the treatment group, decreases in fear of pain will be positively correlated with decreases in general functional impairment. In addition, it was

predicted that change in fear of pain will be an independent predictor of general functional impairment beyond the change in current pain severity.

Exploratory analyses were planned using therapeutic alliance as a predictor of change post-treatment. It was predicted that higher levels of therapeutic alliance, reported by both the therapist and the patient, will be associated with more beneficial outcomes (reductions in pain level, suffering due to pain, impairment in functioning, overdoing and avoidance activity level, depressive severity, fear of pain, and AS, as well as improvements in control over pain and pacing activity level), suggesting more effective therapeutic alliance and greater therapeutic effect.

Given the importance of engagement in treatment as a variable that may influence outcome, and the lack of studies exploring homework compliance in CBT trials within the chronic pain population, supplementary analyses examining the influence of homework compliance were conducted. It was predicted that higher levels of homework compliance reported by both the therapist and the patient, will be associated with more beneficial outcomes (reductions in pain level, suffering due to pain, impairment in functioning, overdoing and avoidance activity level, depressive severity, fear of pain, and AS, as well as improvements in control over pain and pacing activity level).

As the literature suggests, factors such as sex and age of individuals suffering from chronic pain demonstrate a relationship with the experience of pain. As such, exploratory analyses were conducted within our sample to examine whether there is any association between demographic variables (e.g., sex, age, employment status) and the outcome measures employed.

At the three-month follow-up, it was predicted that observed benefits in the treatment group from baseline to post-treatment will be sustained.

Method

Recruitment of Participants

The majority of participants (n = 84) were recruited from various chronic pain clinics in the Greater Toronto Area (GTA) (e.g., Rothbart Centre for Pain Care, First Step Clinic). Potential participants were either identified through the pain clinic's program and approached following consent to contact them, or they were approached in the waiting room while waiting for their appointment with their physician. Other avenues of recruitment included posting advertisements approved by Lakehead University's Research Ethics Board in medical clinics and hospitals throughout the GTA and on webpages such as Kijiji and Craigslist. In all cases, the primary researcher made contact with the potential participant and introduced herself as a researcher conducting a multi-centre study that examines the efficacy of a cognitive behavioural intervention for the management of chronic pain. The primary researcher briefly described the details of the research study, including what is required on the part of the potential participant should they decide to participate (see below). If an individual was interested in the research study, he/she was asked to set up an appointment to read over the informed consent form (see Appendix B) with the research assistant present to answer any questions. The inclusion criteria for the present study include: (i) age 18–65, (ii) chronic pain lasting more than three months, (iii) not meeting exclusionary criteria. Exclusionary criteria include: (i) meeting current diagnostic criteria for psychosis or any other serious mental illness that would significantly impair one's ability to participate in the group, (ii) current substance abuse or dependence of a non-prescribed substance, or (iii) current alcohol abuse or dependence as outlined in the DSM-IV-TR (APA, 2000). Please note that individuals interested in participating in the study that met inclusion criteria and were over the age of 65, were able to participate in the study. However, for

theoretical purposes and factors related to study design, these individuals were removed from data analyses.

Participants were free to continue ongoing pharmacological treatments, and were asked to notify the researchers should they initiate any new treatment or engage in any additional psychological interventions throughout the study period. Introductory contact with the patients through the review of the informed consent form ensured that all patients were able to speak as well as understand English.

Through the consent form, participants were reminded in writing that the objective of the multi-centre research study is to examine the efficacy of a cognitive behavioural intervention in the management of chronic pain. Risks and benefits of participation were also outlined, indicating that potential risks may include psychological distress including depressive symptoms, anxiety symptoms, frustrations, sleep disturbances, irritability, and increased fatigue during or shortly after the weekly sessions. Given the increased psychological distress, it was outlined that some participants may experience a temporary decline in cognitive and emotional functioning. Upon termination of the program, participants received a debriefing form that included a list of community clinical resources (see Appendix C), and participants were encouraged to remain in contact with their primary caregiver. A Crisis Intervention Protocol (see Appendix D) was developed but did not need to be implemented throughout the study period. Through participation in the CBT-based intervention, potential benefits for participants included managing their chronic pain in a variety of domains, as previous investigations of a similar nature reported such gains. These gains included, but were not limited to, improvement in pain severity, physical functioning, psychological functioning, coping strategies, cognitive appraisal, self-control over pain, and medication usage. Potential participants were told that their

participation is completely voluntary and that they may withdraw their participation at any time during the study. In terms of confidentiality, participants were assured that that all information obtained will be held with strict confidence, and their name will never be associated with any verbal or written information they provide, and the limits of confidentiality were outlined. Participants were provided with the contact information for all study investigators, along with the contact information for the ethics review board.

Training of Research Assistants

In addition to the student investigator (C. Iorio), four research assistants were involved in the present study, including co-facilitating the 12-week CBT group program. All research assistants were women, had completed their Bachelor's degrees in Psychology, and underwent extensive training where they had the opportunity to gain all relevant information regarding the study design and procedures, their role as a research assistant, and training on how to deliver the CBT-based treatment protocol. Their role in the treatment delivery was as a co-therapist to the student investigator (C. Iorio). One of the research assistants was also trained in conducting the Mini International Neuropsychiatric Interview (MINI), a structured clinical interview. In terms of the MINI training, sections were practiced and pre-field training was completed, followed by rating of 20 practice interviews before starting field work. All training and field work was supervised by Dr. Martin A. Katzman (psychiatrist), one of the primary investigators.

Procedure

It was proposed that the present study use a multi-centre randomized control trial design (RCT). However, there were some issues with regards to randomization of participants throughout the study. There were constraints that were not anticipated prior to the initiation of the study, including the use of treatment group rooms only during specific time periods and

participants' scheduling limitations, which created obstacles for randomization of participants. To provide more detail, the pain clinics where participants were recruited (and receiving treatment), would only be able to offer group room space at specific time frames, and if there were not enough participants recruited, we would lose that space available. So, at times, there were not enough treatment participants to run a group, but the time frame for use of the group room was fast approaching. Hence, it seemed more reasonable to terminate efforts at recruitment for the control condition, as that would lead to none of the treatment group receiving treatment, and recruit only for the treatment group in order to create an adequate sample size. In addition, many of the participants recruited were restricted in terms of their ability to attend the group program on a weekly basis, as a result of transportation difficulties, financial constraints, or other responsibilities. One example is participants who were only able to attend the group in the winter months, as they were the primary caretaker for their children during the summer months. Should they be part of the control group, they were unable to cross over into the treatment group due to the three month difference. At the time, the researchers needed to weigh whether there was greater benefit in aborting recruitment for the control group and having a greater number of participants recruited, or maintain randomization and have a smaller overall sample size. Given the difficulties with recruitment overall, it seemed more beneficial to have a larger sample size. Therefore, a decision was made to break randomization in order to maintain recruited participants. Analyses comparing treatment and control groups on both demographic variables and baseline scores of time 1 measures were conducted as a way to determine whether any significant differences between groups existed.

Chronic pain patients were recruited with the assistance of each pain clinic's program. Clinical staff performed chart reviews to find clients who met the criteria to participate in the

study. They then made contact with potential participants at their next visit to the clinic. If a patient was interested, the clinical staff asked permission to release the patient's name and contact information to the researcher, who then made contact with the patient in order to provide further information and seek consent. Potential participants were also approached by the research assistant in the waiting room while waiting for their appointment with their physician, and offered an opportunity to participate in the present study. Other avenues of recruitment included posting advertisements approved by Lakehead University's Research Ethics Board in medical clinics and hospitals throughout the GTA and on webpages such as Kijiji and Craigslist. Individuals who were interested in the study were screened to ensure that they met inclusionary criteria for the present research study. The screening procedure ended with the completion of the structured clinical interview (MINI), which was undertaken by either the student investigator or the research assistants.

Clients, whether undergoing pharmacological treatment(s) or not, were accepted into the trial. Pharmacological usage was reviewed pre and post intervention and will be reported as a descriptive outcome measure. Those who met inclusionary criteria and agreed to participate went on to thoroughly read the consent form (see Appendix B) and if they felt comfortable, signed it, thereby entering into the study.

After initial screening, participants were placed in either the intervention or control arm. The intervention arm participated in the 12-week CBT-based intervention (see Appendix A for an outline of each treatment session). The control arm continued as they normally would. At the end of the intervention, post-tests were conducted on both groups and the control arm crossed over and received the 12-week CBT-based intervention. Finally, a three-month post-intervention

follow-up was conducted with all participants who completed the intervention. There were attempts made to contact dropouts for further data collection.

The Cognitive Behavioural Therapy Procedure. In brief, the intervention employed cognitive and behavioural techniques to target participants' psychological, cognitive and emotional pain-related factors that are inhibiting management of their chronic pain. Participants were taught the premise of cognitive behavioural therapy, the value in acceptance of pain, relaxation techniques, appropriate activity levels, techniques in mindfulness, and the potential influence of cognitive factors such as AS and fear of pain on their ability to manage their chronic pain. Each treatment session was approximately 90 minutes in duration. Participants met on a weekly basis, for a total of 12 weeks. Treatment groups consisted of 5 to 12 participants.
The group sessions were co-led by a senior graduate student (completed M.A. in Clinical Psychology and in the process of completing Ph.D. in Clinical Psychology) and a research assistant (completed B.A. in Psychology), both trained in CBT and mindfulness techniques. In total, there were 5 facilitators, including the current student investigator (C. Iorio). All facilitators were supervised by Dr. Martin Katzman. The senior graduate student received training in CBT and mindfulness techniques through coursework, readings, practicum training, and conferences and workshops attended. The research assistants received training in CBT and mindfulness techniques through coursework, readings, and a training workshop they attended ran by the senior graduate student and Dr. Katzman, which included training in CBT and mindfulness in general, as well as training in the specific protocol for chronic pain patients to be utilized in the research study. During this training, facilitators had the opportunity to gain all relevant information regarding the study design and procedures as well as their role as a research assistant. One of the facilitators also underwent extensive training under the supervision of Dr.

Katzman on how to conduct the Mini International Neuropsychiatric Interview Plus (MINI Plus), a structured clinical interview. In terms of the MINI Plus training, sections were practiced and pre-field training was completed, followed by rating of twenty practice interviews before starting field work.

Dr. Martin Katzman reviewed all recordings of the sessions to assure that the group psychotherapy protocol was followed in terms of cognitive, behavioural, and mindfulness based treatment techniques. Following review of all sessions, Dr. Katzman noted that there were no violations of the principles of the protocol and required no further training of the group facilitators.

Participants who entered the treatment phase were asked to complete a pre-treatment questionnaire package prior to the initiation of the group (time 1). Participants in this group were also asked to complete a post-treatment questionnaire package at the end of the 12 week group intervention (time 2). A brief measure of treatment compliance was administered at the start of each group treatment session, and both participants and therapists completed the measure. Individuals in the control group were also asked to complete the same questionnaire packages at the same time points as those in the intervention group. The post-treatment questionnaire package completed by the control group served as their pre-treatment questionnaire package, as they initiated treatment at the end of 12 weeks. Three months post-treatment, all participants were sent a follow-up-treatment questionnaire package either by an email link, which was connected to SurveyMonkey, or if requested specifically, by letter mail (time 3). The order of the measures contained within the questionnaire package was counterbalanced across participants in an attempt to control for potential effects of fatigue and boredom on the results obtained. For each participant, the order of subsequent questionnaire packages was not contingent on the order

of the initial package administered. It is possible that there may be increased measurement variability as a result of not keeping the questionnaire order the same within participants and across time points. However, the main purpose was to control for additional confounding variables, such as fatigue, which could have clouded results obtained.

For participants in the treatment group, a measure of TA (the Working Alliance Inventory-Short Revised**;** WAI-SR) was used, and ratings were made by both the participants and the therapists. It is necessary to address the issue of the student investigator (C. Iorio) also being one of the therapists who completed the WAI-SR. Although the student investigator was involved in both collecting data at all three time points and was a therapist in the 12-week program, she did not review any of the data collected until after study completion. Thus, she was unaware of participants' initial scores on each measure as well as their outcome data. In this way, her ratings of therapeutic alliance were not influenced by her role as a student investigator because she was blind to participants' scores at all three time points. To further ensure accuracy, the co-facilitator, who was not involved in the study investigation, also rated each participant on the WAI-SR. If there was a disagreement between the two therapists on a particular rating, the average of the two scores was taken and rounded to the next whole number. We decided against using consensus ratings between the two therapists, as there may be times when a consensus could not be reached.

Measures

Demographic Questionnaire (see Appendix E). A fourteen-item demographic questionnaire was provided to participants at the start of the proposed research study to complete. The questionnaire asked participants questions relating to the subtype of their chronic pain diagnosis, duration of chronic pain, disability, age, sex, highest level of education

completed, ethnic background, marital status, family household income, employment/education status, and current medications. The information obtained from the demographic questionnaire was used in the present study to describe the sample.

Mini International Neuropsychiatric Interview (MINI) Plus. The MINI Plus (Sheehan et al., 1997) is a short, semi–structured diagnostic inventory intended to explore 17 disorders based upon the Diagnostic and Statistical Manual for Mental Disorders, third edition revised (DSM-III-R). The MINI Plus focuses mainly on current disorder states, and only explores lifetime diagnoses when it is deemed clinically relevant to the present diagnosis. The MINI Plus has good reliability and validity as compared to the Composite International Diagnostic Interview (CIDI) and the Structured Clinical Interview for DSM-IV (SCID). In comparison to the SCID, the MINI Plus demonstrated kappa values above .70 with respect to inter-rater reliability (with the majority of the values above .90), and 14 of the 23 values for test-retest reliabilities above .75 with one value falling below .40 (current mania). In comparison to the CIDI, the MINI Plus has demonstrated high inter-rater reliability, with kappa coefficients ranging from .88 to 1.0, and kappa coefficients for test-retest reliabilities ranging from .76 to .93. Sensitivity and specificity were found to be good for most diagnoses (Lecrubier et al., 1997).

The information obtained from the MINI Plus was used to establish that exclusionary criteria had not been met and also to describe the present sample. Permission was obtained from the developer of the measure (D. Sheehan) to use the MINI Plus for the present study.

West Haven-Yale Multidimensional Pain Inventory (MPI). The MPI (Kerns, Turk, & Rudy, 1985) is divided into three sections; A, B, and C. Within section A, three items tap into present pain severity, pain during the last week, and suffering as a result of pain. Also within section A, nine items compose the general interference subscale. The item assessing work

interference was removed from the general interference score to obtain a score which represents solely interference in work. Still within Section A, two items compose the self-control subscale and three items compose the social support subscale. The remaining items in section A, and all the items in section B and C are not relevant to the present study and therefore will not be discussed. The internal consistency of the MPI scales is very good, ranging from 0.70 to 0.90, with good test-retest reliability coefficients that range from 0.69 to 0.91. The MPI has also demonstrated good internal and external construct validity (Kerns et al., 1985). The MPI was used as an outcome measure of current pain severity, suffering due to pain, general interference in daily functioning due to pain, interference in work functioning due to pain, and self-control.

Reliability analyses were completed on the MPI in the current sample and results indicate Cronbach's alpha range from .72 to .76 for the Pain Severity subscale, from .74 to .89 for the General Interference subscale, from .63 to .84 for the Social Support subscale, from .78 (post) to .82 for the Self-Control subscale, and from .70 to .87 for the Affective subscale.

Pain Anxiety Symptoms Scale-20 (PASS-20). The PASS-20 (McCracken & Dhingra, 2002) is a 20-item measure of fear and anxiety responses specific to pain, which was developed as a short-form to the original 40-item measure (McCracken, Zayfert, & Gross, 1992). Each item is rated on a 6-point Likert-type scale anchored from 0 (never) to 5 (always). The PASS and the PASS-20 both measure four distinct components of fear of pain, including (1) cognitive anxiety (e.g., When I hurt I think about pain constantly), (2) pain related fear (e.g., Pain sensations are terrifying), (3) escape and avoidance (e.g., I try to avoid activities that cause pain), and (4) physiological anxiety (e.g., When I sense pain I feel dizzy or faint). Psychometric evaluation of the PASS-20 demonstrated high levels of internal consistency (alpha = .81), and high correlations with the original version (r = .95; McCracken & Dhingra, 2002). Investigations of

the factorial validity for both the total and subscale scores, as well as internal consistency for each scale has been demonstrated for clinical (Coons, Hadjistavropoulos, & Asmundson, 2004) and non-clinical samples (Abrams, Carleton, & Asmundson, 2007). The PASS was used in the present study as an outcome measure of fear of pain.

Reliability analyses were completed on the PASS total score in the current sample and results indicate Cronbach's alpha range from .94 to .96.

Anxiety Sensitivity Index (ASI). The ASI (Peterson & Reiss, 1993) is a 16-item self-report measure assessing the fear of anxiety-related symptoms and beliefs surrounding the possible harmful consequences of anxiety (e.g., "It scares me when I feel faint"). Each item is rated on a 5-point Likert-type scale ranging from 0 (very little) to 4 (very much). The ASI is scored by summing all 16 items, with possible total scores ranging from 0-64. Higher total scores reflect a greater degree of AS. With respect to reliability of the measure, internal consistency has been found to range from 0.82 to .91 (good to excellent), and test-retest has been determined to be satisfactory (r = .71 to .75) (Peterson & Reiss, 1993). In terms of its factor structure, there has been some controversy in the literature, with some investigations reporting a single and others reporting multiple factors. One of the more sophisticated investigations using a large clinical sample reported the ASI to have one higher-order factor and three lower-order factors which are defined as somatic concerns (e.g., It scares me when my heart beats rapidly), social concerns (e.g., It is important to me not to appear nervous), and mental incapacitation concerns (e.g., When I cannot keep my mind on a task, I worry that I may be going crazy) (Zinbarg et al., 1997). Total score on the ASI was used in the present study as an outcome measure of AS.

Reliability analyses were completed on the ASI in the current sample and results indicate Cronbach's alpha range from .92 to .95.

Beck Depression Inventory II (BDI II). The BDI-II (Beck, Steer, & Brown, 1996) is a 21 item self-report questionnaire which assesses the severity of depression symptoms. Items are rated in a four-point severity scale ranging from 0 - 3. Participants are asked to read 21 groups of four statements, and pick the statement in each group that best describes how they have been feeling in the past two weeks. The total score, which can range from 0-63, is derived by summing the ratings from all 21 questions. Cut-off scores for the BDI-II are as follows; a total score of 0 - 13 is considered minimal depression, 14 - 19 is mild depression, 20 - 28 is moderate depression, and 29 - 63 is severe depression. Higher total scores represent more severe depressive symptoms. The BDI-II has excellent psychometric properties, including good reliability estimates with an alpha coefficient of .91 (Beck et al., 1996). Construct and convergent validity of the BDI-II have also been demonstrated in a sample of college students (Osman et al., 1997). The BDI-II was used in the present study as an outcome measure of depressive severity.

Reliability analyses were completed on the BDI - II in the current sample and results indicate Cronbach's alpha range from .94 to .95.

Patterns of Activity Measure - Pain (POAM-P). The POAM-P (Cane, Nielson, McCarthy, & Mazmanian, 2013) is a 30-item self-report scale that measures three patterns of activity common to individuals experiencing chronic pain: overdoing, avoidance, and pacing. These three activity patterns are captured by the measure's subscales, each of which comprise ten items rated on a 5-point Likert-type scale ranging from "not at all" (0) to "all the time" (4). Reliability analyses have been conducted for each of the three subscales. Results demonstrated excellent internal consistency, with Cronbach's alphas ranging from .86 to .92. Inter-scale correlations support independence of the subscales, with the exception of the pacing and

avoidance subscales ($r = .40$, $p < .001$). A confirmatory factor analysis provided reasonable initial support for the hypothesized three-factor model, with a Comparative Fit Index (CFI) of .807 and Root Mean Square Error of Approximation (RMSEA) of .087 (Iorio, Stone, Cane, Nielson, & Mazmanian, 2011). The POAM-P was used in the present study as an outcome measure of participants' activity level.

Reliability analyses were completed on the POAM-P in the current sample and results indicate Cronbach's alpha range from .87 to .94 for the Avoidant subscale, from .75 to .83 for the Overdoing subscale, and from .92 to .96 for the Pacing subscale.

Working Alliance Inventory-Short Revised (WAI-SR). The WAI-SR (Hatcher & Gillaspy, 2006) is a refined measure of therapeutic alliance that is based on the Working Alliance Inventory (Horvath & Greenberg, 1989). The WAI-SR is a 12-item self-report measure that, similar to the original scale, assesses three key aspects of the therapeutic alliance: (a) agreement on the tasks of therapy, (b) agreement on the goals of therapy and (c) development of an affective bond. Items are summed to create a total score, with higher scores reflecting stronger alliance between client and therapist. In comparison to the WAI and a previous short version of the WAI (the WAI-S; Tracey & Kokotovic, 1989), the WAI-SR demonstrated an improved model fit when employing a confirmatory factor analysis (CFA), as well as lower-scale intercorrelations. The WAI-SR also established good reliability (reliabilities from .88 to .92), along with good convergent validity when compared to the Helping Alliance Questionnaire and the California Psychotherapy Alliance Scale, (total score correlations > 0.74) (Hatcher & Gillaspy, 2006). The psychometric properties of the measure were examined within a German population of outpatients and inpatients. In both samples good reliability and convergent validity was demonstrated (Munder, Wilmers, Leonhart, Linster, & Barth, 2010). The WAI-SR was used

in this study as a measure of therapeutic alliance, and both the therapist and client versions of the scale were employed and completed post-treatment (Time 2).

Reliability analyses were completed on the WAI-SR in the current sample and results indicate Cronbach's alpha of .91 (for the client measure) and .98 (for the therapist measure).

Mindful Attention Awareness Scale (MAAS). The MAAS (Brown & Ryan, 2003) is a 15-item self-report scale that asks participants to rate their experience of being mindless rather than mindful (e.g., "I find myself doing things without paying attention"). The scale measures present-moment awareness of actions, interpersonal communication, thoughts, emotions, and physical states. Items are rated in a Likert-type scale, from 1 (almost always) to 6 (almost never), with higher scores indicative of more mindful behaviour. In terms of the measure's psychometric properties, excellent test-retest reliability (r = .81) and good internal consistency (α = .87) have been reported, along with good convergent and discriminant validity (Brown & Ryan, 2003). Within a chronic pain sample specifically, high levels of internal consistency (α = .87) have also been demonstrated (McCracken, Gauntlett-Gilbert, & Vowles, 2007). The MAAS is not a primary outcome measure in the current study, but was used in supplementary analyses as a measure of overall mindfulness and potentially a predictor of outcome.

Reliability analyses were completed on the MAAS in the current sample and results indicate Cronbach's alpha range from .86 to .90.

The Intolerance of Uncertainty Scale – 12 (IUS-12). The IUS-12 (Carleton, Norton, & Asmundson, 2007) is a short form of the Intolerance of Uncertainty Scale developed by Freeston, Rhéaume, Letarte, Dugas, and Ladouceur (1994; translated into English by Buhr & Dugas, 2002). The self-report questionnaire consists of 12-items that assess intolerance of uncertainty. Items are scored on five-point Likert-type scales, with total scores ranging from 12 to 60. Higher

scores indicate greater intolerance of uncertainty. The IUS-12 has a high internal consistency, strong convergent validity, strong correlations to the original Intolerance of Uncertain Scale, and a clear two factor structure in undergraduate samples (Carleton et al., 2007). Subsequent studies have also found a high internal consistency (Calleo, Hart, Björgivnsson, & Stanley, 2010) and have supported the use of the IUS-12 over the original scale due to an improved factor structure in a clinical sample (McEvoy & Mahoney, 2011). The IUS is not a primary outcome measure in the current study, but was used in supplementary analyses as a measure of overall intolerance of uncertainty as a predictor of outcome.

Reliability analyses were completed on the IUS total score in the current sample, and results indicate Cronbach's alpha range from .93 to .95.

Coping Strategies Questionnaire Revised (CSQ-R). The CSQ-R (Rosenstiel & Keefe, 1983) is a 27-item self-report questionnaire designed to assess six cognitive coping responses to pain. The six subscales are catastrophizing, coping self-statements, ignoring sensation, distancing, distraction, and praying. Each CSQ-R item is rated on a 7-point Likert-type scale that ranges from 0 (never do that) to 6 (always do that). A subscale score is derived by summing all items that load on that particular subscale, with higher scores indicating greater frequency of utilizing that specific coping strategy. The CSQ-R has shown robust psychometric properties, with reliability coefficients ranging from 0.72 to 0.86 (Riley, Robinson, & Geisser, 1999), but it has had limited exposure in patient populations because of its recent development. The CSQ-R is not a primary outcome measure in the current study, but all six scales within the CSQ-R were used in supplementary analyses as a measure of cognitive coping strategies in response to pain as a potential predictor of outcome.

Reliability analyses were completed on the CSQ-R in the current sample and results indicate Cronbach's alpha range from .82 to .93 for the Catastrophizing subscale, from .61 to .71 for the Coping Self-Statements subscale, from .83 to .85 for the Ignoring Sensation subscale, from .86 to .95 for the Distancing subscale, from .78 to .90 for the Distraction subscale, and from .89 to .94 for the Praying subscale.

Pain Catastrophizing Scale (PCS). The PCS (Sullivan, Bishop, & Pivik, 1995) is a 13-item measure which assesses three components of negative thoughts associated with pain: rumination, magnification, and helplessness. The PCS asks participants to reflect on their pain and indicate the extent to which they endorse each self-reflective statement. The statements are rated on a 5-point scale that ranges from 0 (not at all) to 4 (all the time). All items for each subscale are summed to obtain a total score for that subscale, with higher scores indicating greater endorsement of that particular component of negative thoughts. The psychometric properties of the PCS appear adequate, with internal consistency measures ranging from .85 to .91 (Sullivan et al., 1995). Criterion related, concurrent, and discriminant validity for the PCS has also been demonstrated (Osman et al., 2000). The PCS is not a primary outcome measure in the current study, but was used in supplementary analyses as a measure of cognitive coping strategies in response to pain.

Reliability analyses were completed on the PCS total score in the current sample and results indicate Cronbach's alpha range from .93 to .96.

The Homework Compliance Scale. The Homework Compliance Scale (Westra & Dozois, 2006; Westra, Dozois, & Marcus, 2007) was used to measure treatment compliance of those participants in the treatment group. The Homework Compliance Scale is comprised of both client-rated and therapist-rated homework compliance assessed using a 3-item questionnaire

at the start of each treatment session. Items assessing effort, amount of homework, and time spent on homework are rated using a 5-point Likert-type scale. Higher scores indicate greater treatment compliance. The Homework Compliance Scale has been found to have high internal consistency, convergent validity, and predictive validity (Westra & Dozois, 2006; Westra et al., 2007).

Reliability analyses were completed on the Homework Compliance Scale total score in the current sample, and results indicate Cronbach's alpha range from .98 (therapist-rated scale) to .99 (client-rated scale).

Results

Sample Characteristics

A total of 96 chronic pain patients (20 men, 43 women, 33 unidentified) participated in the study. There were 95 participants who completed the MINI Plus structured clinical interview. There were 63 participants who completed the demographic questionnaire, which was administered at time 1. Since sex of participants was asked within the demographic questionnaire, and 33 of the recruited participants did not complete the demographic questionnaire because they dropped out of the study prior to its administration, there are 33 participants whose sex was not identified. Seventy participants were assigned to the treatment group, and 26 were assigned to the control group. Of the 26 participants that were assigned to the control group, 14 crossed over to the treatment group following the three month control period, and this increased the total treatment group size to 84. The age range of participants in the sample was 25 to 64, and the mean age was 49.89 years (SD = 10.21).

A little over one fifth (22.20%) of the sample were single, while about half of the sample (49.20%) were either married or co-habiting. Within the sample, 8.10% obtained their high

school diploma, 43.50% obtained a college degree and 22.60% received a University degree. The majority of the participants identified themselves as Caucasian/European (82.30%), with smaller percentages identifying themselves as East Asian (6.50%), Caribbean (3.20%), African (1.60%), West Asian (1.60%), Filipino (1.60%), Latin American/Hispanic (1.60%), and 1.60% identifying as 'other'.

Over one third (32.20%) of the sample reported their annual family income to fall between $10 000 to $20 000. Over half of the sample was either temporarily not able to go to work/school (41.00%) or unemployed/not in school (19.70%). Just under half of the sample (43.30%) endorsed receiving some form of disability benefits, and 6.60% of the sample was receiving WSIB benefits. Approximately one third of the sample was involved in some form of litigation (29.80%). With respect to previous psychological treatment, 54.80% of the sample reported that they had received individual treatment and 39.30% reported receiving group treatment that was unrelated to their pain. As for receiving treatment that was related to their pain, 41.90% of the sample reported they had received previous individual psychological treatment, and 27.40% reported receiving group treatment, that was related to their pain. In terms of pharmacological treatment, 58.70% of the sample reported that they were consistently taking medication prescribed for their pain. For a complete summary of the demographic information for the entire sample, as well as the demographic information for men and women separately, please see Table 1. Please note that the total sample is reflective of the 63 participants who completed the demographic questionnaire and does not include the 33 participants that dropped out of the study prior to or following completion of the MINI Plus structured clinical interview.

Table 2 summarizes the diagnostic classification findings derived from the structured clinical interview using the MINI Plus. Please note that one participant did not complete the

MINI Plus, and therefore the total sample for the table is 95. Also note that the breakdown of male and female participants totals 63 participants and not 95, as there were 32 participants that dropped out of the study following completion of the MINI Plus. Overall, 91.60% of the sample experienced at least one psychological disorder, either currently or in their lifetime. A breakdown of the percentage of individuals within the sample who met diagnostic criteria for each disorder follows.

Several of the participants reported currently suffering from some form of mood disturbances with past major depressive disorder being reported most frequently (37.90%) followed by current dysthymia (32.60%) and current major depressive disorder (21.10%). A much smaller percentage of the sample reported experience with bipolar disturbances with equal number of participants currently experiencing bipolar one and bipolar two disorder (1.10%). With regard to the anxiety disorders, over half of the sample (56.80%) met criteria for generalized anxiety disorder. A smaller subset met criteria for panic disorder, both current (7.40%) and lifetime (24.20%), current agoraphobia (22.10%), current generalized and non-generalized social phobia (21.00%), current specific phobia (10.50%), current obsessive compulsive disorder (10.50%) and current and past post-traumatic stress disorder (29.40%). In terms of substance use, no one in the sample met criteria for alcohol abuse or dependence, and a small number met criteria for substance abuse (2.10%) and dependence (1.10%). A small percentage of the sample met criteria for an eating disorder, with 4.20% meeting criteria for bulimia nervosa. A relatively smaller portion of the sample met criteria for hypochondriasis (4.20%) and body dysmorphic disorder (1.10%). Adult Deficit Hyperactivity Disorder (ADHD) was also observed in the sample, with 3.20% meeting criteria for ADHD combined subtype,

3.20% meeting criteria for ADHD inattentive subtype, and 2.10% meeting criteria for ADHD hyperactive-impulsive subtype.

When compared to the general population, the percentages observed in the present sample are substantially higher for most of the anxiety and mood disorders (dysthymia, major depressive disorder, generalized anxiety disorder, panic disorder, agoraphobia, social phobia, obsessive compulsive disorder, and past post-traumatic stress disorder), while the remaining disorders appear to be relatively equivalent (APA, 2000). The fact that there are higher percentages of mood and anxiety disorders in the current chronic pain sample than the general population is consistent with findings obtained in previous studies (Dersh et al., 2002; Polatin et al., 1993; White et al., 2008).

Statistical Analytic Strategy

A one-way, between groups Multivariate Analysis of Covariance (MANCOVA) was used to analyze outcome data. The independent variable was treatment group (intervention and control). The dependent variables included: (i) fear of pain, (ii) AS, (iii) general interference in daily functioning due to pain, (iv) interference in work functioning due to pain, (v) current pain severity, (vi) suffering due to pain, (vii) overdoing activity level, (viii) avoidance activity level, (ix) pacing activity level, (x) depressive severity, and (xi) self-control over pain. The covariates in the model were the baseline values of each dependent variable. If any significant differences were observed between the two groups, separate Analysis of Covariance (ANCOVA) models were employed for each dependent variable. Since there was a large discrepancy between cell totals due to the uneven numbers of treatment and control participants, the Levene's test was employed to determine whether the variances between the two groups were equal.

A correlation matrix was created to examine the relationships between the change scores for the following variables: AS, fear of pain, therapeutic alliance (therapist and patient), general interference in functioning, interference in work functioning, current pain severity, suffering due to pain, overdoing activity level, avoidance activity level, pacing activity level, depressive severity, and self-control over pain. Two separate partial correlations were proposed should there be any relationship between change in AS or change in fear of pain and change in functional impairment, in order to determine whether current pain severity has any influence on the relationship observed. Change scores were calculated by subtracting the total time 2 score from the total time 1 score for each outcome variable.

Separate regression models were employed to examine whether therapeutic alliance predicted changes in outcome variables. For each regression model, therapeutic alliance was the predictor variable, and changes in either pain level, suffering due to pain, impairment in functioning, activity level, fear of pain, AS, depressive severity, and control over pain was the outcome variable.

To determine whether significant benefits were sustained at the three month follow-up, two paired *t*-tests were employed separately for each outcome variable. The first paired *t*-test compared scores at baseline with scores at the three month follow-up for either (i) fear of pain, (ii) AS, (iii) general interference in daily functioning due to pain, (iv) interference in work functioning due to pain, (v) current pain severity, (vi) suffering due to pain, (vii) overdoing activity level, (viii) avoidance activity level, (ix) pacing activity level, (x) depressive severity, or (xi) self-control over pain. The second paired *t*-test compared scores at post-treatment with scores at the three month follow-up for either (i) fear of pain, (ii) AS, (iii) general interference in daily functioning due to pain, (iv) interference in work functioning due to pain, (v) current pain

severity, (vi) suffering due to pain, (vii) overdoing activity level, (viii) avoidance activity level, (ix) pacing activity level, (x) depressive severity, or (xi) self-control over pain.

Given the probability of an inflated type I error rate as a result of multiple testing procedures (Tabachnick & Fidell, 2007), a correction was proposed prior to initiation of the present study to reduce the probability of a Type I error. However, due to the decrease in power of the present study as a result of lower than expected sample size, the proposed correction was not undertaken and the alpha level remained at .05. Review of the literature indicates a lack of consensus among statisticians as to whether correction procedures should be employed, or the conditions under which such correction procedures should be undertaken. Some authors argue that the implementation of a correction should be avoided as it is too conservative (e.g., Rothman, 1990; Streiner & Norman, 2011), while others claim that it is required (e.g., Huberty & Morris, 1989; Tabachnick & Fidell, 2007). Nakagawa (2004) maintains that the use of a correction exacerbates the issue of already low power and increases the probability of a Type II error to unacceptable levels. As such, the researchers believed that the decision to maintain the standard alpha level was best given the low power to begin with.

Pre-Analysis Issues

Missing data and number of cases. Following entry of data into the Statistical Package for the Social Sciences (SPSS), the final data were double-checked and screened for accuracy and missing items. The data was screened thoroughly, with each variable undergoing inspection to ensure scores were within the appropriate range (Tabachnick & Fidell, 2007). For those participants with a small number (less than 10%) of missing items within a scale or subscale, the missing item was replaced with the mean value for that individual (Tabachnick & Fidell, 2007, p.67). Twenty four participants did not respond to a small number of items (less than 10%) over

one to two scales or subscales; thus, the mean value for the individual was inserted. For those participants with a large number (more than 10%) of missing items within a scale or subscale, a total score for that scale or subscale was not calculated and the data were excluded from analyses.

The number of cases considered to adequately support the MANOVA was estimated through the use of a general power analysis program (GPower 3.1). The results from the power analysis indicated that for a medium effect size and power of .80, an overall sample size of 128 participants was required. A medium effect size was used in the power analysis, because it is consistent with results obtained in past investigations of CBT approaches to pain management (e.g., Morley et al., 1999).

The current sample consisted of 96 participants; 70 were assigned to the treatment group and 26 were assigned to the control group. Of the 26 participants that were assigned to the control group, 14 crossed over to the treatment group following the three month control period, and this increased the total treatment group size to 84. Within the treatment group (including those participants who crossed over), 54 participants completed the time 1 questionnaire package, 48 participants completed the time 2 questionnaire package, 16 completed the time 3 (follow-up) questionnaire package, and 29 did not complete the questionnaire package at any time point. Within the control group, 21 participants completed the time 1 questionnaire package, 15 participants completed the time 2 questionnaire package, and 5 did not complete the questionnaire package at any time point. Due to attrition rates across the three time points, two sets of analyses were conducted in an attempt to compensate for the decreased power. The first set of analyses included all participants who completed measures at time 1 and time 2, but may or may not have completed measures at time 3 (follow-up). We termed this group “Pre-Post

Completer" analyses. The second set of analyses included only those participants that completed measures at all three time points. We termed this group "Follow-Up Completer" analyses. The treatment group for both sets of analyses included the control participants who had crossed over to the treatment group.

Univariate and multivariate outliers. In addition to screening for accuracy and missing items, the data were also screened for both univariate and multivariate outliers which can also affect results obtained (Tabachnick & Fidell, 2007). In order to test for univariate outliers, all of the scale score variables were first standardized into *z* scores within SPSS. Once all variables were transformed, any case which was greater than ± 3.29 was identified as a univariate outlier. Within the current database, a very small number of cases were identified as significant univariate outliers. Outliers were replaced with the second highest or second lowest value on the scale endorsed plus or minus one.

Multivariate outliers, which are cases with unusual combination of scores on two or more variables (Tabachnick & Fidell, 2007, p. 73), were screened by examining Cook's distance (Cook's D) in SPSS. Influential outliers are defined as those with a Cook's D > 1.00. There were no outliers identified, thus, the raw scores were not altered.

Normality, linearity and homoscedasticity. Assumptions of normality, linearity and homoscedasticity were assessed using box and whisker plots along with histograms. The analyses revealed the MPI Interference subscale at time 1 and time 2 deviated from normality. As such, a decision was made to reverse-score the values (due to the negative skew), and then perform a square root transformation on the data. Following the transformation, both variables were closer to demonstrating normality [time 1 skewness = -0.46(0.29), kurtosis = -1.85(0.57); time 2 skewness = 0.14(0.31), kurtosis = -2.05(0.61)]. It was also discovered the CSQ-R

Distancing subscale deviated from normality, and a log transformation was performed on the data. Following the transformation, the CSQ-R Distancing subscale was closer to demonstrating normality [skewness = 0.30(0.29); kurtosis = -1.60(0.57)]. See Table 3 for all descriptive statistics for skewness and kurtosis for all variables examined. In all analyses conducted, both the transformed and untransformed data will be examined.

Group Equivalency. In order to determine whether the groups were equivalent at baseline, *t*-tests and chi-square analyses were conducted comparing demographic variables as well as baseline (time 1) scores on outcome measures between the control and treatment group. Analyses revealed that there was a significant difference between the two groups at baseline on a measure of current pain ($p = 0.02$) and on a measure of current disability status ($p = 0.02$). The control group displayed lower levels of current pain and more individuals in the control group endorsed receiving disability benefits. Tables 4 to 6 outline all descriptive statistics and analyses for control and treatment group participants on demographic variables and baseline (time 1) outcome measures. Where appropriate, these variables were controlled for during the various statistical analyses performed. Results from these analyses are found below, under "Confounder" analyses.

Pre-Post Completer Analyses

Multivariate Analysis of Co-Variance (MANCOVA). A one-way, between groups MANCOVA was performed, with the independent variable being treatment group (intervention and control) and the 11 dependent variables being: (i) fear of pain, (ii) AS, (iii) general interference in daily functioning due to pain, (iv) interference in work functioning due to pain, (v) current pain severity, (vi) suffering due to pain, (vii) overdoing activity level, (viii) avoidance activity level, (ix) pacing activity level, (x) depressive severity, and (xi) self-control over pain.

The covariates in the model were the baseline values of each dependent variable. Results from the Levene's test revealed that the variance between groups was not significantly different. Thus, the assumption of homogeneity of variance could be maintained. Using Wilks' lambda, there was no significant effect of group on any of the outcome measures, $\Lambda = 0.57$, F (13,25) = 1.44, $p = 0.21$. Additional analyses were completed after controlling for the differences observed at baseline between the treatment and control group participants on measures of current pain as well as disability status. Using Wilks' lambda, after controlling for current pain, there was no significant effect of group on any of the outcome measures, $\Lambda = 0.61$, F (11,29) = 1.72, $p = 0.12$. Using Wilks' lambda, after controlling for disability status, there was no significant effect of group on any of the outcome measures, $\Lambda = 0.57$, F (13,23) = 1.41, $p = 0.23$.

Analysis of Co-Variance (ANCOVA). Due to the low power in the MANOVA with the current sample, separate univariate ANCOVAs were performed for each outcome measure, where treatment group (intervention and control) was used as the independent variable, time 2 (post) outcome score was the dependent variable, and baseline score was the covariate.

Levene's test was employed in all analyses conducted and results revealed that the variance between the groups was not significantly different. Thus, the assumption of homogeneity of variance was maintained. Results revealed that there was a significant difference between groups on a measure of avoidant activity level, $F(1, 57) = 4.08$, $p = 0.05$, partial $\eta^2 = 0.07$. The estimated marginal means indicate that the treatment group had higher levels of avoidant activity (23.18) than the control group (19.49). See Table 7 for results from this analysis.

Correlations. A correlation matrix (see Table 8) was examined and there was no significant relationship discovered between change in AS or change in fear of pain and change in

functional impairment. As such, the two separate partial correlations proposed to determine whether current pain severity has any influence on the relationship between change in AS or change in fear of pain and change in functional impairment, were not conducted.

Regression. Standard linear regression analyses were employed between therapeutic alliance (client and therapist measures) and changes in outcome variables. Therapeutic alliance was not found to significantly predict change in any of the outcome variables. See Tables 9 and 10 for results from these analyses.

Paired *t*-test. Two paired *t*-tests were employed comparing time 1 (baseline) scores with time 3 (follow-up) scores and time 2 (post-treatment) scores with time 3 (follow-up) scores. Results revealed that there were no significant differences between the two time points on both analyses for any of the outcome variables. The paired *t*-test analyses for the pre-post completer group are the same as those outlined below for the follow-up completer group, as only those participants who completed the follow-up phase were included in both sets of analyses due to the inclusion of the follow-up scores. See Tables 11 and 12 for results from these analyses.

Supplementary Analyses. A reduction in the original proposed total sample size has resulted in decreased power for the analyses proposed. As such, a decision was made to explore the treatment group alone using paired *t*-tests. The paired *t*-tests were conducted on scores from the outcome measures at time 1 and time 2 for the treatment group alone. Results demonstrated that there was a reduction in levels of fear of pain from time 1 ($M = 49.83$, $SD = 23.85$) to time 2 ($M = 45.35$, $SD = 24.82$), and this difference was significant, $t(45) = 2.69$, $p = .01$. Findings also revealed that the difference in current pain level from time 1 ($M = 3.89$, $SD = 1.39$) to time 2 ($M = 3.51$, $SD = 1.36$) was approaching significance, $t(45) = 2.69$, $p = .06$. See Table 13 for results from this analysis.

Follow-Up Completer Analyses

Multivariate Analysis of Co-Variance (MANCOVA). A MANCOVA was not completed with participants in this group, as only the treatment group completed outcome measures at time 3 (follow-up). Thus, a comparison between groups could not be completed.

Analysis of Co-Variance (ANCOVA). An ANCOVA was not completed with participants in this group, as only the treatment group completed outcome measures at time 3 (follow-up). Thus, a comparison between groups could not be completed.

Correlations. A correlation matrix (see Table 14) was examined and there was no significant relationship discovered between change in AS or change in fear of pain and change in functional impairment. As such, the two separate partial correlations initially proposed could not be conducted.

Regression. Standard linear regression analyses were employed between therapeutic alliance (client and therapist measures) and changes in outcome variables. Results revealed that client's ratings of therapeutic alliance significantly predicted change in self-control, β = - 0.53, $t(13)$ = - 2.27, p = .04, and explained a significant proportion of variance in change in self-control, F (1, 13) = 5.15, p = 0.03, R^2 = 0.28. It was discovered that therapist's ratings of therapeutic alliance significantly predicted change in catastrophizing, β = 0.52, $t(14)$ = 2.25, p = .04, and explained a significant proportion of variance in change in catastrophizing, $F(1, 14)$ = 5.07 p = 0.04, R^2 = 0.27. See Tables 15 and 16 for results from these analyses.

Paired *t*-test. As outlined in the pre-post completer analyses section above, two paired t-tests were employed comparing time 1 (baseline) scores with time 3 (follow-up) scores and time 2 (post-treatment) scores with time 3 (follow-up) scores. Results revealed that there were no

significant differences between the two time points on both analyses for any of the outcome variables.

Supplementary Analyses. In correspondence with the reduction in power for the proposed analyses conducted, paired *t*-tests were examined on scores from the outcome measures at time 1 and time 2 for only those in the treatment group who completed the follow-up measures. Results revealed that there were no significant differences across the two time points. See Table 17 for results from this analysis.

A decision was also made to explore the treatment group alone using a within-subjects repeated measures analysis. Results from the repeated measures design revealed there were no significant differences across the three time points within subjects. See Table 18 for results from this analysis.

Confounder Analyses

A comparison between the treatment and control groups demonstrated that the two groups varied on baseline measures of current pain and disability status. As such, attempts were made to perform the above analyses while controlling for these variables, where applicable. Significant findings will be reported below.

Controlling for Disability Status and Current Pain. After controlling for disability status and current pain in the ANCOVA models for pre-post completer data, there was a significant difference observed between groups on a measure of self-control, $F(1, 52) = 4.79$, $p = 0.03$, partial $\eta^2 = 0.08$. The estimated marginal means indicate that the treatment group had higher levels of self-control (3.53) than the control group (2.66). There was also a significant difference observed on a measure of avoidant activity, $F(1, 52) = 7.07$, $p = 0.01$, partial $\eta^2 = 0.12$, with the estimated marginal means indicating that the treatment group had higher levels of

avoidant activity (23.53) than the control group (18.60). See Table 19 for results from this analysis. It appears that the confounds of disability status and current pain were suppressing the differences between groups on measures of self-control and avoidant activity. It should be noted that Levene's test was employed in all analyses conducted and the variance between the groups was not found to be significantly different, indicating that the assumption of homogeneity of variance could be maintained.

Homework Completer Analyses

Based on the findings obtained, supplementary analyses were conducted to determine whether differences in outcomes were observed between those who had high and low engagement with the homework exercises. Total scores were calculated for the homework compliance scale and separate values were obtained for ratings made by the patient and ratings made by the therapist. Scores were then re-coded to differentiate between "high" and "low" homework completers. Low homework completers are those who identified engaging with the homework exercises from none to some of the time. High homework completers are those who identified engaging with the homework exercises from quite a bit to a whole lot of the time.

A 2 x 2 repeated measures ANOVA was conducted for each outcome variable, with group (high and low completer) as the between factor and time (time 1 and time 2) as the within factor. The first set of analyses looked at the homework ratings made by the therapist. Results of this set of analyses demonstrated that the only significant interaction was between change in pain catastrophizing and engagement in treatment, F (1, 45) = 4.29, p = 0.04. The mean value of pain catastrophizing at time 1 for participants who fell within the low homework completer group was 23.46 (SD = 14.05) and at time 2 the mean value of the same group was 22.81 (SD = 12.06). Those within the high homework completer group demonstrated mean values of pain

catastrophizing at time 1 of 26.30 (*SD* = 8.65) and at time 2 of 19.50 (*SD* = 7.35). See Table 20 for results from this set of analyses. The second set of analyses looked at the homework ratings made by the client. Results of this set of analyses demonstrated that there was no significant interaction between change in outcome variable and engagement in treatment. See Table 21 for results from this set of analyses. The relationship between participant and therapist ratings of treatment compliance was also examined, and the correlation between the two variables was moderate ($r = 0.57$, $p < .001$).

Discussion

The purpose of the present study was to clarify the role of AS and fear of pain by determining whether the implementation of a 12-week CBT group treatment protocol led to changes in AS, fear of pain, avoidance behaviour, and functional impairment in a sample of chronic pain patients.

Review of Original Hypotheses

There were several hypotheses made at the start of the current study. The first hypothesis was that there will be a significant difference between the intervention group and control group from pre-treatment (Time 1) to post-treatment (Time 2) on all main outcome measures. The second hypothesis was that in the treatment group, decreases in AS will be positively correlated with decreases in general functional impairment. In addition, it was predicted that change in AS will be an independent predictor of general functional impairment beyond the change in current pain severity. The third hypothesis was that in the treatment group, decreases in fear of pain will be positively correlated with decreases in general functional impairment. In addition, it was predicted that change in fear of pain will be an independent predictor of general functional impairment beyond the change in current pain severity. At the three-month follow-up, it was

predicted that observed benefits in the treatment group from baseline to post-treatment will be sustained.

Exploratory analyses were planned using therapeutic alliance as a predictor of change post-treatment. It was predicted that higher levels of therapeutic alliance reported by both the therapist and the patient will be associated with more beneficial outcomes (reductions in pain level, suffering due to pain, impairment in functioning, overdoing and avoidance activity level, depressive severity, fear of pain, and AS, as well as improvements in control over pain and pacing activity level).

Main Findings

To determine whether there were any differences between participants in the treatment and control group, both groups were compared on demographic and pain-related measures. It was discovered that participants in the groups did differ with respect to their disability status as well as their current pain level reported, with the control group experiencing lower levels of current pain and having a higher percentage of participants receiving disability benefits related to their pain. As such, efforts to control for these variables were undertaken in all relevant analyses. It should also be noted that there was difficulty in determining whether significant differences observed between time 1 and time 2 were sustained at the three-month follow-up (time 3), because of the high attrition rate for the three-month follow-up phase (n = 16). It is possible that the participants who completed the time 3 measures are a subgroup of individuals who are overall functioning better. If this were the case, then we would not have observed significant changes throughout the study period for these select individuals.

As stated above, all proposed analyses were conducted, although some were no longer appropriate given the sample size obtained. With respect to the first hypothesis, there were no

significant findings observed when using the MANCOVA design. One of the main issues in the present study is the small sample size and uneven distribution of participants between the treatment and the control group, which may play a role in the validity of results observed. Another variable that was integral to the hypotheses of the present investigation was the measure used to evaluate level of functioning. Although the MPI is commonly used in research to measure level of functioning in chronic pain patients, it asks individuals to rate their change in level of functioning since the development of their chronic pain. When participants respond to the same questions at the end of treatment, their answers may not have reflected whether they experienced any recent change in their level of functioning, because their comparison point would be the onset of their chronic pain rather than the start of the intervention. This may have had a large effect on the results obtained when examining changes in functioning for the present study.

Given the lack of power using the MANCOVA design with the current sample size exploring separate ANCOVA models was more appropriate, although power still remained an issue. Through the ANCOVA analyses it was discovered that when looking at time 1 to time 2 comparisons, there was a significant difference between the two groups on avoidant activity levels, and this finding became stronger after controlling for disability status and current pain levels. Interestingly, the treatment group had higher levels of avoidant activity than the control group. This finding is surprising, given that there was an entire session devoted to pacing of activity levels. It would be expected that those who practiced pacing during the treatment would be less likely to avoid activities than those that did not participate in treatment. It should be noted that in both the treatment and control groups, avoidant activity level did decrease over the course of 12 weeks. Another variable that demonstrated significant differences between groups when

comparing change in scores from time one to time two is self-control. The treatment group showed greater change in self-control compared to the control group, and this finding was only evident after we controlled for the differences in disability status and current pain levels between the two groups. Since one of the main goals of the CBT approach for chronic pain is to increase individuals' perceptions of control over their pain and decrease feelings of helplessness (Otis, 2007), the current finding is an important one, as it suggests that the treatment was effective in this regard.

When looking at the treatment group alone, it was discovered that there were no significant relationships between changes in AS or fear of pain and changes in general functional impairment. However, it was found that the pre-post completers showed a significant reduction in their fear of pain as well as a reduction in current pain level that was approaching significance following the CBT group intervention. Taken together these findings suggest that there is a relationship between completion of the CBT group intervention and reduction in fear of pain. However, it is not clear based on the results from this study, which aspect of the intervention was related to the change in fear of pain. It could be that other non-specific factors that were not tested or controlled for in the present study (e.g., validation from others) are responsible for the changes observed.

With regards to the lack of relationship between change in fear of pain and change in level of functioning impairment, one possible influencing factor could be the small sample size. Considering previous research findings have demonstrated that high levels of both AS and fear of pain are related to high levels of functional impairment (Crombez et al., 1999; Gheldof et al., 2010; Heuts et al., 2004; Plehn et al., 1998), more participants may have led to corroboration of these findings. The fact that change in fear of pain did not translate into change in impairment in

functioning within the current sample may also be a related to the high level of fear of pain (and AS) observed post-intervention, as mean level of fear of pain at time 2 was 44.89 (and mean level of AS was 24.06) The highest total score one could attain on the PASS-20 (measure of fear of pain) is 100 and the highest score on the ASI (measure of AS) is 64. As such, although there were significant reductions observed post-treatment in levels of fear of pain, participants were still exhibiting what would appear to be moderate levels of fear of pain immediately following the intervention and 3-months post-treatment. Since cut-off scores are not provided for the PASS-20, it is difficult to determine how to classify the range of scores observed. However, it should be noted that the mean score observed in the chronic pain sample involved in the development and validation of the PASS-20 was 38.62 (*SD* = 20.38) (McCraken & Dhingra, 2002). More research is required to clarify the meaning of a score for this measure. However, if we presume that fear of pain for the present sample was still within a moderate level post-treatment, we would not expect much alteration in functional impairment. It may be that in order for change in fear of pain to translate into a change in activity level, fear of pain needs to be reduced to a much lower level. Another possibility is that the dose of the intervention was insufficient at reducing fear of pain and AS levels. Of the 12-week program, one session was devoted to targeting AS. Individuals may have required more continuous practice with interoceptive exposure, for example, in order to reduce their levels of AS and to influence their level of functioning. Of course, there is the possibility that the model proposing that fear of pain moderates the relationship between AS and functional impairment is incorrect. However, since we are unable to support or refute this claim based on results from the present study, questions remain surrounding the relationship between AS and fear of pain, and more research is required to clarify the interaction between these two variables within the chronic pain population.

Previous research with other populations has indicated that TA is a predictor of treatment outcome (e.g., Castonguay et al., 2006; Constantino et al., 2007; Horvath & Bedi, 2002), and a recent study that explored TA with the chronic pain population found that TA was associated with changes in pain intensity and interference post-treatment (Burns et al., 2014). However, this investigation involved an individual CBT intervention as opposed to a group intervention. Based on findings from previous examinations of TA, it was reasonable to predict that there would be a relationship between ratings of TA and outcome following a 12-week CBT program for the management of chronic pain. Results from the present study are in line with the literature that indicates higher levels of TA predicts better treatment outcomes (Castonguay et al., 2006). However, this finding was only observed in those participants who completed measures at all three time points (follow-up completers). We discovered that when participants rated the TA high, they also reported more self-control over their pain. When therapists rated TA as high, we observed that clients reported less catastrophizing over their pain. These findings are preliminary and require more support, but they imply that within this sample there is a relationship between TA and greater self-control over pain and less catastrophizing. If corroborated further, these findings may have implications for treatment providers with respect to the value of monitoring TA throughout the therapeutic process, and immediately addressing low ratings of TA made by both the client and the therapist.

It is not surprising that we discovered a discrepancy between the therapist and client ratings of TA, as previous research indicates that there is little relationship between therapist and client ratings of TA (Burns, Higdon, Mullen, Lansky, & Wei, 1999) and client ratings have been found to be superior predictors of outcome when compared to therapist ratings (Horvath & Symonds, 1991). The fact that clients who perceive the TA to be good show greater self-control

over pain is a valuable finding, as it the main goal of a CBT approach to managing chronic pain is to lessen a sense of helplessness, thereby increasing a sense of control over pain. Hence, the results may indicate that one variable that is influencing change in self-control is TA. Another possibility is that participants who rated TA higher were more engaged in treatment, leading them to feel they had a greater sense of control over their pain. Although the present study does not provide direct evidence for TA as a moderating or mediating variable in the relationship between CBT and change in self-control, it does support further investigation of the potential role TA may be playing in outcomes observed post-treatment. Results from the therapists' perspective indicate that TA may be an influencing factor over the change in clients' catastrophizing following a CBT intervention. It would be important to further clarify the role that TA may play in influencing outcomes following CBT-based group interventions. The present study provides direction for future research exploring the role of TA in the psychological treatment of chronic pain. Based on previous work in the field, it may be beneficial for future researchers to explore TA within the first few sessions rather than at the end of treatment. If we had explored TA at the beginning of the intervention, rather than only at termination, we may have discovered significant associations between additional outcome measures.

One other factor to consider for future research is the measure of TA that is utilized. The WAI-SR may be more relevant to measuring TA in an individual therapy session rather than in a group setting. The measure was chosen because it is used most often in comparable research and it demonstrates good psychometric properties. Yet, there would be value in exploring other measures that may be more conductive to group work. One possible measure is the Group Therapy Session Report (GTSR), which can be modified to capture TA (see Castonguay, Pincus, Agras, & Hines, 1998).

Supplementary Findings

It was necessary to examine compliance with homework in the present study, because homework assignments are an integral element of any CBT intervention (Kazantzis et al., 2000), and the literature tells us that engagement in treatment is related to better outcomes post-treatment (Burns & Spangler, 2000). To our knowledge, no previous investigation using a chronic pain population has explored homework compliance. Results obtained suggest that overall, the level of engagement of participants as perceived by both the participant and the therapist, is not related to treatment outcome. There was one interaction observed between level of engagement in treatment and outcome, and that was participants who were more engaged in treatment, as rated by the therapist, demonstrated greater change in pain catastrophizing which was a secondary outcome variable examined. It is interesting that this is the only significant finding that was observed, given previous research findings with other populations that have found homework compliance to be associated with better treatment outcomes overall. We may not have observed the same findings in the present study, given that there was weaker change in the variables examined from time 1 to time 2. If there was greater change observed in the outcome variables in general, we may have been able to determine if treatment compliance was a factor in the gains made. It is also possible that these findings are representative of the interaction between homework compliance and treatment outcome within the chronic pain population, and engagement in treatment may not play as strong of a role in treatment outcome.

With respect to the relationship between therapist and client ratings of compliance, previous studies have found there is a modest relationship between client and therapist ratings of homework compliance (Burns & Nolen-Hoeksema, 1991; Westra & Dozois, 2006), and it has been suggested that they are measuring different constructs (Westra & Dozois, 2006). In the

present study, the relationship between participant and therapist ratings of treatment compliance was greater than previous investigations ($r = 0.57$, $p < .001$), yet there was a difference observed in level of engagement in treatment and outcome depending upon who was making the rating. Perhaps, expectations for homework are different between clients and therapists. For example, the therapist may uphold a higher standard for completion of homework assignments, and clients may be satisfied with minimal efforts at completing homework, thereby rating their level of completion as higher than the therapist. Another possible explanation for the discrepancy between therapist and client measures of homework compliance is that although clients are reassured that their responses are anonymous, they may still be concerned about how they appear to the therapist, and thus rate their level of engagement at a higher level than it is.

It is worth noting that previous investigations that explored homework compliance in CBT were mostly across anxiety disorder populations. The present study is, to our knowledge, the first to examine homework compliance with a chronic pain population. Although the structure of a CBT intervention would be similar across populations, there may be additional factors that influence the practicality of engagement in treatment for those with chronic pain. For instance, if clients are battling unpredictable pain flare-ups, they may be physically unable to complete a homework assignment. The data obtained from the homework compliance scale was used to create categories of high and low homework completers. As such, this may restrict our understanding of the interaction between engagement in homework and outcomes following treatment as we are not looking at all data points simultaneously. More research is required to substantiate the findings observed in the present study.

Level of mindful behaviour was examined using the MAAS at the start and end of the group treatment, and results demonstrated that there were no significant changes observed. Given

that previous literature employing a mindfulness focus in treatment has been associated with more beneficial outcomes within chronic pain populations, it is interesting that we did not observe similar results in the present study. One of the reasons for the lack of findings may be due to an inadequate dosing of the mindfulness treatment employed. Previous studies have included an average of 8 sessions that focused solely on mindfulness education and practice (e.g., Morone et al., 2008; Zautra et al., 2008), whereas the present study only included 1.5 sessions.

Strengths and Limitations

There are both strengths and limitations to the present study that should be considered. One of the main limitations of the present study is the minimal changes observed post-treatment. Given that previous literature provides support for the efficacy of CBT within the chronic pain population, it is puzzling that our results were weak. It is important to note that the protocol employed in the present study diverged from a standard CBT protocol for the management of chronic pain, as it included components targeting AS as well as principles of mindfulness. Without having a comparison of the two protocols prior to initiation of this study, it is difficult to infer whether it was the standard CBT portion of the protocol or additional components which may have contributed to the minimal change observed. It is possible that the treatment protocol employed in the present study was ineffective at managing the outcome variables assessed. Another possible explanation for the minimal change observed is that given the main variables examined were fear of pain and AS, and the protocol devoted only one session of the 12-week program to targeting these variables, the dosing of the treatment was not sufficient. If there were more sessions targeting AS, and more practice of interoceptive exposure exercises, we may have observed greater change in these variables. However, prior to drawing any conclusions about the

intervention, it would be necessary to further examine the specific mechanisms of the intervention. Future investigations could use mediational analyses to isolate the mechanisms responsible for change. A second limitation of the present study is the lack of randomization of participants to the treatment and control groups. Without having a valid control group, it is difficult to interpret any change observed post-treatment, as we are unable to conclude that the change was due to the treatment itself. There was difficulty in recruitment and retention of participants, which may partly be due to factors related to the population itself (e.g., difficulty committing to weekly appointments due to uncertainty of pain levels, transportation issues, financial difficulties, increased vulnerability to illness), and also due to constraints involving clinic procedures (e.g., room space available for recruitment and running groups). These factors affected initial efforts to randomize participants to either the control or treatment group. For example, when there was limited time and space to run a group, but not enough participants recruited into the treatment group, the researchers decided to forego randomization in order to have enough participants to initiate the intervention. Although it is not ideal that there was a lack of randomization in the current study, the researchers believe that it is a reflection of practical concerns that arise when running a clinical trial. A third limitation that should be addressed is the measure used to assess functional impairment. Although the MPI is a commonly used, well validated, and reliable measure, it asks participants to rate their change in activity level since the time they first experienced chronic pain. As stated in the discussion section, participants' responses to this question may not necessarily reflect any change they experienced in their functional abilities over the course of treatment. A more accurate measurement would have been one that assessed recent change in functional impairment or one that assessed current level of functioning as opposed to change in functioning. Alternatively, an assessment from a health

professional, such as a physiotherapist or occupational therapist, may provide more accuracy in terms of level of physical functioning. Lastly, with respect to generalizability of the findings, the heterogeneity of the present sample is both a benefit and a hindrance. It is a hindrance in the sense that due to the variety of chronic pain conditions represented in the sample, it is difficult to determine whether the effects observed are applicable to all the subgroups or a select few. However, there is the possibility that because the sample is heterogeneous, the treatment effects observed do cut across a number of different chronic pain conditions.

There are some notable strengths of the present study, with the first being that the investigation was undertaken using a clinical sample. The value in obtaining a clinical sample is that the nuances of the chronic pain condition are accounted for. As such, the results that we observed in the present sample are more likely to represent what we would observe in other chronic pain patients. The challenge in obtaining a clinical sample is that there is more difficulty with recruitment efforts, which we observed in the present study. However, the benefits seem to outweigh the costs in the sense that the results obtained are more applicable to the presentations to be treated. This study is different from previous investigations, because it examined non-specific factors of treatment that have been overlooked in previous investigations of the treatment of chronic pain. One of the non-specific factors that was explored in the present study is TA. The literature tells us that TA plays an important role in treatment across a number of clinical presentations (see Castonguay et al., 2006; Horvath & Bedi, 2002). The examination of TA in the present study allows us to gain a deeper understanding of the role it plays within the chronic pain population, and will help guide future investigations looking at treatment outcome within this population. Another variable that has been overlooked within the chronic pain literature is homework compliance. The present study has addressed concerns raised by

investigators in the field who have stated that future work should investigate patients' adherence to treatment (Morley et al., 1999). Although there were minimal interactions observed between homework compliance and treatment outcome, this finding provides information that we did not have previously. The value in examining whether homework compliance and/or TA are influencing treatment outcome is that clinicians may benefit from assessing for engagement prior to enrollment in treatment, and potentially employing "pre-treatment" intervention that targets engagement level (e.g., motivational interviewing), or by tailoring their approach to treatment. To ensure treatment fidelity of the CBT protocol, there was a double-checking procedure in place, and results from the review indicated that there were no violations of the principles of the protocol. This is an added strength of the current project, as it provides greater confidence in the results obtained.

The present study has examined aspects of the psychological management of chronic pain conditions that previous work has neglected. Through examination of factors such as TA and homework compliance, there is a greater knowledge of the relationship these factors have with treatment outcome within this population. In terms of clinical utility, if the findings from the present study are validated through further investigation, it may be beneficial to monitor clients' ratings of TA throughout treatment and address any low ratings, as this may have an influence on treatment outcome. Further research is required prior to drawing any solid conclusions with respect to findings related to participants' engagement in treatment. Although some limitations are present, this project has clinical relevance for psychological interventions with the chronic pain population.

Conclusions and Future Directions

Overall, what we can take from the present study is that despite the challenges with randomization and group size, there were relationships observed between the CBT intervention and some important variables that were the focus of this investigation. Following the 12-week CBT program, participants of the present study reported reductions in their level of fear of pain, which was one of the main variables targeted. Further research is required to determine whether the change in fear of pain observed in the present study was directly related to the CBT intervention or other non-specific factors involved in being part of a group treatment (e.g., receiving validation, social aspects of a group format). The main hypothesis for the present study was that by targeting AS, we could indirectly reduce the level of functional impairment in those diagnosed with chronic pain. The results obtained did not support our main hypothesis. There is the possibility that the intervention requires modification to target variables of interest. One unique aspect of the present study is the examination of TA within the chronic pain population. It was discovered that TA is related to treatment outcome, in that the higher the level of TA, the more positive changes observed post-treatment on measures of self-control and catastrophizing for participants who completed outcome measures at all three time points. The lack of change observed in other outcome variables examined generates further inquiry as to whether these variables were not targeted by the CBT intervention. It is also possible that the theory proposing the role of AS in fear of pain and functional impairment may require re-evaluation. Perhaps targeting fear of pain directly would have led to greater change overall and higher levels of functioning.

Findings from the present study have not only provided new knowledge within the domain of managing chronic pain, but they have also offered direction for future investigations.

With the significant difference observed in the present study between groups on level of avoidance of activity, and with the level of avoidance being higher in the treatment group, it is necessary to obtain further support of this finding through future investigations. It would be interesting to examine potential confounding variables that may be playing a role in increasing chronic pain patients' avoidance behaviour. One possible factor is other treatment interventions that the patient is undergoing. Although we did assess for any changes in treatment throughout the study, it could be that those who exhibited an increase in avoidance behaviour were undergoing additional medical-based treatment that resulted in a decrease in activity level. Questions still remain regarding the relationship among the variables of AS, fear of pain, and functional impairment, and more research is required to clarify if these variables work together to influence the chronic pain patient, and whether targeting these variables through CBT is beneficial.

Future investigations would benefit from ensuring the randomization of participants and addressing the high attrition rate that was observed in the present sample, if applicable. In order to gain a clearer understanding of the reason for the high attrition, future studies could include a method of follow-up with participants who have dropped out as a way to gain qualitative data. This data may help with the development of strategies that will pre-empt some participants from discontinuing their participation in the study. Interestingly, most participants who dropped out of the present study did so prior to initiation of the intervention. It is possible that greater ability to accommodate participants in terms of financial compensation or providing transportation may help minimize some of the attrition rates observed. Investigators examining functional impairment may benefit from exploring tools that measure present impairment or level of current functioning. Hopefully, researchers will continue to explore the role of TA within the chronic

pain population. If so, it would be interesting to see whether measuring TA within the first few sessions as opposed to at the end of treatment would provide a difference in results observed in the present study. It may also be of benefit to explore measures of TA that are more relevant to group work rather than those used more for individual treatment. Some interesting directions for investigators may be to explore additional factors that may influence outcomes such as negative thought processes and level of self-efficacy in managing pain. It may also be of benefit to examine the dimensions of AS in future examinations of a similar nature. In such investigations, the use of the revised Anxiety Sensitivity Inventory – 3 (ASI-3) (Taylor et al., 2007) is suggested, as it has demonstrated valid and reliable three-factor structure. In addition, investigating potential mechanisms of change in future studies would clarify the components of an intervention that are responsible for outcomes observed.

References

Abrams, M.P., Carleton, R.N., & Asmundson, G.J.G. (2007). An exploration of the psychometric properties of the PASS-20 with a nonclinical sample. *Journal of Pain, 8* (11), 879-886. doi:10.1016/j.jpain.2007.06.004

Affleck, G., Tennen, H., Keefe, F.J., Lefebvre, J.C., Kashikar-Zuck, S., Wright, K., …Caldwell, D.S. (1999). Everyday life with osteoarthritis or rheumatoid arthritis: Independent effects of disease and gender on daily pain, mood and coping. *Pain, 83*, 601-609. doi:10.1016/S0304-3959(99)00167-0

American Psychiatric Association (APA). (2000). *The Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., text revision. Washington, DC: American Psychiatric Association.

Andersson, H.I. (2004). The course of non-malignant chronic pain: A 12-year follow-up of a cohort from the general population. *European Journal of Pain, 8*, 47-53. doi: 10.1016/S1090-3801(03)00064-8

Apkarian, A.V., Bushnell, M.C., Treede, R.D., & Zubieta, J.K. (2005). Human brain mechanisms of pain perception and regulation in health and disease. *European Journal of Pain, 9,* 463–484. doi:10.1016/j.ejpain.2004.11.001

Aslaksen, P.M., Myrbakk, I.N., Høifødt, R.S., & Flaten, M.A. (2007). The effect of experimenter gender on autonomic and subjective responses to pain stimuli. *Pain, 129,* 260–268. doi:10.1016/j.pain.2006.10.011

Asmundson, G.J.G., Coons, M.J., Taylor, S., & Katz, J. (2002). PTSD and the experience of pain: Research and clinical implications of shared vulnerability and mutual maintenance models. *The Canadian Journal of Psychiatry, 47*(10), 930-

937. Retrieved from http://ezproxy.lakeheadu.ca/login?url=http://search.proquest.com/docview/620095075?a countid=11956

Asmundson, G.J.G., Frombach, I. K., & Hadjistavropoulos, H.D. (1998). Anxiety sensitivity: Assessing factor structure and relationship to multidimensional aspects of pain in injured workers. *Journal of Occupational Rehabilitation*, *8*, 223–234. doi: 10.1023/A:1021382624491

Asmundson, G.J.G., & Katz, J. (2009). Understanding the co-occurrence of anxiety disorders and chronic pain: State-of-the-Art. *Depression and Anxiety, 26*, 888-901. doi: 10.1002/da.20600

Asmundson, G.J.G., Kuperos, J.L., & Norton, G.R. (1997). Do patients with chronic pain selectively attend to pain-related information: Preliminary evidence for the mediating role of fear. *Pain, 72*, 27–32. doi: 10.1016/S0304-3959(97)00010-9

Asmundson, G.J.G., & Norton, G.R. (1995). Anxiety sensitivity in patients with physically unexplained chronic back pain: A preliminary report. *Behaviour Research and Therapy, 33,* 771-777. doi: 10.1016/0005-7967(95)00012-M

Asmundson, G.J.G., Norton, P.J., & Norton, G.R. (1999). Beyond pain: The role of fear and avoidance in chronicity. *Clinical Psychology Review, 19*(1), 97–119. doi: 10.1016/S0272-7358(98)00034-8

Asmundson, G.J.G., & Taylor, S. (1996). Role of anxiety sensitivity in pain-related fear and avoidance. *Journal of Behavioral Medicine, 19*(6), 577-586. doi: 10.1007/BF01904905

Asmundson, G.J.G., Wright, K.D., & Hadjistavropoulos, H.D. (2000). Anxiety sensitivity and disabling chronic health conditions state of the art and future directions. Scandinavian *Journal of Behaviour Therapy, 29*(3-4), 100-117. doi: 10.1080/028457100300049719

Asmundson, G.J.G., Wright, K. D., & Hadjistavropoulos, H.D. (2005). Hypervigilance and attentional fixedness in chronic musculoskeletal pain: Consistency of findings across modified Stroop and dot-probe tasks. *Journal of Pain, 6*, 497–506. doi: 10.1016/j.jpain.2005.02.012

Banks, S.M., & Kerns, R.D. (1996). Explaining high rate of depression in chronic pain: A diathesis-stress framework. *Psychological Bulletin, 119,* 95–110. doi:10.1037/0033-2909.119.1.95

Basler, H.D., Jäkle, C., & Kröner-Herwig, B. (1997). Incorporation of cognitive behavioral treatment into the medical care of chronic low back patients: A controlled randomized study in German pain treatment centers. *Patient Education and Counselling, 31*(2), 113- 124. doi: 10.1016/S0738-3991(97)00996-8

Beck, A.T. (1976). *Cognitive therapy and the emotional disorders.* New York, NY: International Universities Press, Inc.

Beck, A.T., Steer, R.A., & Brown, G.K. (1996). *Manual for Beck Depression Inventory II*. San Antonio, TX: Psychological Corporation.

Bendelow, G. (1993). Pain perceptions, emotions and gender. *Sociology of Health & Illness, 15,* 273-294. doi:10.1111/1467-9566.ep10490526

Berkley, K.J. (1997). Sex differences in pain. *Behavioral and Brain Sciences, 20,* 371-380. doi:10.1017/S0140525X97221485

Birse, T.M., & Lander, J. (1998). Prevalence of chronic pain. *Canadian Journal of Public Health, 89,* 129-131. Retrieved from http://journal.cpha.ca/index.php/cjph/article/view/1045/1045

Boersma, K., Linton, S., Overmeer, T., Jansson, M., Vlaeyen, J., & de Jong, J. (2004). Lowering fear-avoidance and enhancing function through exposure in vivo: A multiple baseline study across six patients with back pain. *Pain, 108*, 8–16. doi:10.1016/j.pain.2003.03.001

Brown, K.W., & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822-848. doi: 10.1037/0022-3514.84.4.822

Buenaver, L.F., Edwards, R.R., Smith, M.T., Gramling, S.E., & Haythornthwaite, J.A. (2008). Catastrophizing and pain-coping in young adults: Associations with depressive symptoms and headache pain. *The Journal of Pain, 9,* 311-319. doi:10.1016/j.jpain.2007.11.005

Buhr, K., & Dugas, M.J. (2002). The intolerance of uncertainty scale: Psychometric properties of the English version. *Behaviour Research and Therapy*, *40*, 931-945. doi: 10.1016/S0005-7967(01)00092-4

Burns, D.B., & Spangler, D. L. (2000). Does psychotherapy homework lead to improvements in depression in cognitive-behavioral therapy or does improvement lead to increased homework compliance? *Journal of Consulting and Clinical Psychology*, *68*(1), 46–56. doi: 10.1037/0022-006X.68.1.46

Burns, D.D. & Nolen-Hoeksema, S. (1991). Coping styles, homework compliance and the effectiveness of cognitive-behavioral therapy. *Journal of Consulting and Clinical Psychology*, *59*(2), 305–311. doi: 10.1037/0022-006X.59.2.305

Burns, J.W., Higdon, L.J., Mullen, J.T., Lansky, D., & Wei, J.M. (1999). Relationships among patient hostility, anger expression, depression, and the working alliance in a work hardening program. *Annals of Behavioral Medicine, 21*(1), 77-82. Retrieved from: http://dx.doi.org.myaccess.library.utoronto.ca/10.1007/BF02895037

Burns, J.W., Johnson, B., Mahoney, N., Devine, J., & Pawl, R. (1998). Cognitive and physical capacity process variables predict long-term outcome after treatment of chronic pain. *Journal of Consulting and Clinical Psychology, 66,* 434–439. doi:10.1037/0022-006X.66.2.434

Burns, J.W., Nielson, W. R., Jensen, M. P., Heapy, A., Czlapinski, R., & Kerns, R. D. (2014). Specific and general therapeutic mechanisms in Cognitive Behavioral Treatment of chronic pain. *Journal of Consulting and Clinical Psychology*. Advance online publication. http://dx.doi.org/10.1037/a0037208

Calleo, J.S., Hart, J., Björgivnsson, T., & Stanley, M.A. (2010). Obsessions and worry beliefs in an inpatient OCD population. *Journal of Anxiety Disorders, 24*(8), 903-908. doi:10.1016/j.janxdis.2010.06.015

Cane, D., Nielson, W.R., McCarthy, M., & Mazmanian, D. (2013). Pain-related activity patterns: Measurement, interrelationships, and associations with psychosocial functioning. *Clinical Journal of Pain*, 29(5):435-442. doi: 10.1097/AJP.0b013e31825e452f.

Carleton, R.N., Abrams, M.P., Asmundson, G.J.G., Antony, M.M., & McCabe, R.E. (2009). Pain-related anxiety and anxiety sensitivity across anxiety and depressive

disorders. *Journal of Anxiety Disorders, 23*, 791–798. doi:10.1016/j.janxdis.2009.03.003

Carleton, R.N., Asmundson, G.J.G., Collimore, K.C., & Ellwanger, J. (2006). Strategic and automatic threat processing in chronic musculoskeletal pain: A startle probe investigation. *Cognitive Behaviour Therapy, 35*(4), 236-247. doi: 10.1080/16506070600898504

Carleton, R.N., Norton, M.A.P.J., & Asmundson, G.J.G. (2007). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders, 21*(1), 105-117. doi:10.1016/j.janxdis.2006.03.014

Castonguay, L. G., Constantino, M. J., & Holtforth, M.G. (2006). The working alliance: Where are we and where should we go? *Psychotherapy: Theory, Research, Practice, Training, 43*(3), 271-279. doi: 10.1037/0033-3204.43.3.271

Castonguay, L.G., Pincus, A.L., Agras, W.S., & Hines, C.E. (1998). The role of emotion in group Cognitive-Behavioral Therapy for binge eating disorder: When things have to feel worse before they get better. *Psychotherapy Research, 8*(2), 225-238. doi: 10.1080/10503309812331332327

Cho, S., Heiby, E.M., McCracken, L.M., Lee, S.M., & Moon, D.E. (2010). Pain-related anxiety as a mediator of the effects of mindfulness on physical and psychosocial functioning in chronic pain patients in Korea. *The Journal of Pain, 11*(8), 789-797. doi:10.1016/j.jpain.2009.12.006

Cohen, S., & Rodriguez, M.S. (1995). Pathways linking affective disturbances and physical disorders. *Health Psychology, 14*(5), 374-380. doi: 10.1037/0278-6133.14.5.374

Constantino, M.J., Castonguay, L. G., & Schut, A. J. (2002). The working alliance: A flagship for the scientist–practitioner model in psychotherapy. In G. S. Tryon (Ed.), *Counseling based on process research: Applying what we know* (pp. 81–131). Boston, MA: Allyn & Bacon.

Constantino, M.J., Manber, R., Ong, J., Kuo, T.F., & Huang, J.S. (2007). Patient expectations and therapeutic alliance as predictors of outcome in group Cognitive Behavioral Therapy for insomnia. *Behavioral Sleep Medicine, 5*(3), 210-228. doi: 10.1080/15402000701263932

Coons, M.J., Hadjistavropoulos, H.D., & Asmundson, G.J.G. (2004). Factor structure and psychometric properties of the Pain Anxiety Symptoms Scale-20 in a community physiotherapy clinic sample. *European Journal of Pain, 8*, 511–516. doi:10.1016/j.ejpain.2003.11.018

Crombez, G., Vlaeyen, J.W.S., Heuts, P.H.T.G., & Lysens, R. (1999). Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. *Pain, 80*, 329–339. doi: 10.1016/S0304-3959(98)00229-2

Crook, J., Rideout, E., & Browne, G. (1984). The prevalence of pain complaints in a general population. *Pain, 18,* 299-314. doi:10.1016/0304-3959(84)90824-8

Crossley, M.L., Nicolson, P., & Owens, G. (2001). Do we need to rethink health psychology? Commentaries on Crossley's "Do we need to rethink health psychology?" *Psychology,Health & Medicine, 6*(3), 243-265. doi: 10.1080/13548500123431

Cusens, B., Duggan, G.B., Thorne, K., & Burch, V. (2010). Evaluation of the Breathworks Mindfulness-Based Pain Management Programme: Effects on well-

being and multiple measures of mindfulness. *Clinical Psychology and Psychotherapy, 17,* 63-78. doi: 10.1002/cpp.653

de Jong, J.R., Vangronsveld, K., Peters, M.L., Goossens, M.E.J.B., Onghena, P., Bulté, I., & Vlaeyen, J.W.S. (2008). Reduction of pain-related fear and disability in post-traumatic neck pain: A replicated single-case experimental study of exposure in vivo. *The Journal of Pain, 9*(12), 1123-1134. doi: 10.1016/j.jpain.2008.06.015

Derakshan, N., & Eysenck, M.W. (1997). Depression and repressors: Theoretical and experimental approaches. *European Psychologist, 2*(3), 235-246. doi: 10.1027/1016-9040.2.3.235

Dersh, J., Polatin, P.B., & Gatchel, R.J. (2002). Chronic Pain and psychopathology: Research findings and theoretical considerations. *Psychosomatic Medicine, 64,* 773–786. doi:10.1097/01.PSY.0000024232.11538.54

Detweiler, J.B., & Whisman, M.A. (1999). The role of homework assignments in cognitive therapy for depression: Potential methods for enhancing adherence. *Clinical Psychology: Science and Practice*, *6*(3), 267–282. doi: 10.1093/clipsy.6.3.267

Drum, D. (1999). *The chronic pain management sourcebook*. Los Angeles: Lowell House.

Edwards, R.R., Haythornthwaitea, J.A., Sullivan, M.J., & Fillingim, R.B. (2004). Catastrophizing as a mediator of sex differences in pain: Differential effects for daily pain versus laboratory-induced pain. *Pain, 111,* 335–341. doi:10.1016/j.pain.2004.07.012

Elomaa, M.M., Williams, A.D., & Kalso, E.A. (2009). Attention management as a treatment for chronic pain. *European Journal of Pain, 13*, 1062–1067. doi:10.1016/j.ejpain.2008.12.002

Engel, G.L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196*, 129–136. doi: 10.1126/science.847460

Enthoven, P., Skargren, E., Carstensen, J., & Oberg, B. (2006). Predictive factors for 1 year and 5-year outcome for disability in a working population of patients with low back pain treated in primary care. *Pain, 122*(1-2), 137-144. doi: 10.1016/j.pain.2006.01.022

Evers, A.W.M, Kraaimaat, F.W., van Riel, P.L.C.M., & de Jong, A.J.L. (2002). Tailored cognitive-behavioral therapy in early rheumatoid arthritis for patients at risk: a randomized controlled trial. *Pain, 100*(1-2), 141-153. doi: 10.1016/S0304-3959(02)00274-9

Farmer Teh, C., Zaslavsky, A.M., Reynolds, C.F., & Cleary, P.D. (2010). Effect of depression treatment on chronic pain outcomes. *Psychosomatic Medicine, 72*, 61-67. doi: 10.1097/PSY.0b013e3181c2a7a8

Fillingim, R.B. (2003). Sex-related influences on pain: A review of mechanisms and clinicalimplications. *Rehabilitation Psychology, 48,* 165-174. doi:10.1037/0090-5550.48.3.165

Fisher, L.D., Dixon, D.O., Herson, J., Frankowski, R.K., Hearron, M.S., & Peace, K.E. (1990). Intention to treat in clinical trials. In K.E. Peace (ed). *Statistical issues in drug research and development* (pp. 331 – 350). New York: Marcel Dekker.

Fishman, S., & Berger, L. (2000). *The war on pain*. New York: HarperCollins Publishers.

Fordyce, W.E. (1976). *Behavioral methods for chronic pain and illness.* St. Louis: C.V. Mosby.

Fordyce, W.E., Fowler, R., & DeLateur, B. (1968). An application of behavior modification technique to a problem of chronic pain. *Behaviour Research and Therapy*, *6*, 105–107. doi: 10.1016/0005-7967(68)90048-X

Freeston, M.H., Rhéaume, J., Letarte, H., Dugas, M.J., & Ladouceur. R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802. doi:10.1016/0191-8869(94)90048-5

Gheldof, E.L.M, Crombez, G., Van den Bussche, E., Vinck, J., Van Nieuwenhuyse, A., Moens,...Vlaeyen, J.W.S. (2010). Pain-related fear predicts disability, but not pain severity: A path analytic approach of the fear-avoidance model. *European Journal of Pain, 14*, 870.e1-879.e9. doi:10.1016/j.ejpain.2010.01.003

Grotle, M., Brox, J.I., Veierød, M.B., Glomsrød, B., Lønn, J.H., & Vøllestad, N.K. (2005). Clinical course and prognostic factors in acute low back pain: Patients consulting primary care for the first time. *Spine, 30*(8), 976-982. doi: 10.1097/01.brs.0000158972.34102.6f

Gupta, S.K. (2011). Intention-to-treat concept: A review. *Perspectives in Clinical Research, 2*(3), 109 - 112. doi: 10.4103/2229-3485.83221

Hatcher, R.L., & Gillaspy, J.A. (2006). Development and validation of a revised short version of the Working Alliance Inventory. *Psychotherapy Research, 16*(1), 12-25. doi: 10.1080/10503300500352500

Haythornthwaite, J.A., Sieber, W.J., & Kerns, R.D. (1991). Depression and the chronic pain experience. *Pain, 46,* 177-184. doi:10.1016/0304-3959(91)90073-7

Hennekens, C.H., Buring, J.E., & Mayrent, S.L. (1987). *Epidemiology in Medicine*. Boston: Little, Brown.

Heritier, S.R., Gebski, V.J., & Keech, A.C. (2003). Inclusion of patients in clinical trial analysis: The intention-to-treat principle. *The Medical Journal of Australia, 179*(8), 438 - 440. Retrieved from: http://www.researchgate.net/publication/9050943_Inclusion_of_patients_in_clinical_tria_analysis_the_intention-to-treat_principle

Heuts, P.H.T.G, Vlaeyen, J.W.S., Roelofs, J., de Bie, R.A., Aretz, K., van Weel, C., & van Schayck, O.C.P. (2004). Pain-related fear and daily functioning in patients with osteoarthritis. *Pain, 110*, 228–235. doi:10.1016/j.pain.2004.03.035

Hoffman, B.M., Papas, R.K., Chatkoff, D.K., & Kerns, R.D. (2007). Meta-analysis of psychological interventions for chronic low back pain. *Health Psychology, 26*(1), 1-9. doi: 10.1037/0278-6133.26.1.1

Holzberg, A.D., Robinson, M.E., Geisser, M.E., & Gremillion, H.A. (1996). The effects of depression and chronic pain on psychosocial and physical functioning. *The Clinical Journal of Pain, 12,* 118-125. doi:10.1097/00002508-199606000-00006

Horvath, A.O., & Bedi, R.P. (2002). The alliance. In J. C. Norcross (Ed.), *Psychotherapy relationships that work: Therapists contributions and responsiveness to patients* (pp. 37-69). New York: Oxford University Press.

Horvath, A.O., & Greenberg, L.S. (1989). Development and validation of the working alliance inventory. *Journal of Counseling Psychology, 36*(2), 221-233. doi: 10.1037/0022-0167.36.2.223

Horvath, A.O., & Symonds, B.D. (1991). Relation between working alliance and outcome in psychotherapy: A meta-analysis. *Journal of Counseling Psychology, 38*(2), 139-149. doi: 10.1037/0022-0167.38.2.139

Huberty, C.J., & Morris, J.D. (1989). Multivariate analysis versus multiple univariate analyses. *Psychological Bulletin, 105*(2), 302-308. doi: 10.1037/0033-2909.105.2.302

Huppert, J.D., & Baker-Morissette, S.L. (2003). Beyond the manual: The insider's guide to panic control treatment. *Cognitive and Behavioral Practice*, *10*(1), 2–13. doi: 10.1016/S1077-7229(03)80003-2

International Association for the Study of Pain. (1986). Classification of Chronic Pain. *Pain, supplement 3,* S1-S226. doi:10.1016/0304-3959(77)90031-8

Iorio, C., Tsirgielis, C., Pawluk, E., Vermani, M., & Katzman, M.A. (2010, May). *The prevalence of psychiatric features within a chronic pain population*. Poster session presented at the Canadian Pain Society Annual Conference, Calgary, AB.

Iorio, C., Stone, S., Cane, D., Nielson, W.R. & Mazmanian, D. (2011, June). *A psychometric evaluation of the Patterns of Activity Measure –Pain*. Poster presented at the Canadian Psychological Association Annual Conference, Toronto, ON.

Jackson, T. (2007). Interpersonal transactions and responses to cold pressor pain among Australian women and men. *Sex Roles, 56*, 55 – 62. doi: 10.1007/s11199-006-9146-4

Jamison, R.N. (1996). *Mastering chronic pain: A professional's guide to behavioural treatment*. Sarasota, FL: Professional Resource Exchange, Inc.

Jann, M.J., & Slade, J.H. (2007). Antidepressant agents for the treatment of chronic pain and depression. *Pharmacotherapy, 27,* 1571-1587. doi:10.1592/phco.27.11.1571

Joel, C., Gérard, L., Francis, G., & Jacques, P. (2004). Prognosis and quality of life in patients with acute low back pain: Insights from a comprehensive inception cohort study. *Arthritis & Rheumatism: Arthritis Care & Research, 51*(2), 168-176. doi: 10.1002/art.20235

Jovey, R.D. (2005, November 8). Wait time alliance needs to consider pain, [Press Release]. Whitby: Canadian Pain Society.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress pain, and illness*. New York, NY: Bantam Dell.

Kállai, I., Barke, A., & Voss, U. (2004). The effects of experimenter characteristics on pain reports in women and men. *Pain, 112,* 142–147. doi:10.1016/j.pain.2004.08.008

Katz, J., & Melzack, R. (2001). The measurement of pain and the assessment of people experiencing pain. In D.C. Turk & R. Melzack (eds). *Handbook of pain assessment* (pp. 3-11). New York: Guilford Press.

Kazantzis, N., Deane, F. P., & Ronan, K. R. (2000). Homework assignments in cognitive and behavioral therapy: A meta-analysis. *Clinical Psychology: Science and Practice, 7,* 189-202. doi: 10.1093/clipsy.7.2.189

Keefe, F.J., Beaupre, P.M., Gil, K.M., Rumble, M.E., & Aspnes, A.K. (2002). Group therapy for patients with chronic pain. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp.234-255). New York, NY: Guilford Press.

Keefe, F.J., & Block, A.R. (1982). Development of an observation method for assessing pain behavior in chronic low back pain patients. *Behavior Therapy, 13,* 363-375. doi: 10.1016/S0005-7894(82)80001-4

Kennedy, C.E., Moore, P.J., Peterson, R.A., Katzman, M.A., Vermani, M., & Charmak, W.D. (2011). What makes people anxious about pain? How personality and perception combine to determine pain anxiety responses in clinical and non-clinical populations. *Anxiety, Stress & Coping: An International Journal, 24*(2), 179-200. doi: 10.1080/10615806.2010.493608

Keogh, E., & Asmundson, G.J.G. (2004). Negative affectivity, catastrophizing, and anxiety sensitivity. In G.J.G. Asmundson, J.W.S. Vlaeyen, & G. Crombez (Eds.), *Understanding and treating fear of pain* (pp. 3-24). New York, NY: Oxford University Press.

Keogh, E., Book, K., Thomas, J., Giddins, G., & Eccleston, C. (2010). Predicting pain and disability in patients with hand fractures: Comparing pain anxiety, anxiety sensitivity and pain catastrophizing. *European Journal of Pain, 14*, 446–451. doi:10.1016/j.ejpain.2009.08.001

Keogh, E., & Mansoor, L. (2001). Investigating the effects of anxiety sensitivity and coping on the perception of cold pressor pain in healthy women. *European Journal of Pain, 5*, 11- 25. doi: 10.1053/eujp.2000.0210

Keogh, E., Mounce, C., & Brosnan, M. (2007). Can a sexually dimorphic index of prenatal hormonal exposure be used to examine cold-pressor pain perception in men and women? *European Journal of Pain, 11,* 231–236. doi:10.1016/j.ejpain.2006.02.011

Kerns, R.D., Turk, D.C., & Rudy, T.E. (1985). The West Haven-Yale Multidimensional Pain Inventory (WHYMPI). *Pain, 23,* 345-356. doi:10.1016/0304-3959(85)90004-1

Kruse, R.L., Alper, B.S., Reust, C., Stevermer, J.J., Shannon, S., & Williams, R.H. (2002) Intention-to-treat analysis: Who is in? Who is out? *Journal of Family Practice, 51*(11), 969 - 971. Retrieved from: http://scholar.google.ca/scholar_url?url=http%3A%2F%2Fimn.gcnpublishing.com%2Ffieadmin%2Fjfp_archive%2Fpdf%2F5111%2F5111JFP_BriefReport1.pdf&hl=en&sa=T&oi=ggp&ct=res&cd=0&ei=FyTdVPeXHYHOqQGq1oHYDw&scisig=AAGBfm0mKKM4zXT-7GCpx-Pi3o5Qg2yGFw&nossl=1&ws=1366x631

Lang, A.J., Sorrell, J.T., Rodgers, C.S., & Lebeck, M.M. (2006). Anxiety sensitivity as a predictor of labor pain. *European Journal of Pain, 10*, 263–270. doi:10.1016/j.ejpain.2005.05.001

Latham, J., & Davis, B.D. (1994). The socioeconomic impact of chronic pain. *Disability and Rehabilitation, 16*(1), 39-44. doi: 10.3109/09638289409166435

Leahy, R. L. (2001). *Overcoming resistance in cognitive therapy*. New York: Guilford.

Lecrubier, Y., Sheehan, D.V., Weiller, E., Amorim, P., Bonora, I., Sheehan, K.H.,…Dunbar, G.C. (1997). The Mini International Neuropsychiatric Interview (M.I.N.I.). A short diagnostic structured interview: Reliability and validity according the CIDI. *European Psychiatry, 12,* 224-231. doi:10.1016/S0924-9338(97)83296-8

Lethem, J., Slade, P. D., Troup, J. D. G., & Bentley, G. (1983). Outline of a fear avoidance model of exaggerated pain perception - I. *Behaviour Research and Therapy*, *21*, 401–408. doi: 10.1016/0005-7967(83)90009-8

Levine, F., & De Simone, L. (1991). The effects of experimenter gender on pain report in male and female subjects, *Pain, 44,* 69–72. doi:10.1016/0304-3959(91)90149-R

Lowery, D., Fillingim, R.B., & Wright, R.A. (2003). Sex differences and incentive effects on perceptual and cardiovascular responses to cold pressor pain. *Psychosomatic Medicine, 65,* 284-291. doi:10.1097/01.PSY.0000033127.11561.78

Mailis-Gagnon, A., & Israelson, D. (2003). *Beyond pain: Making the mind body connection*. Toronto: Viking Canada.

Marquié, L., Raufaste, E., Lauque, D., Mariné, C., Ecoiffer, M., & Sorum, P. (2003). Pain rating by patients and physicians: Evidence of systematic miscalibration. *Pain, 102,* 289-296. doi:10.1016/S0304-3959(02)00402-5

McCarberg, B.H., & Passik, S.D. (2005). *Expert guide to pain management*. United States of America: American College of Physicians Press.

McCracken, L.M., & Dhingra, L. (2002). A short version of the Pain Anxiety Symptoms Scale (PASS-20): Preliminary development and validity. *Pain Research and Management, 7*(1), 45-50. Retrieved from http://www.pulsus.com/journals/pdf_frameset.jsp?jnlKy=7&atlKy=5022&isArt=t&jnlAdvert=Pain&adverifHCT=&sTitle=A short version of the Pain Anxiety Symptoms Scale (PASS-20): Preliminary development and validity, Pulsus Group Inc&HCtype=Physician

McCracken, L.M., Gauntlett-Gilbert, J., & Vowles, K.E. (2007). The role of mindfulness in a contextual cognitive-behavioral analysis of chronic pain-related suffering and disability. *Pain, 131*, 63-69. doi: 10.1016/j.pain.2006.12.013

McCracken, L.M., Gross, R.T., Aikens, J., & Carnrike Jr., C.L.M. (1996). The assessment of anxiety and fear in persons with chronic pain: A comparison of instruments. *Behaviour Research and Therapy, 34*(11/12), 927-933. doi: 10.1016/S0005-7967(96)00057-5

McCracken, L.M., & Thompson, M. (2009). Components of mindfulness in patients with chronic pain. *Journal of Psychopathology and Behavioral Assessment, 31*, 75–82. doi: 10.1007/s10862-008-9099-8

McCracken, L.M., Zayfert, C., & Gross, R.T. (1992). The pain anxiety symptoms scale: Development and validation of a scale to measure fear of pain. *Pain, 50*(1), 67-73. doi: 10.1016/0304-3959(92)90113-P

McEvoy, P.M., & Mahoney, A.E.J. (2011). Achieving certainty about the structure of intolerance of uncertainty in a treatment-seeking sample with anxiety and depression. *Journal of Anxiety Disorders, 25*(1), 112-122. doi:10.1016/j.janxdis.2010.08.010

McWilliams, L.A., Goodwin, R.D. & Cox, B.J. (2004). Depression and anxiety associated with three pain conditions: Results from a nationally representative sample. *Pain, 111*, 77–83. doi:10.1016/j.pain.2004.06.002

Meana, M., Cho, R., & DesMeules, M. (2004). Chronic pain: The extra burden on Canadian women. *BMC Women's Health, 4,* S17-SS28. doi:10.1186/1472-6874-4-S1-S17

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. *Pain, 1*, 277-299. doi: 10.1016/0304-3959(75)90044-5

Melzack, R. (2001). Pain and the neuromatrix in the brain. *Journal of Dental Education, 65*(12), 1378-1382. Retrieved from: http://www.jdentaled.org/content/65/12/1378.long

Melzack, R., & Wall, D. W. (1965). Pain mechanisms: A new theory. *Science, 19,* 971 979. doi:10.1126/science.150.3699.971

Miller, L.R., & Cano, A. (2009). Comorbid chronic pain and depression: Who is at risk? *The Journal of Pain, 10,* 619-627. doi:10.1016/j.jpain.2008.12.007

Moncrieff, J., Wessely, S., & Hardy, R. (2004). Active placebos versus antidepressants for depression. *Cochrane Database of Systematic Reviews, 1*, CD003012. doi: 10.1002/14651858.CD003012.pub2.

Morone, N.E., Greco, C.M., & Weiner, D.K. (2008). Mindfulness meditation for the treatment of chronic low back pain in older adults: A randomized controlled pilot study. *Pain, 134*, 310–319. doi: 10.1016/j.pain.2007.04.038

Morley, S., Eccleston, C., & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain, 80*, 1–13. doi: 10.1016/S0304-3959(98)00255-3

Morley, S., & Williams, A. (2002). Conducting and evaluating treatment outcome studies. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp.52-70). New York, NY: Guilford Press.

Morley, S., Williams, A., & Hussain, S. (2008). Estimating the clinical effectiveness of cognitive behavioural therapy in the clinic: Evaluation of a CBT informed pain management programme. *Pain, 137*(3), 670-680. doi: 10.1016/j.pain.2008.02.025

Moulin, D.E., Clark, A.J., Speechley, M, & Morley-Forster, P.K. (2002). Chronic pain in Canada: Prevalence, treatment, impact, and the role of opioid analgesia. Pain Research and Management, 7(4), 179-184. Retrieved from http://www.pulsus.com /journals/pdf_frameset.jsp?jnlKy=7&atlKy=4466&isArt=t&jnlAdvert=Pain&ad erifHCTp=&sTitle=hronic pain in Canada - Prevalence, treatment, impact and the role of opioid analgesia, Pulsus Group Inc&HCtype=Physician

Munder, T., Wilmers, F., Leonhart, R., Linster, H.W., & Barth, J. (2010). Working Alliance Inventory-Short Revised (WAI-SR): Psychometric properties in outpatients and inpatients. *Clinical Psychology & Psychotherapy, 17*(3), 231-239. doi: 10.1002/cpp.658

Nakagawa, S. (2004). A farewell to Bonferroni: The problems of low statistical power and publication bias. *Behavioral Ecology, 15*(6), 1044–1045. doi:10.1093/beheco/arh107

Nayak, S., Shiflett, S.C., Eshun, S., & Levine, F.M. (2000). Culture and gender effects in pain beliefs and the prediction of pain tolerance. *Cross-Cultural Research, 34,* 135-151. doi: 10.1177/106939710003400203

Newton-John, T.R., & Geddes, J. (2008). The non-specific effects of group-based cognitive behavioural treatment of chronic pain. *Chronic Illness, 4*(3), 199-208. doi: 10.1177/1742395308091868

Norris, V.M. (2000). Assessment of pain. In M. Munafo & J. Trim (Eds.), *Chronic pain: A handbook for nurses* (pp. 10-26). London, England: Reed Educational and Professional Publishing Ltd.

Norton, P.J., & Asmundson, G.J.G. (2004). Anxiety sensitivity, fear, and avoidance behavior in headache pain. *Pain, 111*, 218–223. doi:10.1016/j.pain.2004.06.018

Novy, D.M., Nelson, D.V., Francis, D.J., & Turk, D.C. (1995). Perspectives of chronic pain: An evaluative comparison of restrictive and comprehensive models. *Psychological Bulletin, 118,* 238-247. doi:10.1037/0033-2909.118.2.238

Öhman, M., & Söderberg, S. (2004). The experiences of close relatives living with a person with serious chronic illness. *Qualitative Health Research, 14*(3), 396-410. doi: 10.1177/1049732303261692

Olthuis, J.V., Watt, M.C., Mackinnon, S.P., Potter, S.M, & Stewart, S.H. (2015). The nature of the association between anxiety sensitivity and pain-related anxiety: Evidence from correlational and intervention studies, *Cognitive Behaviour Therapy, 44*(5), 423-440. doi: 10.1080/16506073.2015.1048823

Osman, A., Barrios, F., Gutierrez, P.M., Kopper, B.A., Merrifield, T., & Grittmann, L. (2000). The Pain Catastrophizing Scale: Further psychometric evaluation with adult samples. *Journal of Behavioral Medicine, 23,* 351-365. doi:10.1023/A:1005548801037

Osman, A., Downs, W.R., Barrios, F.X., Kopper, B.A., Gutierrez, P.M., & Chiros, C.E. (1997). Factor Structure and psychometric characteristics of the Beck Depression Inventory-II. *Journal of Psychopathology and Behavioral Assessment, 19,* 359-376. doi:10.1007/BF02229026

Otis, J.D. (2007). *Managing chronic pain: A cognitive-behavioral therapy approach*. New York, NY: Oxford University Press, Inc.

Peterson, R.A., & Reiss, S. (1993). *Anxiety Sensitivity Index Revised test manual*. Worthington, OH: IDS Publishing.

Philips, H.C., & Jahanshahi, M. (1985). Chronic pain: An experimental analysis of the effects of exposure. *Behaviour Research and Therapy, 23*(3), 281-290. doi: 10.1016/0005-7967(85)90006-3

Plehn, K., Peterson, R.A., & Williams, D.A. (1998). Anxiety sensitivity: Its relationship to functional status in patients with chronic pain. *Journal of Occupational Rehabilitation,8*(3), 213-222. doi: 1053-0487/98/0900-021

Polatin, P.B., Kinney, R.K., Gatchel, R.J., Lillo, E., & Mayer, T.G. (1993). Psychiatric illness and chronic low back pain. The mind and the spine - Which goes first? *Spine, 18,* 66–71. doi: 10.1097/00007632-199301000-00011

Reid, M.C., Otis, J., Barry, L.C., & Kerns, R.D. (2003). Cognitive-behavioral therapy for chronic low back pain in older persons: A preliminary study. *Pain Medicine, 4*(3), 223-230. doi: 10.1046/j.1526-4637.2003.03030.x

Reiss, S. (1991). Expectancy model of fear, anxiety, and panic. *Clinical Psychology Review, 11*, 141–153. doi: 10.1016/0272-7358(91)90092-9

Reiss, S., & McNally, R. J. (1985). Expectancy model of fear. In S. Reiss & R. R. Bootzin (Eds.), *Theoretical issues in behavior therapy* (pp. 107-121). San Diego: Academic Press.

Reiss, S., Peterson, R.A., Gursky, D.M., & McNally, R.J. (1986). Anxiety sensitivity, anxiety frequency and the prediction of fearfulness. *Behaviour Research and Therapy, 24*(1), 1-8. doi: 10.1016/0005-7967(86)90143-9

Richardson, I.H., Richardson, P.H., Williams, A.C.C., Featherstone, F., & Harding, V.R. (1994). The effects of a cognitive-behavioural pain management programme on the quality of work and employment status of severely impaired chronic pain patients. *Disability and Rehabilitation, 16*(1), 26-34. doi:10.3109/09638289409166433

Riley, J.L., Robinson, M.E., & Geisser, M.E. (1999). Empirical subgroups of the Coping Strategies Questionnaire - Revised: A multisample study. *Clinical Journal of Pain, 15,* 111-116. doi:10.1097/00002508-199906000-00007

Riley, J. L., Robinson, M. E., Wise, E. A., & Price, D. D. (1999). A meta-analytic review of pain perception across the menstrual cycle. *Pain, 81*, 225–235. doi:10.1016/S0304-3959(98)00258-9

Rothman, K.J. (1990). No adjustments are needed for multiple comparisons. *Epidemiology, 1*(1), 43-46. Retrieved from http://www.jstor.org/stable/20065622

Rosenstiel, A.K., & Keefe, F.J. (1983). The use of coping strategies in chronic low back pain patients: Relationship to patient characteristics and current adjustment. *Pain, 17(1),* 33-44. doi:10.1016/0304-3959(83)90125-2

Sams, T. (2006). *ABC's of pain relief and treatment: Advances, breakthroughs and choices*. Lincoln, NE: iUniverse.

Sanderson, P.L., Todd, B.D., Holt, G.R., & Getty, C.J.M. (1995). Compensation, work status, and disability in low back pain patients. *Spine, 20*(5), 554-556.

doi: 10.1097/00007632-199503010-00009

Scascighini, L., Toma, V., Dober-Spielmann, S., & Sprott, H. (2008). Multidisciplinary treatment for chronic pain: A systematic review of interventions and outcomes. *Rheumatology, 47*, 670–678. doi: :10.1093/rheumatology/ken021

Schneider J.P. (2004). *Living with chronic pain: The complete health guide to the causes and treatment of chronic pain*. Long Island City, NY: Hatherleigh Press, Inc.

Schoenbaum, M., Unützer, J., McCaffrey, D., Duan, N., Sherbourne, C., & Wells, K.B. (2002). The effects of primary care depression treatment on patients' clinical status and employment. *Health Services Research, 37*(5), 1145-1158. doi: 10.1111/1475-6773.01086

Schreiber, S., & Galai-Gat, T. (1993). Uncontrolled pain following physical injury as the core trauma in post-traumatic stress disorder. *Pain, 54*, 107-110. doi: 10.1016/0304-3959(93)90105-X

Schütze, R., Rees, C., Preece, M., & Schütze, M. (2010). Low mindfulness predicts pain catastrophizing in a fear-avoidance model of chronic pain. *Pain, 148*, 120–127. doi:10.1016/j.pain.2009.10.030

Selye, H. (1950). *The physiology and pathology of exposure to stress: A treatise based on the concepts of the general-adaptation-syndrome and the diseases of adaptation*. Montreal: Acta, Inc.

Sharp, T.J. (2001). Chronic pain: A reformulation of the cognitive-behavioural model. *Behaviour Research and Therapy, 39*(7), 787–800. doi: 10.1016/S0005-7967(00)00061-9

Sharp, T.J., & Harvey, A.G. (2001). Chronic pain and posttraumatic stress disorder: Mutual maintenance? *Clinical Psychology Review, 21*(6), 857-877. doi: 10.1016/S0272-7358(00)00071-4

Sheehan, D.V., Lecrubier, Y., Sheehan, K.H., Janavs, J., Weiller, E., Keskiner, A.,…Dunbar, G. (1997). The validity of the Mini International Neuropsyciatric Interview (M.I.N.I.) according to the SCID-P and its reliability. *European Psychiatry, 12,* 232-241. doi:10.1016/S0924-9338(97)83297-X

Steiner, M., Steinberg, S., Stewart, D., Carter, D., Berger, C., Reid, R., … Streiner, D. (1995). Fluoxetine in the treatment of premenstrual dysphoria. *The New England Journal of Medicine, 332*(23), 1529 - 1534. doi: 10.1056/NEJM199506083322301

Streiner, D.L. (2008). Missing data and the trouble with LOCF. *Evidence Based Mental Health, 11,* 3 - 5. doi:10.1136/ebmh.11.1.3-a

Streiner, D., & Geddes, J. (2001). Intention to treat analysis in clinical trials when there are missing data. *Evidence Based Mental Health, 4*, 70 – 71. doi: 10.1136/ebmh.4.3.70

Streiner, D.L., & Norman, G.R. (2011). Correction for multiple testing: Is there a resolution? *Chest, 140*, 16-18. doi: 0.1378/chest.11-0523

Strunin, L., & Boden, L.I. (2004). Family consequences of chronic back pain. *Social Science & Medicine, 58*, 1385–1393. doi: 10.1016/S0277-9536(03)00333-2

Sullivan, M.J.L., Bishop, S.R., & Pivik, J. (1995). The pain catastrophizing scale: Development and validation. *Psychological Assessment, 7,* 524-532. doi:10.1037/1040-3590.7.4.524

Sullivan, M.J.L., Reesor, K., Mikail, S., & Fisher, R. (1992). The treatment of depression in chronic low back pain: Review and recommendations. *Pain, 50*(1), 5-13.

doi: 10.1016/0304-3959(92)90107-M

Sullivan, M.D., & Turk, D.C. (2001). Psychiatric illness, depression, and psychogenic pain. In J.D. Loeser, S.H. Butler, C.R. Chapman, & D.C. Turk (Eds.), *Bonica's management of pain, third edition* (pp.483-500). Philadelphia: Lippincott.

Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics, 5th edition*. Boston: Allyn & Bacon.

Taylor, S., Zvolensky, M.J., Cox, B.J., Deacon, B., Heimberg, R.G., Ledley, D.R., . . . , & Cardenas, S.J. (2007). Robust dimensions of anxiety sensitivity: Development and initial validation of the Anxiety Sensitivity Index - 3. *Psychological Assessment, 19*, 176–188. doi: 10.1037/1040-3590.19.2.176

Thomas, E., Silman, A.J., Croft, P.R., Papageorgiou, A.C., Jayson, M.IV., & Macfarlane, G.J. (1999). Predicting who develops chronic low back pain in primary care: A prospective study. *British Medical Journal, 318*(7199), 1662–1667. doi: 10.1136/bmj.318.7199.1662

Thorn, B.E., & Kuhajda, M.C. (2006). Group cognitive therapy for chronic pain. *Journal of Clinical Psychology: In Session, 62*(11), 1355-1366. doi: 10.1002/jclp.20315

Thorn, B.E., Pence, L.B., Ward, L.C., Kilgo, G., Clements, K.L., Cross, T.H., ... Tsui, P.W. (2007). A randomized clinical trial of targeted cognitive behavioural treatment to reduce catastrophizing in chronic headache sufferers. *The Journal of Pain, 8*(12), 938-949. doi: 10.1016/j.jpain.2007.06.010

Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the Working Alliance Inventory. *Psychological Assessment, 1*, 207-210. doi: 10.1037/1040-3590.1.3.207

Tsang, A., Von Korff, M., Lee, S., Alonso, J., Karam, E., Angermeyer, M.C.,…Watanabe, M.(2008). Common chronic pain conditions in developed and developing countries: Gender and age differences and comorbidity with depression-anxiety disorders. *The Journal of Pain, 9,* 883-891. doi:10.1016/j.jpain.2008.05.00

Tunks, E.R., Crook, J., & Weir, R. (2008). Epidemiology of chronic pain with psychological comorbidity: Prevalence, risk, course and prognosis. *Canadian Journal of Psychiatry, 53,* 224 -234. Retrieved from http://ezproxy.qa.proquest. com.myaccess.library.utoronto.ca/ docview/621973649?accountid=14771

Turk, D.C. (1996). Cognitive factors in chronic pain and disability. In K.S. Dobson & K.D. Craig (Eds.), *Advances in cognitive behavioural therapy* (pp.83-115). Thousand Oaks, CA: Sage Publications.

Turk, D.C. (2002). A cognitive-behavioural perspective on treatment of chronic pain patients. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp.138-158). New York, NY: Guilford Press.

Turk, D.C., & Genest, M. (1979). Regulation of pain: The application of cognitive and behavioural techniques for prevention and remediation. In P.C. Kendall & S.D. Hollon (Eds.), *Cognitive behavioural interventions: Theory, research, and procedures* (pp. 287-318). New York, NY: Academic Press, Inc.

Turk, D.C., Loeser, J.D., & Monarch, E.S. (2002). Chronic pain: Purposes and costs of interdisciplinary pain rehabilitation programs. *TEN, 4,* 64-69.Retrieved from http://www.medworksmedia.com/pdf/reprints/0202%20TEN%20Turk%203.6.pdf

Turk, D.C, Meichenbaum, D., & Genest, M. (1983). *Pain and behavioral medicine: A cognitive behavioral perspective.* New York, NY: The Guilford Press.

Turk, D.C., & Melzack, R. (2011). The measurement of pain and the assessment of people experiencing pain. In D.C. Turk & R. Melzack (Eds.), *Handbook of pain assessment* (pp. 3-18). New York, NY: The Guilford Press.

Turk, D.C., & Monarch, E.S. (2002). Biopsychosocial perspective on chronic pain. In D.C. Turk & R.J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp.3-51). New York, NY: Guilford Press.

Turk, D.C., & Rudy, T. (1987). Towards a comprehensive assessment of chronic pain. *Behaviour Research & Therapy, 25,* 237-249. doi:10.1016/0005-7967(87)90002-7

Turk, D.C., Swanson, K.S., & Tunks, E.R. (2008). Psychological approaches in the treatment of chronic pain patients-When pills, scalpels, and needles are not enough. *Canadian Journal of Psychiatry, 53*(4), 213-223. Retrieved from: http://myaccess.library.utoronto.ca/login?url=http://search.proquest.com.myaccess.library.utoronto.ca/docview/222846903?accountid=14771

Turner, J.A., Mancl, L., & Aaron, L.A. (2006). Short- and long-term efficacy of brief cognitive behavioral therapy for patients with chronic temporomandibular disorder pain: A randomized, controlled trial. *Pain, 121*(3), 181–194. doi: 10.1016/j.pain.2005.11.017

Turner-Stokes, L., Erkeller-Yuksel, F., Miles, A., Pincus, T., Shipley, M., & Pearce, S. (2003). Outpatient cognitive behavioral pain management programs: A randomized comparison of a group-based multidisciplinary versus an individual

therapy model. *Archives of Physical Medicine and Rehabilitation, 84*(6), 781-788. doi: 10.1016/S0003-9993(03)00015-7

Uman, L.S., Stewart, S.H., Watt, M.C., & Johnston, A. (2006). Differences in high and low anxiety sensitive women's responses to a laboratory-based cold pressor task. *Cognitive Behaviour Therapy, 35*(4), 189–197. doi: 10.1080/16506070600898512

Unruh, A.M. (1996). Gender variations in clinical pain experience. *Pain, 65,* 123-167. doi:10.1016/0304-3959(95)00214-6

van der Kolk, B.A., Pelcovitz, D., Roth, S., Mandel, F.S., McFarlane, A., & Herman, J.L. (1996). Dissociation, somatization, and affect dysregulation: The complexity of adaption to trauma. *American Journal of Psychiatry, Suppl 153*(7), 83-93. Retrieved from http://ezproxy.lakeheadu.ca/login?url=http://search.proquest.com/docview/618794479?Accountid=11956

Vlaeyen, J.W.S., de Jong, J., Geilen, M., Heuts, P.H.T.G., & van Breukelen, G. (2001). Graded exposure in vivo in the treatment of pain-related fear: A replicated single case experimental design in four patients with chronic low back pain. *Behavioural Research and Therapy, 39*, 151–166. doi: 10.1016/S0005-7967(99)00174-6

Vlaeyen, J.W.S., de Jong, J.R., Onghena, P., Kerckhoffs-Hanssen, M., & Kole-Snijders, A.M.J. (2002). Can pain related fear be reduced? The application of cognitive behavioural exposure in vivo. *Pain Research and Management, 7*(3), 144-153. Retrieved from http://ezproxy.qa.proquest.com.myaccess.library.utoronto.ca/docview/619788029?accoutid=14771

Von Korff, M., & Dunn, K.M. (2008). Chronic pain reconsidered. *Pain, 138,* 267-276. doi:10.1016/j.pain.2007.12.010

Von Korff, M., Dworkin, S.F., & Le Resche, L. (1990). Graded chronic pain status: An epidemiologic evaluation. *Pain, 40,* 279-291. doi:10.1016/0304-3959(90)91125-3

Waddell, G., Newton, M., Henderson, I., Somerville, D., & Main, C.J. (1993). A Fear Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain, 52,* 157-168. doi: 10.1016/0304-3959(93)90127-B

Ware, J.E.J., & Sherbourne, C.D. (1992). The MOS 36-item Short-Form Health Survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30*, 473-483. doi: 10.1097/00005650-199206000-00002

Watt, M.C., Stewart, S. H., Conrod, P., & Schmidt, N. B. (2008). Personality-based approaches to treatment of co-morbid anxiety and substance use disorder. In S. H. Stewart, & P. Conrod (Eds), *Co-morbid Anxiety and Substance Use Disorders: Theoretical and Treatment Issues*. New York, NY: Springer.

Watt, M.C., Stewart, S.H., Lefaivre, M.J., & Uman, L.S. (2006). A brief cognitive behavioral approach to reducing anxiety sensitivity decreases pain-related anxiety. *Cognitive Behaviour Therapy, 35*(4), 248-256. doi: 10.1080/16506070600898553

West, C., Usher, K., Foster, K., & Stewart, L. (2012). Chronic pain and the family: The experience of the partners of people living with chronic pain. *Journal of Clinical Nursing, 21*, 3352–3360. doi: 10.1111/j.1365-2702.2012.04215.x

Westra, H.A., & Dozois, D.J.A. (2006). Preparing clients for Cognitive Behavioral Therapy: A randomized pilot study of motivational interviewing for anxiety. *Cognitive Therapy and Research, 30*, 481–498. doi:10.1007/s10608-006-9016-y

Westra, H.A., Dozois, D.J.A., & Marcus, M. (2007). Expectancy, homework compliance, and initial change in Cognitive–Behavioral Therapy for anxiety. *Journal of Consulting and Clinical Psychology, 75*(3), 363–373. doi:10.1037/0022-006X.75.3.363

White, K.S., Raffa, S.D., Jakle, K.R., Stoddard, J.A., Barlow, D.H., Brown, T.A.,…Gervino, E.V. (2008). Morbidity of DSM-IV Axis I disorders in patients with noncardiac chest pain: Psychiatric morbidity linked with increased pain and health care utilization. *Journal of Consulting and Clinical Psychology, 76,* 422- 430. doi:10.1037/0022-006X.76.3.422

Wijnhoven, H.A.H., de Vet, H.C.W., & Picavet, H.S.J. (2006). Prevalence of musculoskeletal disorders is systematically higher in women than in men. *Clinical Journal of Pain, 22,* 717-724. doi:10.1097/01.ajp.0000210912.95664.53

Williams, R.C. (1988). Toward a set of reliable and valid measures for chronic pain assessment and outcome research. *Pain, 35*(3), 239-251. doi: 10.1016/0304-3959(88)90133-9

Woby, S.R., Watson, P.J., Roach, N.K., & Urmston, M. (2004). Adjustment to chronic low back pain—the relative influence of fear-avoidance beliefs, catastrophizing, and appraisals of control. *Behaviour Research and Therapy, 42*, 761–774. doi:10.1016/S0005-7967(03)00195-5

Woods, M.P., & Asmundson, G.J.G. (2008). Evaluating the efficacy of graded in vivo exposure for the treatment of fear in patients with chronic back pain: A randomized controlled clinical trial. *Pain, 136*, 271–280. doi:10.1016/j.pain.2007.06.037

Yalom, I.D., & Leszcz, M. (2005). *The theory and practice of group psychotherapy*. New York, NY: Basic Books.

Zautra, A.J., Davis, M.C., Reich, J.W., Nicassio, P., Tennen, H., Finan, P., ... & Irwin, M.R. (2008). Comparison of cognitive behavioral and mindfulness meditation interventions on adaptation to rheumatoid arthritis for patients with and without history of recurrent depression. *Journal of Consulting and Clinical Psychology, 76*(3), 408–421. doi: 10.1037/0022-006X.76.3.408

Zigmond, A.S., & Snaith, R.P. (1983). "The hospital anxiety and depression scale". *Acta Psychiatrica Scandinavica*, *67*(6), 361–370. doi: 10.1111/j.1600-0447.1983.tb09716.x

Zinbarg, R. E., Barlow, D. H., & Brown, T. (1997). The hierarchical structure and general factor saturation of the Anxiety Sensitivity Index: evidence and implications. *Psychological Assessment*, *9*, 277–284. doi: 10.1037/1040-3590.9.3.277

Table 1

Demographic Characteristics by Sex and Pooled Sample

Demographic characteristics	Men *(n = 20)*	Women *(n =43)*	Pooled sample *(N = 63)*
Age (years)	*M* = 50.25 (*SD* = 9.28)	*M* = 49.72 (*SD* = 10.72)	*M* = 49.89 (*SD* = 10.21)
Age range (years)	31-64	25-64	25-64
Marital status (frequency)			
Single	5 (25.50%)	9 (20.90%)	14 (22.20%)
Cohabiting	4 (20.00%)	5 (11.60%)	9 (14.30%)
Widowed	0 (0%)	2 (4.70%)	2 (3.20%)
Married	5 (25.50%)	17 (39.50%)	22 (34.90%)
Divorced/Separated	6 (30.00%)	10 (23.30%)	16 (25.40%)
Highest education level (frequency)			
Elementary	0 (0%)	5 (11.60%)	5 (8.10%)
High school	3 (15.80%)	2 (4.70%)	5 (8.10%)
Some Post-secondary	2 (10.50%)	9 (20.90%)	11 (17.70%)
College degree	10 (52.60%)	17 (39.50%)	27 (43.50%)
Bachelor degree	1 (5.30%)	6 (14.00%)	7 (11.30%)
Master's degree	1 (5.30%)	3 (7.00%)	4 (6.50%)
PhD degree	2 (10.50%)	1 (2.30%)	3 (4.80%)
Ethnicity (frequency)			
Caucasian/European	16 (84.20%)	35 (81.40%)	51 (82.30%)
African	1 (5.30%)	0 (0%)	1 (1.60%)
West Asian	1 (5.30%)	0 (0%)	1 (1.60%)
Caribbean	1 (5.30%)	0 (0%)	2 (3.20%)
East Asian	0 (0%)	4 (9.30%)	4 (6.50%)
Filipino	0 (0%)	1 (2.30%)	1 (1.60%)
Latin American/Hispanic	0 (0%)	1 (2.30%)	1 (1.60%)
Other	0 (0%)	1 (2.30%)	1 (1.60%)

Note: The pooled sample is reflective of the 63 participants who completed the demographic questionnaire and does not include the 33 participants that dropped out of the study prior to or following completion of the MINI Plus structured clinical interview. *(continued)*

Table 1 (*continued*)

Demographic characteristics	Men *(n = 23)*	Women *(n = 43)*	Pooled sample *(N=63)*
Annual family income			
$10,000 – $20,000	5 (26.30%)	14 (35.00%)	19 (32.20)
$20,001 – $40,000	5 (26.30%)	5 (12.50%)	10 (16.90%)
$40,001 – $60,000	3 (15.80%)	7 (17.50%)	10 (16.90%)
$60,001 – $80,000	0 (0%)	7 (17.50%)	7 (11.90%)
$80,001 – $100,000	5 (26.30%)	2 (5.00%)	7 (11.90%)
> $100,000	1 (5.30%)	5 (12.50%)	6 (10.20%)
Employment status			
Working/school f/t	3 (15.80%)	2 (4.80%)	5 (8.20%)
Working/school p/t	3 (15.80%)	5 (11.90%)	8 (13.10%)
Work within the home	0 (0%)	1 (2.40%)	1 (1.60%)
Unemployed/not in school	2 (10.50%)	10 (23.80%)	12 (19.70%)
Temporarily not able to go to work/school	8 (42.10%)	17 (40.50%)	25 (41.00%)
Retired	3 (15.80%)	7 (16.70%)	10 (16.40%)
Receiving Disability Benefits			
WSIB	2 (10.50%)	2 (4.80%)	4 (6.60%)
Any Disability	7 (38.90%)	19 (45.20%)	26 (43.30%)
Involved in Litigation			
Yes	5 (29.40%)	12 (30.00%)	17 (29.80%)
Previous Individual Counselling			
Unrelated to Pain	8 (42.10%)	26 (60.50%)	34 (54.80%)
Related to Pain	5 (26.30%)	21 (48.80%)	26 (41.90%)
Previous Group Counselling			
Unrelated to Pain	8 (42.10%)	16 (38.10%)	24 (39.30%)
Related to Pain	5 (26.30%)	12 (27.90%)	17 (27.40%)
Pain Medication			
Yes	11 (55.00%)	26 (60.5%)	37 (58.70%)

Table 2

Frequency of Psychological Disorders as Assessed with the M.I.N.I Structured Clinical Interview

Psychological Disorders	Men *(n = 20)*	Women *(n =43)*	Pooled sample *(N=95)*
Mood Disorders			
Major Depressive Disorder (Current)	6 (30.00%)	8 (18.60%)	20 (21.10%)
Major Depressive Disorder (Past)	8 (40.00%)	15 (34.90%)	36 (37.90%)
Major Depressive Disorder (Recurrent)	4 (20.00%)	4 (9.30%)	13 (13.70%)
Major Depressive Disorder (with Melancholic Features)	5 (25.00%)	3 (7.00%)	10 (10.50%)
Major Depressive Disorder (with Atypical Features)	0 (0%)	1 (2.30%)	2 (2.10%)
Dysthymia (Current)	7 (35.00%)	15 (34.90%)	31 (32.60%)
Dysthymia (Past)	4 (20.00%)	1 (2.30%)	6 (6.30%)
Bipolar 1 (Current)	1 (5.00%)	0 (0%)	1 (1.10%)
Bipolar 1 (Past)	0 (0%)	1 (2.30%)	1 (1.10%)
Bipolar 2 (Current)	0 (0%)	1 (2.30%)	1 (1.10%)
Bipolar 2 (Past)	0 (0%)	0 (0%)	0 (0%)
Bipolar NOS	0 (0%)	1 (2.30%)	3 (3.20%)
Anxiety Disorders			
Panic Disorder (Current)	2 (10.00%)	3 (7.00%)	7 (7.40%)

Note: One participant did not complete the MINI Plus, and therefore the total sample for the table is 95. The breakdown of men and women totals 63 participants, as there were 32 participants that dropped out of the study following completion of the MINI Plus. *(continued)*

Table 2 *(continued)*

Psychological Disorders	Men *(n = 20)*	Women *(n =43)*	Pooled sample *(N=95)*
Panic Disorder (Lifetime)	3 (15.00%)	9 (20.90%)	23 (24.20%)
Panic Disorder (Limited Symptoms)	1 (5.00%)	5 (11.60%)	8 (8.40%)
Agoraphobia (Current)	7 (35.00%)	10 (23.30%)	21 (22.10%)
Agoraphobia (Lifetime)	0 (0%)	0 (0%)	0 (0%)
Social Phobia (Current Generalized)	4 (20.00%)	5 (11.60%)	14 (14.70%)
Social Phobia (Current Non-Generalized)	1 (5.00%)	2 (4.70%)	6 (6.30%)
Specific Phobia (Current)	3 (15.00%)	3 (7.00%)	10 (10.50%)
Obsessive Compulsive Disorder (Current)	2 (10.00%)	4 (9.30%)	10 (10.50%)
Post-Traumatic Stress Disorder (Current)	2 (10.00%)	6 (14.00%)	12 (12.60%)
Post-Traumatic Stress Disorder (Lifetime)	4 (20.00%)	9 (20.90%)	16 (16.80%)
Generalized Anxiety Disorder	10 (50.00%)	25 (58.10%)	54 (56.80%)
Substance-Related Disorders			
Alcohol Dependence (Current)	0 (0%)	0 (0%)	0 (0%)

(continued)

Table 2 *(continued)*

Psychological Disorders	Men (n = 20)	Women (n = 43)	Pooled sample (N=95)
Alcohol Abuse (Current)	0 (0%)	0 (0%)	0 (0%)
Substance Dependence (Current)	0 (0%)	0 (0%)	1 (1.10%)
Substance Abuse (Current)	1 (5.00%)	0 (0%)	2 (2.10%)
Eating Disorders			
Anorexia (Current)	0 (0%)	0 (0%)	0 (0%)
Bulimia (Current)	0 (0%)	4 (9.30%)	4 (4.20%)
Somatoform Disorders			
Somatization Disorder	0 (0%)	0 (0%)	0 (0%)
Hypochondriasis	1 (5.00%)	2 (4.70%)	4 (4.20%)
Body Dysmorphic Disorder	0 (0%)	0 (0%)	1 (1.10%)
Pain Disorder	0 (0%)	0 (0%)	0 (0%)
Attention Deficit Disorders			
ADHD Combined	1 (5.00%)	0 (0%)	3 (3.20%)
ADHD Inattentive	1 (5.00%)	0 (0%)	3 (3.20%)
ADHD Hyperactive-Impulsive	1 (5.00%)	1 (2.30%)	2 (2.10%)

Table 3

Descriptives for Skewness and Kurtosis

Variable Name	*n*	Skewness (Standard Error)	Kurtosis (Standard Error)
IUS Time 1	71	0.06 (0.50)	-1.20 (0.97)
IUS Time 2	61	0.74 (0.52)	0.59 (1.01)
IUS Time 3	16	1.48 (0.75)	2.13 (1.48)
CSQ-R Catastrophizing Time 1	67	0.61 (0.50)	-0.38 (0.97)
CSQ-R Catastrophizing Time 2	62	-0.37 (0.52)	-0.56 (1.01)
CSQ-R Catastrophizing Time 3	16	0.32 (0.75)	2.41 (1.48)
CSQ-R Coping Self-Statements Time 1	67	-0.02 (0.50)	-1.34 (0.97)
CSQ-R Coping Self-Statements Time 2	61	0.48 (0.52)	0.01 (1.01)
CSQ-R Coping Self-Statements Time 3	16	-0.34 (0.75)	0.33 (1.48)
CSQ-R Ignoring Sensation Time 1	67	0.28 (0.50)	-0.70 (0.97)
CSQ-R Ignoring Sensation Time 2	62	0.22 (0.52)	-0.57 (1.01)
CSQ-R Ignoring Sensation Time 3	16	-0.57 (0.75)	-0.25 (1.48)
CSQ-R Distancing Time 1	65	1.15 (0.29)	0.23 (0.57)
CSQ-R Distancing Time 2	62	0.45 (0.52)	-0.45 (1.01)
CSQ-R Distancing Time 3	16	0.47 (0.75)	-0.85 (1.48)
CSQ-R Distraction Time 1	67	0.50 (0.50)	-0.86 (0.97)
CSQ-R Distraction Time 2	62	-0.87 (0.52)	1.96 (1.01)
CSQ-R Distraction Time 3	16	0.53 (0.75)	-0.19 (1.48)

(continued)

Table 3 *(continued)*

Variable Name	*n*	Skewness (Standard Error)	Kurtosis (Standard Error)
CSQ-R Praying Time 1	67	-0.04 (0.50)	-1.54 (0.97)
CSQ-R Praying Time 2	61	0.21 (0.52)	-1.50 (1.01)
CSQ-R Praying Time 3	16	0.65 (0.75)	-0.06 (1.48)
PCS Total Score Time 1	71	0.02 (0.50)	-0.71 (0.97)
PCS Total Score Time 2	62	-0.40 (0.52)	-0.51 (1.01)
PCS Total Score Time 3	16	-0.44 (0.75)	2.16 (1.48)
PASS Time 1	69	0.13 (0.50)	-1.57 (0.97)
PASS Time 2	61	1.58 (0.52)	2.49 (1.01)
PASS Time 3	16	0.40 (0.75)	-1.87 (1.48)
MPI Current Pain Time 1	73	-0.31 (0.46)	-0.95 (0.89)
MPI Current Pain Time 2	62	-0.34 (0.43)	0.36 (0.85)
MPI Current Pain Time 3	16	0.00 (0.85)	-1.88 (1.74)
MPI Suffering Time 1	74	-0.26 (0.46)	-0.81 (0.89)
MPI Suffering Time 2	63	-0.52 (0.43)	0.52 (0.85)
MPI Suffering Time 3	16	0.67 (0.85)	0.59 (1.74)
MPI Interference Time 1	66	-1.38 (0.29)	1.54 (0.57)
MPI Interference Time 2	60	-1.07 (0.31)	0.66 (0.60)
MPI Interference Time 3	15	-0.39 (0.75)	-0.14 (1.48)
MPI Work Interference Time 1	26	-1.32 (0.46)	0.90 (0.89)
MPI Work Interference Time 2	30	-1.17 (0.43)	2.68 (0.85)

(continued)

Table 3 *(continued)*

Variable Name	*n*	Skewness (Standard Error)	Kurtosis (Standard Error)
MPI Work Interference Time 3	6	0.00 (0.85)	2.50 (1.74)
MPI Self-Control Time 1	68	-0.65 (0.50)	-0.50 (0.97)
MPI Self-Control Time 2	62	-1.14 (0.52)	0.69 (1.01)
MPI Self-Control Time 3	16	-0.31 (0.75)	0.90 (1.48)
BDI-II Total Score Time 1	70	0.59 (0.50)	0.69 (0.97)
BDI-II Total Score Time 2	62	-0.54 (0.52)	-1.06 (1.01)
BDI-II Total Score Time 3	16	-1.18 (0.75)	1.71 (1.48)
ASI Total Score Time 1	71	0.13 (0.50)	-1.18 (0.97)
ASI Total Score Time 2	61	0.37 (0.52)	-0.76 (1.01)
ASI Total Score Time 3	16	-0.26 (0.75)	1.60 (1.48)
MAAS Total Score Time 1	71	-0.44 (0.50)	-0.42 (0.97)
MAAS Total Score Time 2	61	0.38 (0.52)	-0.73 (1.01)
MAAS Total Score Time 3	16	0.96 (0.75)	-0.04 (1.48)
POAM-P Avoidant Time 1	69	-0.02 (0.50)	-0.66 (0.97)
POAM-P Avoidant Time 2	62	0.86 (0.52)	-0.06 (1.01)
POAM-P Avoidant Time 3	16	-0.54 (0.75)	-1.59 (1.48)
POAM-P Overdoing Time 1	70	-0.76 (0.50)	2.03 (0.97)
POAM-P Overdoing Time 2	62	-0.72 (0.52)	2.39 (1.01)
POAM-P Overdoing Time 3	16	-0.54 (0.72)	-0.50 (1.48)

(continued)

Table 3 *(continued)*

Variable Name	*n*	Skewness (Standard Error)	Kurtosis (Standard Error)
POAM-P Pacing Time 1	70	-0.09 (0.50)	-0.29 (0.97)
POAM-P Pacing Time 2	61	0.18 (0.52)	-1.00 (1.01)
POAM-P Pacing Time 3	16	-0.31 (0.75)	-1.65 (1.48)
WAI Client Total Score	51	-0.69 (0.52)	-0.05 (1.01)
WAI Therapist Total Score	55	-0.62 (0.52)	0.23 (1.01)

Table 4

Determining Group Equivalency Using the *t*-Test for all Outcome Measures

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
PASS Total (Treatment Group)	41	54.07 (22.99)		
PASS Total (Control Group)	19	46.11 (24.54)	58	1.22
MPI Current Pain (Treatment Group)	39	4.15 (1.11)		
MPI Current Pain (Control Group)	21	3.38 (1.40)	58	2.35*
MPI Suffering (Treatment Group)	40	4.85 (1.15)		
MPI Suffering (Control Group)	21	5.00 (1.30)	59	-0.46
MPI Interference (Treatment Group)	17	4.54 (1.31)		
MPI Interference (Control Group)	6	4.37 (1.61)	21	0.26
MPI Work Interference (Treatment Group)	21	4.33 (1.93)		
MPI Work Interference (Control Group)	5	5.20 (1.30)	24	-0.95
MPI Self-Control (Treatment Group)	38	3.09 (1.56)		
MPI Self-Control (Control Group)	20	3.08 (1.49)	56	0.04
BDI-II Total Score (Treatment Group)	40	26.45 (14.84)		
BDI-II Total Score (Control Group)	20	26.60 (12.03)	58	-0.04
ASI Total Score (Treatment Group)	41	28.27 (14.91)		
ASI Total Score (Control Group)	20	25.25 (15.06)	59	0.74
POAM-P Avoidant (Treatment Group)	40	26.03 (6.92)		
POAM-P Avoidant (Control Group)	19	25.42 (8.97)	57	0.28
POAM-P Overdoing (Treatment Group)	40	22.55 (8.73)		

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ *(continued)*

Table 4 *(continued)*

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
POAM-P Overdoing (Control Group)	20	26.25 (5.66)	58	-1.72
POAM-P Pacing (Treatment Group)	40	23.15 (10.09)		
POAM-P Pacing (Control Group)	20	24.75 (8.27)	58	-0.61

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 5

Determining Group Equivalency Using the *t*-Test for Demographic Measures

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
Age (Treatment Group)	42	48.86 (10.47)	61	-1.14
Age (Control Group)	21	51.95 (9.59)		
Years in Pain (Treatment Group)	38	13.79 (11.07)	57	-1.09
Years in Pain (Control Group)	21	17.22 (12.45)		

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 6

Determining Group Equivalency Using the Chi-Square Test for Demographic Measures

Variable Name	Grouping Variable	
	Treatment	Control
Area of Body in Pain		
Head	0 (0%)	3 (42.90%)
Neck	3 (30.00%)	1 (14.30%)
Back/Buttocks	5 (50.00%)	0 (0%)
Thighs/Knees	1 (10.00%)	0 (0%)
Legs/Feet	0 (0%)	1 (14.30%)
Entire Body	1 (10.00%)	2 (28.60%)
Pearson Chi Square (df)	11.15 (5)	
Sex		
Male	16 (38.10%)	4 (19.00%)
Female	26 (61.90%)	17 (81.00%)
Pearson Chi Square (df)	2.34 (1)	
Education		
Completed Elementary School	2 (4.90%)	3 (14.30%)
Completed High School	11 (26.80%)	5 (23.80%)
Completed Post-Secondary School	28 (68.30%)	13 (61.90%)
Pearson Chi Square (df)	1.66 (2)	
Ethnic Background		
Caucasian	31 (77.50%)	20 (95.20%)

Note: Numbers in parentheses represent row percentages. For the question asking "What area of the body does your pain affect the most?", the majority of participants indicated more than one pain area, leading to loss of data for this variable. *$p < 0.05$ (*continued*)

Table 6 *(continued)*

Variable Name	Grouping Variable	
	Treatment	Control
Non-Caucasian	9 (22.50%)	1 (4.80%)
Pearson Chi Square (df)	3.16 (1)	
Marital Status		
Single	7 (16.70%)	7 (33.30%)
Co-habiting	7 (16.70%)	2 (9.50%)
Widowed	1 (2.40%)	1 (4.80%)
Married	15 (35.70%)	7 (33.30%)
Divorced/Separated	12 (28.60%)	4 (19.00%)
Pearson Chi Square (df)		3.02 (4)
Annual Income		
$40 000 and Lower	18 (46.20%)	11 (52.40%)
$40 001 and Higher	21 (53.80%)	9 (42.90%)
Pearson Chi Square (df)	2.30 (2)	
Employment/Education Status		
Working/In School	10 (24.40%)	4 (19.00%)
Not Working/In School	25 (61.00%)	12 (57.10%)
Retired	6 (14.60%)	4 (19.00%)
Pearson Chi Square (df)	2.33 (3)	

Note: Numbers in parentheses represent row percentages. *$p < 0.05$ *(continued)*

Table 6 *(continued)*

Variable Name	Grouping Variable	
	Treatment	Control
Non-Caucasian	9 (22.50%)	1 (4.80%)
Pearson Chi Square (df)	3.16 (1)	
Marital Status		
Single	7 (16.70%)	7 (33.30%)
Co-habiting	7 (16.70%)	2 (9.50%)
Widowed	1 (2.40%)	1 (4.80%)
Married	15 (35.70%)	7 (33.30%)
Divorced/Separated	12 (28.60%)	4 (19.00%)
Pearson Chi Square (df)		3.02 (4)
Annual Income		
$40 000 and Lower	18 (46.20%)	11 (52.40%)
$40 001 and Higher	21 (53.80%)	9 (42.90%)
Pearson Chi Square (df)	2.30 (2)	
Employment/Education Status		
Working/In School	10 (24.40%)	4 (19.00%)
Not Working/In School	25 (61.00%)	12 (57.10%)
Retired	6 (14.60%)	4 (19.00%)
Pearson Chi Square (df)	2.33 (3)	

Note: Numbers in parentheses represent row percentages. *$p < 0.05$ *(continued)*

Table 6 *(continued)*

Variable Name	Grouping Variable	
	Treatment	Control
On Pain Medication		
Yes	32 (57.1%)	5 (71.4%)
No	15 (26.8%)	1 (14.3%)
Pearson Chi Square (df)	0.61 (2)	
WSIB Benefits		
Receiving WSIB Benefits	3 (7.30%)	1 (5.00%)
Not Receiving WSIB Benefits	38 (92.70%)	19 (95.00%)
Pearson Chi Square (df)	0.12 (1)	
Disability Benefits		
Receiving Disability Benefits	14 (33.30%)	12 (66.70%)
Not Receiving Disability Benefits	28 (66.70%)	6 (33.30%)
Pearson Chi Square (df)	5.70 (1)*	
Litigation		
Involved in Litigation	13 (34.20%)	4 (21.10%)
Not Involved in Litigation	25 (65.80%)	15 (78.90%)
Pearson Chi Square (df)	1.05 (1)	
Counselling		
Received Individual Counselling	21 (50.00%)	13 (65.00%)
Unrelated to Pain		

Note: Numbers in parentheses represent row percentages. *$p < 0.05$ *(continued)*

Table 6 *(continued)*

Variable Name	Grouping Variable	
	Treatment	Control
Did not Receive Individual Counselling Unrelated to Pain	21 (50.00%)	7 (35.00%)
Pearson Chi Square (df)	1.23 (1)	
Received Group Counselling Unrelated to Pain	18 (43.90%)	6 (30.00%)
Did not Receive Group Counselling Unrelated to Pain	23 (56.10%)	14 (70.00%)
Pearson Chi Square (df)	1.09 (1)	
Received Individual Counselling Related to Pain	18 (42.90%)	8 (40.00%)
Did not Receive Individual Counselling Related to Pain	24 (57.10%)	12 (60.00%)
Pearson Chi Square (df)	0.05 (1)	
Received Group Counselling Related to Pain	10 (23.80%)	7 (35.00%)
Did not Receive Group Counselling Related to Pain	32 (76.20%)	13 (65.00%)
Pearson Chi Square (df)	0.85 (1)	

Note: Numbers in parentheses represent row percentages. *$p < 0.05$

Table 7

Analysis of Covariance for all Outcome Measures

Variable Name	*F*-value	*df*	partial η^2	Estimated Marginal Means	Standard Error
PASS-20 Total	1.08	1, 57	0.02	43.90 (T)	1.62 (T)
				47.39 (C)	2.94 (C)
MPI Current Pain	0.13	1, 57	0.00	3.43 (T)	0.18 (T)
				3.57 (C)	0.32 (C)
MPI Suffering due to Pain	2.56	1, 58	0.04	4.60 (T)	0.16 (T)
				4.10 (C)	0.27 (C)
MPI Interference	0.01	1, 53	0.00	1.49 (T)	0.06 (T)
				1.47 (C)	0.11 (C)
MPI Work Interference	0.51	1, 12	0.04	4.39 (T)	0.43 (T)
				5.12 (C)	0.89 (C)
MPI Self-Control	3.49	1, 56	0.06	3.57 (T)	0.18 (T)
				2.86 (C)	0.32 (C)
BDI-II Total	1.45	1, 59	0.02	23.83 (T)	1.13 (T)
				26.59 (C)	1.99 (C)
ASI Total	0.11	1, 58	0.00	24.35 (T)	1.17 (T)
				25.17 (C)	2.14 (C)
POAM-P Avoidance	4.08*	1, 57	0.07	23.18 (T)	0.88 (T)
				19.49 (C)	1.60 (C)

Note: "T" in parentheses equals the treatment group and "C" equals the control group. The difference in the degree of freedom values across variables is due to missing data. *$p < 0.05$

(continued)

Table 7 *(continued)*

Variable Name	*F*-value	*df*	partial η^2	Estimated Marginal Means	Standard Error
POAM-P Overdoing	0.07	1, 58	0.00	23.59 (T)	0.79 (T)
				24.00 (C)	1.39 (C)
POAM-P Pacing	1.19	1, 57	0.02	24.51 (T)	0.94 (T)
				22.46 (C)	1.63 (C)

Note: "T" in parentheses equals the treatment group and "C" equals the control group. The difference in the degree of freedom values across variables is due to missing data. **p* < 0.05

Table 8

Bivariate Correlations Among Change Scores in Outcome Variables for the Pre-Post Completer Sample (n = 60)

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.00												
2	.41**	1.00											
3	-.06	.01	1.00										
4	.12	-.02	.10	1.00									
5	.10	-.01	-.15	-.09	1.00								
6	.21	.02	.00	-.11	.03	1.00							
7	-.08	.04	.21	-.02	.30*	-.22	1.00						
8	.04	.27*	.03	.02	.26	.16	.08	1.00					
9	.15	.01	.09	.04	-.18	-.00	-.05	.23	1.00				
10	.33*	.12	-.19	-.02	.36**	.27*	.14	.28*	.18	1.00			
11	.34**	.02	-.09	-.06	.42**	.08	.11	.05	.12	.39**	1.00		
12	-.06	.23	.13	-.00	.22	-.04	.46**	49***	.26*	.24	.04	1.00	
13	.04	-.19	.05	.06	-.08	.01	-.01	-.06	-.17	.17	-.02	-.22	1.00

*Correlation is significant at the .05 level **Correlation is significant at the .01 level ***Correlation is significant at the .001 level

1. AS
2. Fear of Pain
3. Therapeutic Alliance (T)
4. Therapeutic Alliance (C)
5. General Interference Subscale
6. Work Interference Subscale
7. Current Pain Severity
8. Suffering due to Pain
9. Overdoing Activity Level
10. Avoidance Activity Level
11. Pacing Activity Level
12. Depressive Severity
13. Self-Control over Pain

Table 9

Linear Regressions from the WAI Pre-Post Completer Sample (Client Scores)

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
PASS-20 Total	-0.02	0.13	-0.02	-0.13	0.02	0.00
MPI Current Pain	-0.00	0.02	-0.02	-0.13	0.02	0.00
MPI Suffering due to Pain	0.00	0.01	0.02	0.10	0.01	0.00
MPI Interference	-0.00	0.01	-0.09	-0.59	0.35	0.01
MPI Work Interference	-0.01	0.02	-0.11	-0.72	0.52	0.01
MPI Self-Control	0.01	0.02	0.06	0.40	0.16	0.00
BDI-II Total	-0.00	0.11	-0.00	-0.02	0.00	0.00
ASI Total	0.08	0.10	0.12	0.84	0.70	0.01
MAAS Total	0.02	0.14	0.02	0.13	0.02	0.00
POAM-P Avoidance	-0.01	0.08	-0.02	-0.13	0.02	0.00
POAM-P Overdoing	0.02	0.08	0.04	0.29	0.09	0.00
POAM-P Pacing	-0.04	0.09	-0.06	-0.42	0.18	0.00
IUS Total	-0.09	0.10	-0.13	-0.91	0.82	0.02
CSQ-R Catastrophizing	0.02	0.06	0.05	0.31	0.10	0.00
CSQ-R Coping Self-Statements	0.06	0.06	0.15	1.04	1.09	0.02
CSQ-R Ignoring	0.12	0.07	0.24	1.66	2.75	0.06
CSQ-R Distancing	0.03	0.05	0.08	0.56	0.31	0.01
CSQ-R Distraction	-0.03	0.07	-0.07	-0.46	0.21	0.01

Note: No values were significant at the $p < 0.05$ level.

(continued)

Table 9 *(continued)*

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
CSQ-R Praying	0.01	0.04	0.02	0.16	0.03	0.00
PCS Total	-0.02	0.10	-0.03	-0.23	0.05	0.00

Note: No values were significant at the $p < 0.05$ level.

Table 10

Linear Regressions from the WAI Pre-Post Completer Sample (Therapist Scores)

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
PASS-20 Total	0.01	0.12	0.01	0.06	0.00	0.00
MPI Current Pain	0.02	0.02	0.21	1.54	2.37	0.04
MPI Suffering due to Pain	0.00	0.01	0.03	0.23	0.05	0.00
MPI Interference	-0.01	0.01	-0.15	-1.03	1.06	0.02
MPI Work Interference	0.00	0.02	0.00	0.02	0.00	0.00
MPI Self-Control	0.01	0.02	0.05	0.35	0.12	0.00
BDI-II Total	0.09	0.09	0.13	0.93	0.86	0.02
ASI Total	-0.04	0.09	-0.06	-0.44	0.19	0.00
MAAS Total	-0.13	0.12	-0.14	-1.04	1.09	0.02
POAM-P Avoidance	-0.10	0.07	-0.19	-1.43	2.04	0.04
POAM-P Overdoing	0.04	0.07	0.09	0.63	0.40	0.01
POAM-P Pacing	-0.05	0.08	-0.09	-0.65	0.43	0.01
IUS Total	-0.14	0.08	-0.24	-1.77	3.14	0.06
CSQ-R Catastrophizing	0.05	0.05	0.13	0.91	0.82	0.02
CSQ-R Coping Self-Statements	-0.04	0.05	-0.10	-0.70	0.49	0.01
CSQ-R Ignoring	0.04	0.07	0.09	0.66	0.43	0.01
CSQ-R Distancing	-0.08	0.05	-0.22	-1.59	2.51	0.05
CSQ-R Distraction	-0.07	0.06	-0.15	-1.06	1.12	0.02

Note: No values were significant at the $p < 0.05$ level. *(continued)*

Table 10 *(continued)*

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
CSQ-R Praying	-0.04	0.03	-0.16	-1.16	1.35	0.03
PCS Total	0.11	0.09	0.17	1.22	1.49	0.03

Note: No values were significant at the $p < 0.05$ level.

Table 11

Paired *t*-tests for the Pre-Post Completer Sample: Time 1 and Time 3

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
PASS Time 1 Total	16	47.00 (24.18)		
PASS Time 3 Total	16	43.69 (25.55)	15	0.83
MPI Time 1 Current Pain	15	3.20 (1.08)		
MPI Time 3 Current Pain	15	3.07 (1.53)	14	0.29
MPI Time 1 Suffering	16	4.38 (1.31)		
MPI Time 3 Suffering	16	4.56 (1.21)	15	-1.00
MPI Time 1 Interference	15	4.53 (1.27)		
MPI Time 3 Interference	15	4.27 (1.00)	14	1.09
MPI Time 1 Work Interference	5	4.20 (2.39)		
MPI Time 3 Work Interference	5	3.60 (0.89)	4	0.89
MPI Time 1 Self-Control	16	3.63 (1.26)		
MPI Time 3 Self-Control	16	3.84 (1.34)	15	-0.88
BDI-II Time 1 Total Score	16	21.50 (14.13)		
BDI-II Time 3 Total Score	16	18.44 (12.18)	15	1.39
ASI Time 1 Total Score	16	24.19 (14.53)		
ASI Time 3 Total Score	16	19.19 (14.88)	15	1.98
POAM-P Time 1 Avoidant	16	22.81 (7.71)		
POAM-P Time 3 Avoidant	16	23.56 (10.26)	15	-0.41

Note: The difference in the degree of freedom values across variables is due to missing data. *$p < 0.05$

(continued)

Table 11 *(continued)*

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
POAM-P Time 1 Overdoing	16	23.19 (8.09)		
POAM-P Time 3 Overdoing	16	21.81 (7.40)	15	0.81
POAM-P Time 1 Pacing	16	22.50 (8.67)		
POAM-P Time 3 Pacing	16	24.38 (10.13)	15	-1.04

Note: The difference in the degree of freedom values across variables is due to missing data.
*$p < 0.05$

Table 12

Paired *t*-tests for the Pre-Post Completer Sample: Time 2 and Time 3

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
PASS Time 2 Total	16	44.75 (27.93)		
PASS Time 3 Total	16	43.69 (25.55)	15	0.33
MPI Time 2 Current Pain	16	2.94 (0.85)		
MPI Time 3 Current Pain	16	3.13 (1.50)	15	-0.43
MPI Time 2 Suffering	16	4.63 (1.09)		
MPI Time 3 Suffering	16	4.56 (1.21)	15	0.29
MPI Time 2 Interference	15	4.47 (1.03)		
MPI Time 3 Interference	15	4.27 (1.00)	14	1.43
MPI Time 2 Work Interference	5	4.60 (1.14)		
MPI Time 3 Work Interference	5	3.60 (0.89)	4	1.83
MPI Time 2 Self-Control	16	3.97 (1.04)		
MPI Time 3 Self-Control	16	3.84 (1.34)	15	0.64
BDI-II Time 2 Total Score	16	19.69 (15.05)		
BDI-II Time 3 Total Score	16	18.44 (12.18)	15	0.79
ASI Time 2 Total Score	16	23.69 (13.61)		
ASI Time 3 Total Score	16	19.19 (14.88)	15	1.92
POAM-P Time 2 Avoidant	16	22.69 (9.77)		
POAM-P Time 3 Avoidant	16	23.56 (10.26)	15	-0.70

Note: The difference in the degree of freedom values across variables is due to missing data. *$p < 0.05$

(continued)

Table 12 *(continued)*

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
POAM-P Time 2 Overdoing	16	22.69 (7.42)		
POAM-P Time 3 Overdoing	16	21.81 (7.40)	15	0.81
POAM-P Time 2 Pacing	16	24.75 (9.31)		
POAM-P Time 3 Pacing	16	24.38 (10.13)	15	0.26

Note: The difference in the degree of freedom values across variables is due to missing data.
*$p < 0.05$

Table 13

Paired *t*-tests for the Pre-Post Completer Sample: Treatment Group Only

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
PASS Time 1	46	49.83 (23.85)		
PASS Time 2	46	45.35 (24.82)	45	2.69**
MPI Current Pain Time 1	45	3.89 (139)		
MPI Current Pain Time 2	45	3.51 (1.36)	44	1.97
MPI Suffering Time 1	46	4.61 (1.18)		
MPI Suffering Time 2	46	4.61 (1.16)	45	0.00
MPI Interference Time 1	43	1.50 (0.35)		
MPI Interference Time 2	43	1.53 (0.40)	42	-0.58
MPI Work Interference Time 1	12	4.00 (1.95)		
MPI Work Interference Time 2	12	4.25 (1.71)	11	-0.45
MPI Self-Control Time 1	44	3.19 (1.44)		
MPI Self-Control Time 2	44	3.55 (1.50)	43	-1.62
BDI-II Total Score Time 1	47	26.35 (14.91)		
BDI-II Total Score Time 2	47	24.49 (14.81)	46	1.43
ASI Total Score Time 1	47	26.40 (15.01)		
ASI Total Score Time 2	47	24.40 (14.89)	46	1.66
POAM-P Avoidant Time 1	46	24.00 (7.96)		
POAM-P Avoidant Time 2	46	23.15 (8.49)	45	0.88

Note: The difference in the degree of freedom values across variables is due to missing data. *$p < 0.05$

(continued)

Table 13 *(continued)*

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
POAM-P Overdoing Time 1	46	23.35 (8.61)		
POAM-P Overdoing Time 2	46	23.35 (7.22)	45	0.00
POAM-P Pacing Time 1	45	23.22 (8.96)		
POAM-P Pacing Time 2	45	24.44 (8.26)	44	-1.12

Note: The difference in the degree of freedom values across variables is due to missing data.
*$p < 0.05$

Table 14

Bivariate Correlations Among Change Scores in Outcome Variables for the Follow-Up Completer Sample (n = 16)

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.00												
2	.44	1.00											
3	.06	.13	1.00										
4	.22	.02	.08	1.00									
5	.31	-.08	-.13	-.06	1.00								
6	.09	.14	.41	-.41	.09	1.00							
7	.09	.11	-.26	-.15	.54*	.30	1.00						
8	.52*	.27	.03	.32	.40	.21	.55*	1.00					
9	.00	-.24	-.17	-.03	-.01	-.02	.15	.12	1.00				
10	.19	.08	-.43	-.13	.70**	.14	.74**	.39	.19	1.00			
11	.38	.05	-.04	-.09	.69**	.05	.34	.13	-.41	.35	1.00		
12	.41	.44	.08	.11	.38	.13	.60*	.60*	.19	.25	.18	1.00	
13	-.11	-.41	-.29	-.53*	.04	.01	.09	-.23	-.06	.21	.18	-.43	1.00

*Correlation is significant at the .05 level **Correlation is significant at the .01 level ***Correlation is significant at the .001 level

1. AS
2. Fear of Pain
3. Therapeutic Alliance (T)
4. Therapeutic Alliance (C)
5. General Interference Subscale
6. Work Interference Subscale
7. Current Pain Severity
8. Suffering due to Pain
9. Overdoing Activity Level
10. Avoidance Activity Level
11. Pacing Activity Level
12. Depressive Severity
13. Self-Control over Pain

Table 15

Linear Regressions from the WAI Follow-Up Analyses Sample (Client Scores)

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
PASS-20 Total	0.03	0.33	0.02	0.08	0.01	0.00
MPI Current Pain	-0.02	0.03	-0.15	0.52	0.27	0.02
MPI Suffering due to Pain	0.04	0.03	0.32	1.22	1.50	0.10
MPI Interference	-0.00	0.01	-0.06	-0.21	0.05	0.00
MPI Work Interference	-0.05	0.03	-0.41	-1.61	2.60	0.17
MPI Self-Control	-0.05	0.02	-0.53	-2.27	5.15	0.28*
BDI-II Total	0.08	0.21	0.11	0.39	0.15	0.01
ASI Total	0.16	0.19	0.22	0.82	0.68	0.05
MAAS Total	-0.12	0.29	-0.12	-0.40	0.16	0.01
POAM-P Avoidance	-0.08	0.17	-0.13	-0.48	0.23	0.02
POAM-P Overdoing	-0.02	0.15	-0.03	-0.12	0.01	0.00
POAM-P Pacing	-0.06	0.19	-0.09	-0.33	0.11	0.01
IUS Total	0.07	0.17	0.12	0.43	0.18	0.01
CSQ-R Catastrophizing	0.10	0.11	0.25	0.92	0.84	0.06
CSQ-R Coping Self-Statements	0.07	0.13	0.16	0.58	0.33	0.03
CSQ-R Ignoring	0.12	0.10	0.32	1.20	1.44	0.10
CSQ-R Distancing	0.12	0.10	0.31	1.17	1.37	0.10
CSQ-R Distraction	-0.14	0.11	-0.36	-1.37	1.89	0.13

Note: *$p < 0.05$

(continued)

Table 15 *(continued)*

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
CSQ-R Praying	0.12	0.06	0.50	2.10	4.39	0.25
PCS Total	0.33	0.22	0.39	1.47	2.17	0.15

Note: $*p < 0.05$

Table 16

Linear Regressions from the WAI Follow-Up Analyses Sample (Therapist Scores)

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
PASS-20 Total	0.13	0.27	0.13	0.50	0.25	0.02
MPI Current Pain	-0.03	0.03	-0.26	-0.97	0.94	0.0
MPI Suffering due to Pain	0.00	0.03	0.03	0.11	0.01	0.00
MPI Interference	-0.01	0.01	-0.13	-0.48	0.23	0.02
MPI Work Interference	0.05	0.03	0.41	1.68	2.84	0.17
MPI Self-Control	-0.02	0.02	-0.29	-1.12	1.25	0.08
BDI-II Total	0.05	0.17	0.08	0.29	0.08	0.01
ASI Total	0.04	0.16	0.06	0.22	0.05	0.00
MAAS Total	0.33	0.24	0.35	1.36	1.86	0.13
POAM-P Avoidance	-0.22	0.12	-0.43	-1.78	3.17	0.19
POAM-P Overdoing	-0.08	0.12	-0.17	-0.64	0.41	0.03
POAM-P Pacing	-0.03	0.16	-0.04	-0.16	0.03	0.00
IUS Total	-0.12	0.14	-0.23	-0.89	0.78	0.05
CSQ-R Catastrophizing	0.18	0.08	0.52	2.25	5.07	0.27*
CSQ-R Coping Self-Statements	-0.10	0.11	-0.23	-0.84	0.71	0.05
CSQ-R Ignoring	0.09	0.09	0.26	1.00	1.01	0.07
CSQ-R Distancing	-0.04	0.12	-0.09	-0.33	0.11	0.01
CSQ-R Distraction	0.03	0.09	0.09	0.35	0.12	0.01

Note: *$p < 0.05$

(continued)

Table 16 *(continued)*

Variable Name	b	SEB	β	*t*-score	*F*-value	R^2
CSQ-R Praying	0.02	0.06	0.12	0.42	0.18	0.01
PCS Total	0.27	0.19	0.36	1.40	1.95	0.13

Note: *$p < 0.05$

Table 17

Paired *t*-tests for the Follow-up Completer Sample: Treatment Group Only

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
PASS Time 1	15	48.13 (24.59)		
PASS Time 2	15	46.13 (28.34)	14	0.58
MPI Current Pain Time 1	14	3.29 (1.07)		
MPI Current Pain Time 2	14	2.86 (0.86)	13	1.31
MPI Suffering Time 1	15	4.47 (1.30)		
MPI Suffering Time 2	15	4.73 (1.03)	14	-0.81
MPI Interference Time 1	15	1.51 (0.36)		
MPI Interference Time 2	15	1.49 (0.33)	14	0.15
MPI Work Interference Time 1	5	4.40 (2.51)		
MPI Work Interference Time 2	5	5.20 (0.84)	4	-1.00
MPI Self-Control Time 1	15	3.63 (1.30)		
MPI Self-Control Time 2	15	3.93 (1.07)	14	-1.09
BDI-II Total Score Time 1	15	22.75 (15.34)		
BDI-II Total Score Time 2	15	21.35 (16.12)	14	0.65
ASI Total Score Time 1	15	23.93 (15.01)		
ASI Total Score Time 2	15	24.27 (13.89)	14	-0.18
POAM-P Avoidant Time 1	15	23.33 (7.69)		
POAM-P Avoidant Time 2	15	23.07 (9.99)	14	0.15

Note: The difference in the degree of freedom values across variables is due to missing data. *$p < 0.05$

(continued)

Table 17 *(continued)*

Variable Name	*n*	Mean (Standard Deviation)	*df*	*t*-score
POAM-P Overdoing Time 1	15	22.60 (8.01)		
POAM-P Overdoing Time 2	15	22.67 (7.68)	14	-0.04
POAM-P Pacing Time 1	15	22.60 (8.97)		
POAM-P Pacing Time 2	15	24.33 (9.48)	14	-0.88

Note: The difference in the degree of freedom values across variables is due to missing data.
*$p < 0.05$

Table 18

Repeated Measures Analyses for the Follow-up Completer Sample

Variable Name	*n*	*F*-value	*df*	partial η^2
PASS-20 Total	16	0.46	2, 30	0.03
MPI Current Pain	14	0.48	2, 26	0.04
MPI Suffering due to Pain	15	0.57	1.42, 19.93	0.04
MPI Interference	15	0.85	2, 28	0.57
MPI Work Interference	4	1.91	2, 6	0.39
MPI Self-Control	16	1.07	2, 30	0.07
BDI-II Total	16	1.26	2, 30	0.08
ASI Total	16	2.92	2, 30	0.16
POAM-P Avoidance	16	0.18	2, 30	0.01
POAM-P Overdoing	16	0.46	2, 30	0.03
POAM-P Pacing	16	0.98	2, 30	0.06

Note: No values were significant at the $p < 0.05$ level. Mauchly's test of sphericity was significant for the variable MPI Suffering due to Pain ($p = 0.03$). As such, the Greenhouse-Geisser corrected tests are reported for this variable. The difference in the degree of freedom values across variables is due to missing data.

Table 19

Analysis of Covariance for Outcome Measures: Covarying Disability Status and Current Pain

Variable Name	*F*-value	*df*	partial η^2	Estimated Marginal Means	Standard Error
PASS-20 Total	1.42	1, 52	0.03	44.07 (T)	1.74 (T)
				48.70 (C)	3.35 (C)
MPI Current Pain	0.17	1, 55	0.00	3.44 (T)	0.19 (T)
				3.60 (C)	0.34 (C)
MPI Suffering due to Pain	3.29	1, 54	0.06	4.62 (T)	0.16 (T)
				4.01 (C)	0.29 (C)
MPI Interference	0.57	1, 49	0.01	1.52 (T)	0.06 (T)
				1.42 (C)	0.11 (C)
MPI Work Interference	0.00	1, 10	0.00	4.54 (T)	0.38 (T)
				4.50 (C)	0.88 (C)
MPI Self-Control	4.79*	1, 52	0.08	3.53 (T)	0.19 (T)
				2.70 (C)	0.34 (C)
BDI-II Total	0.37	1, 54	0.01	25.79 (T)	1.24 (T)
				27.41 (C)	2.29 (C)
ASI Total	0.51	1, 53	0.01	24.32 (T)	1.25 (T)
				26.28 (C)	2.40 (C)
POAM-P Avoidance	7.07**	1, 52	0.12	23.53 (T)	0.85 (T)
				18.60 (C)	1.61 (C)

Note: "T" in parentheses equals the treatment group and "C" equals the control group. The difference in the degree of freedom values across variables is due to missing data. For the variable current pain, only disability status was controlled for in the analysis. *$p < 0.05$; ** p = 0.01

(continued)

Table 19 *(continued)*

Variable Name	*F*-value	*df*	partial η^2	Estimated Marginal Means	Standard Error
POAM-P Overdoing	0.07	1, 53	0.00	23.58 (T)	0.82 (T)
				24.03 (C)	1.50 (C)
POAM-P Pacing	2.89	1, 52	0.05	25.04 (T)	0.91 (T)
				21.80 (C)	1.64 (C)

Note: "T" in parentheses equals the treatment group and "C" equals the control group. The difference in the degree of freedom values across variables is due to missing data. For the variable current pain, only disability status was controlled for in the analysis. *$p < 0.05$; ** p = 0.01

Table 20

Repeated Measures Analysis of Variance: Therapist Ratings of Homework Compliance

Variable Name	*n*	*F*-value	*df*	*p*-value
PASS-20 Total	46	0.58	1, 44	0.45
MPI Current Pain	45	0.00	1, 43	0.95
MPI Suffering due to Pain	46	2.31	1, 44	0.14
MPI Interference	43	0.06	1, 41	0.82
MPI Work Interference	12	0.00	1, 10	1.00
MPI Self-Control	44	0.09	1, 42	0.77
BDI-II Total	47	2.75	1, 45	0.10
ASI Total	47	1.08	1, 45	0.31
MAAS Total	47	0.05	1, 45	0.83
POAM-P Avoidance	46	0.12	1, 44	0.73
POAM-P Overdoing	46	0.00	1, 44	1.00
POAM-P Pacing	45	0.04	1, 43	0.84
IUS Total	47	0.00	1, 45	1.00
CSQ-R Catastrophizing	46	0.66	1, 44	0.42
CSQ-R Coping Self-Statements	45	2.16	1, 43	0.15
CSQ-R Ignoring Sensation	46	0.27	1, 44	0.61
CSQ-R Distancing	45	2.18	1, 43	0.15
CSQ-R Distraction	46	0.16	1, 44	0.69
CSQ-R Praying	45	0.08	1, 43	0.78
PCS Total	47	4.29	1, 45	0.04

Table 21

Repeated Measures Analysis of Variance: Client Ratings of Homework Compliance

Variable Name	*n*	*F*-value	*df*	*p*-value
PASS-20 Total	45	0.83	1, 43	0.37
MPI Current Pain	44	1.31	1, 42	0.26
MPI Suffering due to Pain	45	0.66	1, 43	0.42
MPI Interference	42	0.59	1, 40	0.45
MPI Work Interference	12	0.18	1, 10	0.68
MPI Self-Control	43	0.82	1, 41	0.37
BDI-II Total	46	0.26	1, 44	0.61
ASI Total	46	0.80	1, 44	0.38
MAAS Total	46	0.18	1, 44	0.67
POAM-P Avoidance	45	0.39	1, 43	0.54
POAM-P Overdoing	45	1.33	1, 43	0.26
POAM-P Pacing	44	1.11	1, 42	0.30
IUS Total	46	0.00	1, 44	0.99
CSQ-R Catastrophizing	45	0.05	1, 43	0.82
CSQ-R Coping Self-Statements	44	0.09	1, 42	0.76
CSQ-R Ignoring Sensation	45	0.69	1, 43	0.41
CSQ-R Distancing	44	2.08	1, 42	0.16
CSQ-R Distraction	45	1.16	1, 43	0.29
CSQ-R Praying	44	0.02	1, 42	0.89
PCS Total	46	0.59	1, 44	0.45

Appendix A

Cognitive Behavioural Therapy 12-Week Group Treatment Protocol

Session Number	Title of Session	Topics Covered
1	Education on Chronic Pain	Introduction to group leaders and other group members. Present group norms and expectations. Introduce participants to the notion that pain can be managed. Have participants complete baseline questionnaire package.
2	Introduction to Cognitive Behavioural Therapy	Educate patients on the theory of CBT and how it can be applied to chronic pain. Instill hope in patients by providing them with empirical evidence for the efficacy of CBT for chronic pain. Have patients begin to recognize some of their own negative cognitions that they may be engaging in.
3	Automatic Thoughts and Pain	Introduce the concept of automatic thoughts. Educate patients on the link between thoughts, emotions and behaviours. Have patients work through the ABC model in response to their own automatic thoughts.
4	Cognitive Restructuring	Provide education on how patients can restructure their thoughts. Practice a thought record.
5	Relaxation	Explain what relaxation is (and what it is not). Provide patients with information on how relaxation can aid in the management of their chronic pain. Guide patients through three relaxation exercises: visual imagery, progressive muscle relaxation, and diaphragmatic breathing.
6	Stress Management	Provide an explanation of the stress response and how this affects chronic pain. Have patients identify sources of stress in their life. Provide patients with strategies to help them manage their stress.
7	Time-Based Pacing	Outline the difference between avoidance, overdoing, and pacing. Discuss why pacing is helpful and when/how it is useful.
8	Anxiety Sensitivity	Provide psychoeducation on anxiety, anxiety sensitivity, fear of pain, and their relationships with chronic pain. Introduce interoceptive exposure exercises.

9	Introduction to Mindfulness	Provide education on what mindfulness practice is and how it can be useful in managing chronic pain. Introduce and guide patients through meditative exercises.
10	Anger Management and The Body Scan	Explain what anger is and how it can have an influence on pain. Describe the three different styles of anger. Provide patients with guidelines for communicating with others assertively. Introduce the body scan exercise.
11	Sleep Hygiene	Provide education on the importance of sleep and strategies that patients can employ to improve their sleep.
12	Relapse Prevention	Review all the strategies patients have gained knowledge of through the course of treatment. Discuss relapse prevention and flare-up planning. Engage patients in a discussion of their future plans and goals. Have patients complete post-treatment questionnaire.

Appendix B

Participant Information Sheet

Examining the efficacy of a cognitive behavioural intervention in reducing anxiety sensitivity and functional impairment in chronic pain patients

Dear Potential Participant:

Thank you for taking part in this research study investigating a cognitive and behavioural group treatment for chronic pain.

This study consists of twelve group treatment sessions, each lasting approximately one and a half hours in length. At the start of the first and last group session you will be asked to complete a series of questionnaires. This may take up to 20 minutes. You will also be contacted three months following the last group session, and asked to complete the same questionnaire package. The completion of each questionnaire package may take up to 20 minutes.

This research project is being conducted under the supervision of Dr. Dwight Mazmanian and Dr. Martin Katzman, and has been approved by the Lakehead University Research Ethics Board. Only Dr. Mazmanian, Dr. Katzman, and I will have access to the information you provide. Your information will be assigned a unique subject number to ensure anonymity and confidentiality. The information will be securely stored at the START Clinic for Mood and Anxiety Disorders for a period of at least five years. In addition, your identifying information will be kept completely confidential in any publication of results.

Participation in this research study is completely voluntary and you may decline to answer any question or refuse to participate in any part of this study. If for any reason you wish to withdraw from the study you may do so at any time without penalty. Your participation in this study will not affect the treatment you are receiving from your physician. There is minimal potential for psychological harm associated with participation in this study.

A report of findings will be available to those interested upon request. If you require additional information please do not hesitate to contact one of the researchers.

Thank you,

Christina Iorio, M.A.
Ph.D. Student, Clinical Psych.
Lakehead University
Thunder Bay, ON
ciorio@lakeheadu.ca
Phone: (807) 343-8441

Dr. Dwight Mazmanian, Ph.D., C.Psych.
Associate Professor
Lakehead University
Thunder Bay, ON
dwight.mazmanian@lakeheadu.ca
Phone: (807) 343-8257

Dr. Martin A. Katzman, M.D., F.R.C.P. (C)
Adjunct Faculty
Lakehead University
Thunder Bay, ON
mkatzman@startclinic.ca
Phone: (416) 598-9344

Informed Consent Form

Study Title: Examining the efficacy of a cognitive behavioural intervention in reducing anxiety sensitivity and functional impairment in chronic pain patients

Study Investigators: Christina Iorio, M.A.
Ph.D. Student
Lakehead University
Thunder Bay, ON
ciorio@lakeheadu.ca
Phone: (807) 343-8441

Dr. Dwight Mazmanian, Ph.D., C.Psych.
Associate Professor
Lakehead University
Thunder Bay, ON
dwight.mazmanian@lakeheadu.ca
Phone: (807) 343-8257

Dr. Martin A. Katzman, M.D., F.R.C.P. (C)
Adjunct Faculty
Lakehead University
Thunder Bay, ON
mkatzman@startclinic.ca
(416) 598-9344

Description and Purpose:
You are being asked to volunteer to participate in a clinical research study. This consent form may contain words or information that you may not understand. Please take sufficient time to consider the information in this consent form and ask any questions that you may have.

You are being asked to participate in this study because you have been diagnosed with chronic pain.

The purpose of this study is to evaluate a group treatment for individuals suffering with chronic pain. The treatment is intended to help participants better manage their chronic pain.

This study will be conducted in various pain clinics across the Greater Toronto Area. It is intended that 150 patients will participate in this study. Your participation in this study will last approximately 20 hours, over a period of twelve weeks.

Procedures:

This study consists of twelve group treatment sessions, each lasting approximately one and a half hours in length. The sessions will be led by a psychiatrist and a trained psychology doctorate student. We ask that you notify one of the researchers should there be any changes to your current treatment, including medications, particularly any new additions during your participation in the research study. Your participation in the study will not be affected.

You will be randomly assigned to either the treatment or control group. Those in the control group will complete a questionnaire package at the beginning of the study, and 12 weeks later will begin the group treatment. At the start of the first and last group session you will be asked to

complete a series of questionnaires. You will also be contacted three months following the last group session, and asked to complete the same questionnaire package. The completion of each questionnaire package may take up to 20 minutes. Prior to enrollment in the study, you will be asked to take part in a structured clinical interview. This may take up to 60 minutes.

Costs/Compensation:

The treatment provided as part of this study will be offered at no cost to you. Upon completion of the study, you will be entered into a draw with the chance to win a gift certificate in the amount of $100.00.

Risks Associated with the Study:

The risks that you may experience as a result of participation in this study include experiencing sadness or anxiety from discussing issues related to your chronic pain and from answering questions about these issues in the questionnaires. You may also experience boredom from filling out the questionnaires. You may choose to stop participating at any time or skip any questions that may be too difficult for you. Your participation in this study will not affect the treatment you are receiving from your physician.

Benefits:

This study may benefit you by providing strategies to help you cope with your chronic pain. Information gained from this study may help professionals treating patients suffering with chronic pain, by providing them with new treatment options. It is possible that you may not experience any direct benefits as a result of your participation in this study, beyond the exposure to information regarding the management of your chronic pain.

Confidentiality:

Your name or any information that could identify you will not appear in any reports or publications as a result of the findings from this study. Information from this study may be required by the government regulatory agencies (e.g., Health Canada, the ethics review board), but your name will not be identified on such records.

All research records will be retained for at least five years. You have the right to request information about your study data held by the study investigator, and to correct any inaccuracies, if necessary.

It is important for you to know that all information discussed with the researchers and within the group setting will be held with the strictest of confidence. However, there are some exceptions and limits of confidentiality that you should be aware of. These include:

- If there are reasonable grounds to suspect that a child is or may be in need of protection, we are bound by law to report these matters to the Children's Aid Society.

- When an allegation of sexual abuse by a health practitioner is disclosed we are required to report to the abusing practitioner's regulatory college.
- When there is a serious threat of physical harm to you or another identified individual we may break confidentiality (i.e., call the police).
- If subpoenaed by a court order, it is required that personal health information (i.e., therapist notes for a client) is released.

Voluntary Participation/Withdrawal:

Your participation in this study is entirely voluntary; you do not have to participate, and you have the right to withdraw from the study at any time. If you decide to withdraw from the study, your future medical care will not be affected in any way. The study investigator may withdraw you from the study if he/she feels it is in your best interest, if you fail to follow directions for participating in the study, of it is discovered that you do not meet the study requirements, or for administrative reasons.

Summary of Findings:

If you wish to receive a summary of the results obtained from this study, please provide either your email or mailing address below. If you do not wish to receive a summary of the results obtained from this study, please leave the space below blank. A brief report of findings will be available to those interested within four months of study completion.

Email address: _____

or

Mailing address: _____

_____

_____

Contacts:

You have the right to ask any questions concerning the study at any time. If you have any questions, you may contact the study investigator at (807) 343-8441. If you have any questions regarding your rights as a research participant, you can contact the Office of Research, Lakehead University at (807) 346-7749.

Consent:

Study Title: Examining the efficacy of a cognitive behavioural intervention in reducing anxiety sensitivity and functional impairment in chronic pain patients

I confirm that I have been given sufficient time to consider the above information and to seek advice if I choose to do so. In addition, I confirm that to the best of my knowledge and belief, all technical language used by the research team members has been explained and that I received satisfactory answers to all questions which I asked. I have read and understand this consent form and I voluntarily agree to participate in this research trial. I have received a copy of this consent form.

Full Name (*please print)* Date

_____ _____

Signature *(please sign)*

_____

Name of person who explained Informed consent (*printed*)

_____

Signature of person who explained Informed consent Date

_____ _____

Appendix C

Participant Debriefing Form

Thank you again for your participation in this study. The purpose of this study was to evaluate a group treatment for individuals suffering with chronic pain. The treatment is intended to help participants better manage their chronic pain.

If at any point you feel uncomfortable with volunteering your data, we will remove it from our pool. To request that your data be removed from our pool, please contact the researcher at (807) 343-8441.

If you wish to receive a summary of the results obtained from this study, please provide either your email or mailing address below. If you do not wish to receive a summary of the results obtained from this study, please leave the space below blank. A brief report of findings will be available to those interested within four months of study completion.

Email address: _____

or

Mailing address: _____

_____

_____

Thank you again for the time and effort that you put into this study. If you have any questions or concerns, please do not hesitate to ask. Attached, we have provided a list of local mental health resources should you require any assistance in the future.

Thank you,

Christina Iorio, M.A.
Ph.D. Student, Clinical Psych.
Lakehead University
Thunder Bay, ON
ciorio@lakeheadu.ca
Phone: (807) 343-8441

Dr. Dwight Mazmanian, Ph.D., C.Psych.
Associate Professor
Lakehead University
Thunder Bay, ON
dwight.mazmanian@lakeheadu.ca
Phone: (807) 343-8257

Dr. Martin A. Katzman, M.D., F.R.C.P. (C)
Adjunct Faculty
Lakehead University
Thunder Bay, ON
mkatzman@startclinic.ca
(416) 598-9344

Mental Health Resource List: Toronto and Surrounding Area

Intake, Information and Referral Services Canadian Mental Health Association (CMHA) Toronto Branch

East of Yonge Street in Toronto
416-289-6285 x 243 - Monday to Friday 8:00 a.m. to 4:00 p.m.

West of Yonge Street in Toronto
416-789-6880 - Monday to Friday 8:00 a.m. to 4:00 p.m.

Centre for Addiction and Mental Health, McLaughlin Information Centre (CAMH)

Information line: Staff-assisted calls between 9:00 a.m. and 9:00 p.m. Monday - Friday.

Automated response line: available 24 hours. English, French and other languages.

In Toronto call 416-595-6111. Ontario toll-free 1-800-463-6273

The Consumer/Survivor Information Resource Centre of Toronto

416-595-2882 - Also 24-hour infoshare line 416-595-027

Mental Health Services Information Ontario

For community mental health services outside Toronto 1-866-531-2600.

2-1-1 Toronto (Telephone 2-1-1)
Your connection to community, social, health, and government services.
Companion website www.211toronto.ca complements the phone service.

Appendix D

Crisis Intervention Protocol

The protocol outlined below is to be implemented in emergency situations that may occur during the undertaking of the research study. Some potential situations where this protocol may be employed include, but are not limited to, the following:

a. Times when a participant is at imminent risk of harm to themselves or others.
b. During a medical emergency.
c. If a participant displays symptoms of a severe psychotic episode.

The steps listed below should be followed when one encounters a crisis situation involving a participant of the research study.

i. Ensure the participant who is at imminent risk remains with a therapist.
ii. Ensure all other group members are safe.
iii. Contact the police/ambulance (or take the individual to the emergency room).
iv. Contact the clinical on-site supervisor (Dr. Katzman), if he is not already present.
v. Contact the secondary clinical on-site supervisor (Dr. Vermani), if Dr. Katzman is unavailable.
vi. Contact the clinical off-site supervisor (Dr. Mazmanian) if Dr. Katzman and Dr. Vermani are unavailable.
vii. Inform the participant's physician of their current condition (if the participant provides consent to do so).

Appendix E

Demographic Questionnaire

What is your current chronic pain diagnosis (if known)? _____

What area of your body does your pain affect the most?

- ☐ Head
- ☐ Neck
- ☐ Chest/Stomach
- ☐ Lower Abdomen/Pelvis/Hips
- ☐ Back/Buttocks
- ☐ Thighs/Knees
- ☐ Legs/Feet
- ☐ Arms/Hands
- ☐ Entire Body
- ☐ Other _____

How long have you been suffering from chronic pain? _____

Age: _____

Sex:

- ☐ Male
- ☐ Female

Highest level of education (check one):

- ☐ Completed elementary school
- ☐ Completed high school
- ☐ Some Post-secondary Education
- ☐ Completed College Program
- ☐ Completed Bachelor's Degree
- ☐ Completed Master's Degree
- ☐ Completed Ph.D. or equivalent

Ethnic Background (please check one that best applies):

- ☐ Caucasian/European
- ☐ African
- ☐ Arab
- ☐ West Asian (*Armenian, Egyptian, Iranian, Lebanese, Israeli*)
- ☐ Caribbean

- East Asian (*Japanese, Korean, Chinese, Cambodian, Indonesian, Laotian, Vietnamese*)
- Filipino
- Latin American/Hispanic
- First Nations/Metis/Inuit
- South Asian (*East Indian, Pakistani, Punjabi, Sri Lankan*)
- Other – Specify: _____

Marital Status (check one):

- Single
- Co-habiting
- Widowed
- Married
- Divorced/separated

Average annual family household income (please check the category that best applies):

- $10 000 - $20 000
- $20 001 - $40 000
- $40 001 - $60 000
- $60 001 - $80 000
- $80 001 - $100 000
- $100 000 +

Employment/Education Status (please check one):

- Working fulltime outside of the home/in school full time
- Working part time/in school part time
- Work within the home
- Unemployed/not in school
- Temporarily not able to work/go to school or on leave
- Retired

Please list any medications you are currently taking:

Drug Name	**Dosage**	**Start Date**

Are you currently receiving WSIB benefits related to your pain?

- ☐ Yes
- ☐ No

Are you currently receiving disability benefits related to your pain?

- ☐ Yes
- ☐ No

Are you currently involved in any litigation related to your pain (e.g., lawsuit)?

- ☐ Yes
- ☐ No