The Moderating Role of Depression in the Relationship between Coping Strategies and

Significant Others' Reactions with the Experience of Chronic Pain

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Abstract

Research shows a strong co-morbidity between pain and depression (Schatzberg, 2004). Individuals suffering with both chronic pain and depression exhibit greater pain intensity, greater interference due to pain and more pain behaviours (Haythornthwaite, Sieber & Kerns, 1991). A variety of coping strategies (Endler, Corace, Summerfeldt, Johnson, & Rothbart, 2003; Ramírez-Maestre, Esteve, & López, 2008) and social support (Lopez-Martínez, Esteve-Zarazaga, & Ramírez-Maestre, 2008) have been found to be associated with the pain experience. Previous research on coping among pain patients has not considered the confounding effects of depression in the studies. This project investigates the moderating role of depression in the relationship between pain experiences with coping strategies and reactions from significant others in 201 chronic pain patients. The coping strategies examined include pain-related negative cognitions (pain rumination, pain magnification) and pain-related cognitive coping styles (catastrophizing, coping self-statements, ignoring sensation, distancing, distraction, praying). Reactions from significant others (punishing, solicitous, and distracting responses) were also examined. The various facets of the pain experience examined include pain severity, general interference with functioning, and sense of self-control. The results showed that rumination, catastrophizing, praying and distraction are associated with negative pain experiences, whereas ignoring painful sensations and the use of coping self-statements are associated with more positive pain experiences. Distracting patients from their pain is associated with greater self-efficacy in terms of control over pain. With the exception of the relationship between catastrophizing and work interference, depression was not found to be a moderator between the pain-related factors and pain experience. Instead, it was

found to have direct relationship with the pain experience. Supplementary findings

suggest that different coping strategies predict the pain experience in men and women.

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Defining Pain

Pain is a unique experience which can be traced back through time and across places. The experience of pain is complex in nature, 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 "(a)n unpleasant sensory and emotional experience associated with potential tissue damage, or described in terms of such damage" (Lindblom, Merskey, Mumford, Nathan, Noordenbos, & Sunderland, 1986). It is important to note the difference in how acute pain and chronic pain are conceptualized. 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).

There are a couple of ways in which chronic pain differs from acute pain. 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 (Apkarian, Bushnell, Treede, & Zubieta, 2005). Thus, acute pain perception in normal individuals appear 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 minimizing the pain and maximizing the individual's functioning. 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 as "pain which has persisted beyond normal tissue healing time" (International Association for the Study of Pain, 1986), which on average has been deemed to be approximately three to six months after the initial pain episode (Birse & Lander, 1998). This definition is limiting because it focuses solely on the physical aspect of chronic pain, and excludes psychological or psychosocial factors which may play a role in the development and maintenance of such pain. Examining chronic pain without taking into account additional factors besides the physical nature of the pain proves difficult when attempting to explain situations that involve pain in the absence of physical injury, or pain which persists following the healing of an injury (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 model of pain views pain as linked directly to the presence of some form of organic pathology within the body. In contrast, theories such as the gate control model of pain describe pain as stemming from a number of factors that include sensory, motivational, affective, and cognitive factors (Melzack & Wall, 1965).

Regardless of 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, regardless of the specific manner in which chronic pain is defined, those who suffer with this pain 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 prevalence rate of chronic pain within Canada appears to range anywhere from 20% to 44% (Birse, & Lander, 1998; Smith, Hopton, & Chambers, 1999). In the United States, however, current data suggest that the prevalence rates fall within the range of 4% to 11% (Hardt, Jacobsen, Goldberg, Nickel, & Buchwald, 2008). The discrepancy in prevalence rates reported both within and between the two countries might be due to differences in the definitions of chronic pain that were utilized in the research. For example, in some epidemiological studies, the definition of chronic pain refers to

pain which is not directly linked to a nociceptive (pain-producing) substrate (Verhaak, Kerssens, Dekker, Sorbi, & Bensing, 1998), rather than a definition based on normal healing time, such as pain which persists beyond six months (Moulin, Clark, Speechley, & Morley-Forster, 2002). Other researchers define chronic pain to be pain that has persisted for three months or more (e.g., Parsons et al., 2007), while others consider chronic pain to be pain that persists for six months or more (e.g., Sjøgren, Ekholm, Peuckmann, & Grønbaek, 2009).

Some additional reasons for the discrepant findings may include variation in sample characteristics such as gender or age because chronic pain appears to be more prevalent in women and older individuals (Birse & Lander, 1998). Differences in methodology may also contribute to the inconsistent results. Some studies have employed telephone surveying (e.g., Moulin et al., 2002) while others have employed interviews (e.g., Sjøgren et al., 2009) or medical examinations (e.g., Mäkélä, & Heliövaara, 1991). Additionally there are differences in the definition of chronic pain employed in different studies.

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. The annual cost in the United States for outpatient visits for those dealing with chronic pelvis pain alone is estimated to be approximately $881.5 million (Meana, Cho & DesMeules, 2004). In Canada, the annual cost estimate for each chronic pain patient is $14,744 (Jovey, 2005). Other costs borne by society include loss of productivity, increased utilization of health care that strains the health care system, and a substantial amount of health care expenditures (Turk, Loeser, & Monarch, 2002).

In response to the high cost of chronic pain within the North American economy, a call for better education of health care professionals in the assessment and treatment of pain is required. The Canadian Pain Society advises that the internationally recognized standard for treatment of pain is an interdisciplinary pain rehabilitation program (Jovey, 2005) that is composed of a team of various health care professionals. Although somewhat costly in their initial setup, these programs not only demonstrate the best opportunity at improvement for chronic pain patients, but also seem to offer promise of reducing the high costs of pain-related disability (Chen, 2006). Unfortunately, there are not many publicly funded interdisciplinary pain programs within Canada, leading to long wait lists of 14-24 months in the few that do exist (Jovey, 2005). Thus, attention needs to be focused on the implementation of these programs in an attempt to provide patients with access to appropriate resources.

Physiological Mechanisms of Pain

As previously mentioned, pain can be considered to serve an adaptive function as it alerts an individual to various forms of tissue damage, and protects him/her from any further damage to the body (Kingdon, Stanley & Kizior, 1998). The adaptability of experiencing pain is demonstrated by looking at those few individuals who suffer from a rare syndrome (congenital analgesia) in which they experience no pain whatsoever (Cox et al., 2006). This inability to experience pain leads these individuals to be at increased risk of severe danger to their bodies, as they are more prone to accidents and injury due to the lack of sensory experiences of pain (Fishman & Berger, 2000). Thus, pain is understood to be useful; however, when it is long-standing and interferes with daily functioning it can lead to severe consequences.

In terms of the physiological mechanisms of pain, there is an activation of structures and processes upon injury which allows for the transmission of the pain signal from the site of damage to the brain. In order to understand pain perception, one must first look to the process of pain sensation which involves the nervous system. The nervous system is divided into two parts: the central nervous system (CNS) which is comprised of the brain and spinal cord, and the peripheral nervous system (PNS) which is the link between the CNS and the rest of the body and carries signals back and forth. The CNS processes and reacts to pain that usually stems from parts of the body which belong to the PNS (Zimmerman, 2004). The body contains millions of sensory nerve cells found throughout the skin, muscles, and other parts of the body. These nerve cells continuously pick up and relay information to the brain through the use of pain pathways, which are comprised of nerve fibres and electrochemical nervous impulses. Sensory nerve fibres can be found along both sides of the spinal cord, travelling up to the brain, which together comprises the CNS (Caudill, 2008). When tissue damage occurs as a result of an environmental event or when nociceptors (injury-sensitive receptors) are activated by mechanical, thermal, or chemical stimuli, these nociceptors generate nerve impulses that travel along the fibres of the peripheral nervous system (PNS) to the central nervous system (CNS). The brain has an important role in pain modulation, as it must continuously process and filter all sensory information it receives (Drum, 1999). This process involving the sensory transduction and neural transmission of the tissue damage or of the stimulation by mechanical, thermal or chemical events is called nociception (Chapman, 1984).

It is believed that acute pain involves pain impulses which begin in the PNS, and then travel to the brain (Chapman, 1984). Once the signal has reached the brain, it is able to be perceived and recognized as pain (Kingdon et al., 1998). However, the process in chronic pain is somewhat different. Some researchers believe that the pain moves back and forth through pathways or "loops" between the brain and spinal cord, essentially feeding on itself (Drum, 1999) and persisting across time. Even when no actual pain stimulus is received, the afferent nerve fibres have the ability to release pain signals without any stimulation. Chronic pain can also be caused by the regeneration of damaged nerve cells, as this process includes the sprouting of new nerve endings (Graff-Radford, 2001). A separate process termed modulation is able to inhibit the transmission of the pain signal to the brain. In modulation, certain neurotransmitters are released by a system of nerve fibres which changes the synaptic sensitivity of the ascending pain signal and prohibits its recognition by the brain (e.g., Kingdon et al., 1998).

Two types of pain exist which originate within different structures in the body: nociceptive and neuropathic pain. Nociceptive pain refers to pain which arises from injury to muscles, tendons, and ligaments, or within the internal organs (Schneider, 2004). This type of pain is categorized as heavy, dull, sharp, aching, and/or throbbing (Kingdon et al., 1998), with some examples of chronic nociceptive pain that include chronic low back pain, rheumatoid arthritis, fibromyalgia, headaches, or chronic pelvic pain (Schneider, 2004). Neuropathic pain, on the other hand describes a pain that is the result of injury or disease of neurons located in the peripheral or central nervous system (Schaible & Richter, 2004). Changes occur as a result of the damage to the nervous system, resulting in abnormalities in the manner in which the pain is experienced (Nagda

& Bajwa, 2004). Nerve fibres which have been damaged can fire spontaneously throughout the nerve pathway, and this spontaneous firing can continue indefinitely, leading to the experience of chronic pain. Due to the abnormal reactions of the nerve fibres in neuropathic pain, what develops is a tendency of exaggerated responses to painful stimuli (hyperalgesia), the dispersion of pain to areas which were initially absent of pain, and the experience of painful sensations in response to stimuli that are not normally painful, such as a light touch (allodynia) (Winterowd, Beck, & Gruener, 2003). This type of pain is often described as burning, shooting, or electrical pain, although there is often difficulty on the part of the patient to describe this type of pain (Kingdon et al., 1998). Some examples include trigeminal neuralgia, diabetic neuropathy, phantom limb pain, and postherpetic neuralgia. It is possible that a certain pathophysiologic condition may include both nociceptive pain and neuropathic elements, such as the experience of back pain that radiates down the leg (Sams, 2006).

In terms of the biochemical nature of pain and pain modulation, there are a number of neurotransmitters produced within the body which act to either suppress or stimulate the sensation of pain (Zimmerman, 2004). The release of these neurotransmitters either inhibits or increases the firing of specific neurons involved in the pain pathway. Neurotransmitters which are believed to decrease painful sensations include endorphins, enkephalins, and dynorphins. Narcotic drugs (endogenous opioids) mimic the action these natural pain relievers have on the body (Bracciano, 2008). There are specific ways in which endogenous opioids can be increased, including exercise, stress reduction, and medical treatments such as transcutaneous electrical nerve stimulation (TENS) (Schneider, 2004). Natural pain relievers also affect emotions and

mood by binding to receptors of pain-sensing neurons, leading them to become less sensitive to receiving pain signals. This is significant, as these substances have an effect on anxiety and depression, which are highly comorbid with chronic pain (Tunks, Crook, & Weir, 2008). There are additional substances produced within the brain which aid in the stimulation of natural pain relievers. Specifically, serotonin is believed to play a role in the alleviation of pain. In lower concentration levels, serotonin decreases blood flow to the site of pain, leading to a decrease in pain tolerance. Individuals suffering with chronic pain tend to display lower levels of endorphins and serotonin in their spinal fluid (Almay, Johansson, von Knorring, Sedvall, & Terenius, 1980).

Sex Differences in Pain

There is a consensus in the pain literature that there are sex differences in relation to pain. Studies examining the prevalence rates of pain in both men and women indicate that women tend to have higher prevalence rates of a number of pain conditions (Crook, Rideout, & Browne, 1984; Munce & Stewart, 2007; Tsang et al., 2008; Wijnhoven, de Vet, & Picavet, 2006). The 2000-2001 Canadian Community Health Survey (Meana et al., 2004) reports higher prevalence rates of chronic pain among women (18%) than men (14%). The differences found in prevalence rates begin to appear in adolescence, and continue through to adulthood (Lester, Lefebvre, & Keefe, 1994). However, the magnitude of these differences and the reasons for the sex differential continue to be debated. Within the Canadian Community Health Survey sample, the sex discrepancy in prevalence rates appears to be explained by differences in age, education and income levels rather than by sex alone. 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. With respect to the intensity of pain experienced, no sex differences were apparent within this sample, because both men and women suffering from chronic pain conditions (including back pain, fibromyalgia, arthritis/rheumatism and migraine headaches) reported similar levels of pain intensity (Meana et al., 2004). Thus, the exact magnitude of the differences between men and women is difficult to determine because findings vary depending on the nature of pain and the population examined.

In addition to prevalence rates, sex differences in pain perception have been examined, specifically pain sensitivity and pain tolerance (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 these studies, pain induction techniques were used to determine any differences in pain thresholds (the point which pain is first detected) and pain tolerance levels (the length of time one is able to endure pain). The majority of studies asked participants to verbalize the point at which pain threshold or pain tolerance was reached (Edwards at al., 2004; Fillingim, 2003; Lowery et al., 2003; Nayak et al., 2000). However, some results were based on neurophysiological responses to painful stimuli, such as muscle responses, pupil dilation, and regional brain activation (Fillingim, 2003). Overall, results 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). There have been some studies however that found 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).

In attempts to clarify the sex differences obtained in relation to pain perception and intensity, a number of explanations have been offered. Physician bias may play a role in the discrepancy found between men and women, because physicians tend to give men a lower pain rating than women (Marquié et al., 2003). In addition, socialization may play an important role in the willingness to disclose pain (Bendelow, 1993), as studies examining ability to tolerate acute pain in infants revealed no sex differences (Fuller, 2002). Additional factors including biological, social, cultural, and psychological factors have been examined and are discussed below.

In terms of biological factors, differences observed in pain perception between men and women can potentially be explained through an examination of the sex hormones. For example, studies have shown fluctuations in pain sensitivity across the female menstrual cycle (Giamberardino, Berkley, Jezzi, de Bigontina, & Vecchiet, 1997; LeResche, Manel, Sherman, Gandara, & Dworkin, 2003; Riley, Robinson, Wise, & Price, 1999), suggesting that circulating sex hormones such as estrogen might be involved in pain regulation (Keogh, Mounce, & Brosnan, 2007). Some researchers postulated that men might have a greater pain tolerance because testosterone has a protective effect (Harbuz, Perveen-Gill, & Lightman, 1995; Hau, Dominquez, & Evrard, 2004).

The sex (gonadal) hormones play a role in modulating functions of the CNS. In particular, these hormones play a role in balancing neurotransmitters such as norepinephrine and serotonin in the nervous system (Mailis-Gagnon & Israelson, 2003). This is important, as discussed earlier, because certain neurotransmitters have an effect on certain chronic pain conditions. In addition to affecting neurotransmitters, the gonadal hormones also affect the opioid system. Particularly in women, these hormones affect pain thresholds in relation to stages of the menstrual cycle. Thus, sex hormones not only have a reproductive function, but also have been found to play a role in the immune system, trauma-induced inflammation, and the nervous system. In terms of analgesic drugs, researchers have demonstrated that women tend to respond less to drugs such as ibuprofen, but respond more favourably to opioids than do men (Mailis-Gagnon & Israelson, 2003). These differences have implications for treatment. When one considers the literature, it can be seen that the link between sex hormones and pain perception in humans has not been completely mapped out. However, researchers have suggested a link between sex hormones and the action of GABA where GABAnergic mechanisms have implications for pain, hormonal states, and neuroactive agents such as serotonin and dopamine (Berkley, 1997). As well, opiod and non-opiod mechanisms that are involved in analgesia are modulated by sex hormones and other steroids (Berkley 1997).

There are also sex differences in organic pain which has a non-pathological basis. In women this form of pain is experienced thorough menstruation, ovulation, pregnancy and childbirth, whereas men may experience pain from procedures such as circumcision or testicular pain from trauma or infection (Mailis-Gagnon & Israelson, 2003). There is more likelihood that pain related to anatomy experienced by men is due to injury or

disease, as in acute pain, where there is some underlying cause which can be directly treated (Lester et al., 1994). In addition, the transmission of pain signals, pain perception, and pain sensitivity may differ between men and women due in part to organic differences such as brain chemistry, metabolism or hormonal variation (Unruh, 1996).

Although sex differences related to pain can be biological in nature, social and cultural factors, such as role expectations and social role modeling, have also been examined. Studies examining the manner in which pain is expressed by men and women demonstrate that while men are embarrassed about pain they experience and are more reluctant to disclose it, women were more likely to share their feelings of pain (Klonoff, Landrine, & Brown, 1993). Men and women also tend to cope with pain differently (Keefe et al., 2004). Men concentrate more on problem solving strategies and women focus on the emotional aspects of pain, and tend to rely more on social and emotional support. Furthermore, men appear to feel more in control of their pain, reporting lower levels of pain and catastrophizing, where catastrophizing refers to negative thoughts surrounding the assumption that the worst will happen given the current situation (Mailis-Gagnon & Israelson, 2003).

In general, women tend to report more psychological distress (McDonough & Strohschein, 2003). This may explain to some degree the gender differences observed in relation to pain because pain and psychological distress (especially depression) often co-occur (Banks & Kerns, 1996; Patten et al., 2008). Those suffering with chronic pain often have to deal with a number of co-existing stressors, including their pain symptoms, loss of functioning, and associated disability (Banks & Kerns, 1996). It has been proposed that the interaction of these stressors, along with a vulnerability to engage in negative

coping strategies (such as cognitive distortions or negative thoughts) may in fact lead one

to spiral into a depressive episode. Research in this area has demonstrated support for the

theory (Abramson et al., 2002; Abramson, Metalsky, & Alloy, 1989; Ingram, Miranda, &

Segal, 1998; Nolen-Hoeksema, 1991). This may explain the higher rate of depression in

women suffering with chronic pain; if women are experiencing a greater degree of stress

which interacts with negative cognitions, this may in turn lead to an increase in pain and

depressive symptoms. In terms of health care utilization, it appears that women are more

likely than men to seek help for their pain in places such as a pain clinic (Mailis-Gagnon

& Israelson, 2003; Unruh, 1996).

Unruh (1996) proposed five key factors for examination in research that looks at

sex differences in pain patients. Firstly, it was proposed that researchers take into

account the fact that sex of the individual may be an independent factor or may interact

with other variables such as duration, frequency, severity, or location of pain. Secondly,

the author suggested that attention be given to the impact of sex while taking into account

the relationship between age and pain. There is limited research surrounding the influence

of sex on pain in the elderly population as well as in infants (Unruh, 2002). Investigation

of these populations may further clarify the role of biological and environmental factors

in the pain experience. Thirdly, in terms of examining the meaning of pain for both men

and women, the author suggested that when using retrospective self-report

questionnaires, differences seen between the two sexes may be due to differences in

recall ability rather than in actual pain experience. Thus, it was suggested that future

research using self-report measures be prospective in nature if possible and restricted to

shorter recall periods. Fourthly, the author suggested that the relationship between the

patient and the health professional also be examined, because sex of the patient and of the health professional may be a factor in the manner in which one presents with pain, the acceptability of the pain behaviours, the treatments offered to the patient, and the patient's willingness to engage in various treatment options available. Lastly, the manner in which men and women adjust to and cope with their pain, along with any differences in the effects of treatment options should also be further investigated. Unruh (1996) concluded that more attention needs to be paid to the impact of sex on the underlying biological mechanisms associated with pain, as this may aid in the explanation of the differences found between men and women with respect to their pain experience. Thus, the complexity of pain itself requires a biopsychosocial approach to be taken to examine the sex differences related to the perception of pain.

Pain Theories

Over the years a number of theories of pain have been proposed. Originally, it was believed that pain was felt in the heart. It was not until the mid-seventeenth century when René Descartes conceptualized the notion of pain pathways that pain was considered a sensation set apart from the other senses; he envisioned the pain pathway to be comprised of a number of fibers which ran between the skin and areas of the brain (Fishman & Berger, 2000). Although pain does travel along pathways of nerves, it is now known that there is not one single pathway, as Descartes had suggested. Rather, there are two main routes which pain signals travel through: the CNS that includes the brain and spinal cord, and the PNS that includes the somatic, autonomic and the enteric nervous system. These two main routes are comprised of numerous smaller pathways which run in many directions, where the complex system in its entirety has yet to be fully

understood. The main finding which came out of Descartes' theory was that pain is not a static event, but rather is a process which has the potential to transform as it moves along the various pathways within the body (Fishman & Berger, 2000).

There was a competing theory of pain at the time of Descartes called the intensive theory that describes pain as a "normal" sensation which has become magnified (Fishman & Berger, 2000). This theory was originally based on Aristotle's notion of pain as an excessive sensitivity to heat and touch, but was later refined by scientists in the nineteenth century who applied the theory to all senses. Each individual is understood to have a different "magnifying glass" so to speak, in that pain tolerance varies from one individual to the next. With this theory came the understanding that pain is highly subjective in nature. The mind-body connection is also an important aspect of this theory, in that it is posited that individuals have the ability to either magnify or minimize their perception of pain (Fishman & Berger, 2000). Today, these ideas have implications for treatments such as cognitive behavioural therapy that aid chronic sufferers to modify their cognitive coping and appraisal patterns in a more adaptive manner which in turn would impact on the pain experience (intensity, sensation, and unpleasantness), mood or affect, pain behaviours, and functioning (Morley, Eccleston, & Williams, 1999).

The relatively more recent gate control theory of pain was conceptualized by Ronald Melzack and Patrick Wall in 1965. This theory 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 explains 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 experienced.

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 experienced by the body. 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. 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).

The gate control theory postulates that A and C nerve fibers allow for the transmission or inhibition of pain signals up the spinal cord to the brain. The A fibers continuously work to hold the "gate" open through the dorsal horn of the spinal cord, thus, continuously sending messages up to the brain. Specific A fibers have different roles, such as the A-delta fibers which carry the impulses fairly rapidly, allowing the body to respond quickly to pain. A-delta fibers send sharp, acute pain signals, whereas A-

beta fibers send painless touch and pressure sensations at a lower speed (Drum, 1999). The C fibers tend to carry slow (Schneider, 2004), burning, aching pain signals which are often the forms of pain most associated with chronic nonmalignant pain. The C fibers send messages to the brain at an extremely slow rate as compared to the A fibers. Their task is to warn an individual that his or her body may have suffered harm; a valuable message following an injury as the enduring pain signals the body to rest, i.e., limping until broken ankle is healed (Drum, 1999).

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). Upon realization that conventional medical treatments were failing to be effective in alleviating pain, alternative treatment options (such as physiotherapy, cognitive behavioural therapy, acupuncture, etc.) began to surface. These alternative treatments were not simply derived from theory, but rather were based upon experimental findings in addition to theoretical underpinnings. Over time, examination led to a more comprehensive view of pain, incorporating both biological and psychological aspects of pain and pain management.

Pain Assessment

The first step towards the management of pain is to adequately assess it, yet there are a number of factors which present difficulty when it comes to the assessment of chronic pain. The persistence of chronic pain leads to modification in the sufferer's natural response to pain, for example, the lowering of the individuals' pain threshold due to the reduction of serotonin and endorphin levels (Drum, 1999). Thus, the pain

experienced by the individual may be more intense than it appears. Adaptations to chronic pain also occur, as the body compensates for the pain by normalizing autonomic responses (Drum, 1999). Sufferers also learn to control their behaviours in order to mask their experience of pain (Kingdon et al., 1998). It is not possible to measure the severity of a patient's pain simply through visual inspection (Librach, 1991). This leads to great difficulty in assessing chronic pain, because the clinician is faced with the challenge of detecting the "true" pain which is experienced. Hence, it is the subjective experience of the patient on which the clinician must rely (Kingdon et al., 1998). However, it is this very subjectivity that contradicts the values of the current health care system which is based upon objective measurement.

Previous to the past thirty years or so, pain was assessed solely based on the biomedical model of pain, where medical assessment procedures were employed in order to determine the original "cause" of the pain, along with determining the degree of impairment or disability the patient is experiencing (Turk & Rudy, 1987). However, the inability to locate organic causes for chronic pain, along with the continuation of pain following the removal of the organic cause led researchers to conclude that chronic pain involved more than simply biological factors (Turk & Rudy, 1987). Hence, the conceptualization of pain developed into two differing approaches: psychiatric and behavioural.

With respect to the psychiatric approach, patients were viewed in a dichotomous manner; either their pain had an organic basis or it was not organically based. If it was the latter, then the pain was deemed to be emotional in nature. Many diagnostic tools looking at psychopathology have been employed in pain assessment, some looking

specifically at these conditions within the chronic pain population. Some of these instruments include the Pain Apperception Test (Petrovich, 1958), the Low Back Cognitive Distortion Scale (Lefebvre, 1981), and the Lb [low back] scale derived from the MMPI (Hanvik, 1951).

A different perspective is upheld by the behaviourally-oriented psychologists in which pain is deemed to be a subjective experience that can only be assessed through the examination of behaviours (Turk & Rudy, 1987). These pain behaviours are measured for example, by looking at facial expressions during a structured activity (Craig & Prkachin, 1983), or through the use of a recording apparatus to measure physical activity (Follick, Ahem, & Laser-Wolston, 1984; Sanders, 1980).

Over time, a multidimensional view of pain was adopted leading to the development of a comprehensive assessment of pain. The various dimensions of pain that are commonly assessed include physical, functional, behavioural, cognitive, emotional, economical, and social factors (Williams, 1988). The physical assessment of pain relies on verbal reports, biofeedback monitors, and symptom checklists. 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). Behavioural and cognitive measures 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 through the use of scales such as the Hospital Anxiety and Depression (HAD) scale. A number of economic factors such as cost of treatments, hospitalizations, medications, compensation, insurance, disability payments

are assessed. Sociocultural factors include living arrangements, independence, family involvement, quality of life and patient goals. All factors described above are generally assessed through the use of standardized measures or patient questionnaires (Williams, 1988).

A typical assessment of chronic pain begins with a historical intake, followed by an examination of the experience of pain from the patient's perspective (including duration, intensity, location, symptoms, etc). At this point, it is imperative to determine the impact the pain has had on the individual's daily life. Thus, an examination of psychosocial factors should also be included in the assessment (Norris, 2000). In order to gather a comprehensive evaluation of the pain experienced by an individual, a number of questionnaires have been employed in the assessment procedure. These questionnaires range from those which attempt to measure pain intensity, location and quality, to those which examine psychological, psychosocial and behavioural factors which may be associated with pain.

In determining pain intensity, several measures are commonly in use. They include the Visual Analogue Scale (VAS), Numerical Rating Scale (NRS) and the Verbal Rating Scale (VRS). The VAS is comprised of a 10-centimetre line which is marked 'No Pain' on one end and 'Worst Imaginable Pain' on the other (Norris, 2000). Patients are asked to indicate where on the scale they would rate their current pain intensity. The VAS has proven to be statistically robust (Price, McGrath, Rafii, & Buckingham, 1983; Revill, Robinson, Rosen, & Hogg, 1976), and is quite useful in assessing changes in intensity of pain as it is a sensitive measure (Maxwell, 1978). The limitations of the VAS include the need to rely on paper or electronic means to present the scale, and the differential error

rates associated with horizontal versus vertical graphical presentation of the scale that are related to the normal reading tradition of the respondent (Williamson & Hoggart, 2005). The NRS consists of 11, 21, or 101 point scales, where each end point indicates either no pain or the highest level of pain. This measure can be administered to the patient either verbally or graphically (Williamson & Hoggart, 2005), and allows for quick and easy administration, along with simple recording (Norris, 2000). The VRS uses a list of numbered adjectives which describe various levels of pain intensity (i.e., no pain, mild pain, moderate pain, and severe or intense pain). The VRS has the least sensitivity among the three measures, which may result in over or under-estimation in change in pain intensity (Williamson & Hoggart, 2005).

Through the use of pain questionnaires, clinicians are able to quantify the intensity of the pain experienced by the patient. Questionnaires such as the McGill Pain Questionnaire (Melzack, 1975) are often useful in research settings, but in clinical settings it is more practical to use the analog scale (visual or oral) as this measure allows for ease in tracking treatment progress. With the analogue scale it is easier for patients to quantify their pain intensity as they are using a 5 or 10 point scale. This aids in the evaluation of treatment progress, as the VAS provides a clear baseline and endpoint measure. However, it is important to keep in mind that results can only be interpreted on an individual basis and not compared across patients (Librach, 1991).

In assessing chronic pain, it is often necessary to determine whether the onset or continuation of pain is due to physiological or psychological factors. One way to achieve this distinction is to check for the presence of Pain Disorder, as outlined in the Diagnostic and Statistical Manual, fourth edition (American Psychiatric Association, 2000). An

example of someone suffering from Pain Disorder that is thought to be related to psychological stress would be a patient complaining of headaches solely in the presence of their spouse (Merskey, 2000). The value in assessing for Pain Disorder (as defined by the DSM) is that if diagnosed, it allows for the patient to avoid unnecessary and potentially harmful medical interventions.

Thus, multiple measures can be used in conjunction to assess pain. Some forms of chronic pain have been found to have uncertain predictability, and thus, it has been suggested that they be viewed as a dynamic state rather than a static trait (Von Korff & Miglioretti, 2005). A prognostic approach to chronic pain assessment can aid in the reduction of future risks associated with the pain, as well as managing pain intensity (Von Korff & Miglioretti, 2005). Early detection of chronic pain leading to early treatment increases the likelihood of more positive outcomes for the patient. Increasing the ability of primary care physicians to detect chronic pain disorders in their patients may be the first line of defense in the treatment of chronic pain (Meana et al., 2004).

Pain Management

There are differences which exist in terms of the management for chronic pain, as there are clinicians who do not recognize the multidimensional nature of chronic pain (Kingdon et al., 1998). Chronic pain ranges in its cause (such as pain resulting from an injury or disease to pain with no apparent organic basis), and can cause different levels of functional impairment in the individual (Osterweis, Kleinman, & Mechanic, 1987). Despite these differences, individuals are often grouped together under the term "chronic pain syndrome", leading to a homogeneous treatment of all forms of chronic pain (Wilson & Gil, 1996). Individuals suffering from chronic pain not only suffer from the

sensation of pain but also have to endure the consequences of that pain, including financial difficulties, sleep disturbances, depressed mood, decreased activity, family issues, and social withdrawal (Keefe, Gil & Rose, 1986).

Pharmacological treatment has proven to be effective in the treatment of pain (Clark, 2000). Factors to examine prior to deciding on pharmacological treatment include previous treatments, side effect profiles, psychiatric comorbidity, temperament, coping, and personal history (Clark, 2000). The difficulty with employing pharmacological treatment is that it is often difficult to predict which one treatment will be effective, because the pain itself may change over time, directly affecting the treatment being used (Clark, 2000).

In terms of pharmacologic treatments, there are several medications that are used to treat a variety of pain disorders. Opioids appear to be effective in treating chronic non-malignant pain. Concerns over opioid abuse and development of tolerance to the medication led to the creation of guidelines set out by various organizations in the 1990s to address the risks associated with opioid usage (Clark, 2000). Please see Table 1 for a review of some of the more common pharmacological treatments for chronic pain syndromes.

In terms of psychological treatments, there have been a variety of strategies employed in chronic pain management that include hypnosis, relaxation training, and cognitive behavioural approaches (Tunks, 2008). Research in the area of pain and depression has led to the discovery that the pain experience is comprised of both pain sensations and emotions (Schneider, 2004). Similar neural pathways are involved in both pain sensations and emotions (Talbot et al., 1991), leading to the notion that in patients

suffering with chronic pain, solely treating the body is not sufficient because one must also treat the mind (Mailis-Gagnon & Israelson, 2003). Due to the comorbidity of chronic pain with anxiety and depression (Tunks et al., 2008), chronic pain patients may also experience a heightened awareness and fear associated with body sensations (Norton & Asmundson, 2004), which increases the difficulty of living with chronic pain. Thus, psychological treatments to aid in chronic pain must focus not only on the perception of pain, but also on the alleviation of symptoms associated with anxiety and depression (Schneider, 2004).

Among the most common psychological treatments employed in the treatment of chronic pain are those techniques associated with cognitive behavioural therapy (CBT). The premise underlying the use of CBT in chronic pain patients is that the manner in which an individual thinks about his or her chronic pain impacts the way that individual feels (Schneider, 2004). The premise of CBT is that it is one's thoughts (internal experiences) that relate to the interpretation of information outside of the self that cause the individual to feel and behave in the manner in which he or she does. The underlying goal of CBT in its use with chronic pain patients is to transform negative thoughts and dysfunctional beliefs, attitudes and expectations in relation to pain into more adaptive thoughts, emotions and behaviours (Grant & Haverkamp, 1995). CBT is also used in pain patients to increase their motivation to engage in social and pleasurable activities (Schneider, 2004). A meta-analysis of 25 trials examining the effectiveness of CBT in the treatment of chronic pain revealed CBT to be more effective than either waiting list controls or alternative treatment controls in improving pain experience, cognitive coping and appraisal, and the behavioural expression of pain (Morley et al., 1999).

Some other psychologically-based techniques used in the treatment of chronic pain include biofeedback, relaxation or meditation, and hypnosis. Biofeedback techniques use various instruments to monitor patients' skin temperature, heart rate, or brain waves, and the results of this monitoring is presented immediately back to the patient to help him or her learn to control specific bodily functions (Zeichner & Boczkowski, 1986). The rationale in using this technique is that the feedback provided can allow patients to change an aspect of their physical nature which they normally have no control over. In terms of pain, biofeedback has the ability to break spasm cycles and reduce anxiety, depression and continuous monitoring of the body for additional pain (Schneider, 2004). DeCharms et al. (2005) found that chronic pain patients were able to control the portion of their brain understood to be involved in pain processing (the rACC) using real time neuroimaging, which subsequently led to decreases in pain perception.

Mindfulness meditation is a practice which is used with chronic pain patients with the intention of teaching patients to detach themselves from the experience of pain and observe the painful experiences without attaching meaning to them (Schneider, 2004). Research efforts have been employed to examine the effects of mindfulness meditation on relieving chronic pain symptoms, and positive results have been obtained (Shigaki, Glass, & Schopp, 2006). In a sample of individuals suffering with rheumatoid arthritis, it was found that eight weeks of mindfulness practice led to improved coping efficacy, a factor found to be related to perceived pain experienced, with a stronger influence for patients who had recurrent depression (Zautra et al., 2008). The mindfulness group, however, also included emotion regulation therapy, thus limiting results obtained to

reflect the effects of purely mindfulness-based treatment. Sagula and Rice (2004) examined the effects of mindfulness on the grief process (over loss of physical activities, relationships, careers, and hobbies) associated with chronic pain. Results indicated that the process of grieving was initially passed through at a faster pace by those in the mindfulness group. As well, the treatment group demonstrated a decrease in depression and state anxiety. It can be difficult to empirically evaluate the abstract concepts associated with mindfulness based therapy, as they include increased awareness, compassion, insight, and "mindfulness" itself which are difficult to operationally define. Although encouraging findings have been obtained, more refined research is needed to determine the effects of mindfulness based techniques on pain reduction in the chronic pain population.

Hypnosis is described as an altered state of consciousness, thought to allow for a deeper level of relaxation, potentially leading to more peaceful sleep, increased energy and decreased pain (Schneider, 2004). Reviews on the literature of hypnosis as a treatment option for pain reduction have concluded that hypnosis is an innovative treatment which has demonstrated effectiveness (Milling, 2008). In the past, hypnosis was used as sole anaesthesia for major surgeries. Today, hypnosis has been found to be effective in a variety of chronic pain populations, including arthritis, cancer, irritable bowel syndrome, and many organically based pain syndromes (Drum, 1999). A review examining headache and migraine sufferers determined hypnosis to be a viable treatment option for this population, as it demonstrates efficacy without incurring side effects or risk of adverse reactions (Hammond, 2007). A recent development has been the use of virtual reality hypnosis in the treatment of chronic pain. The use of virtual reality in

delivering hypnosis to patients is presumed to be more effective than the standard approach to hypnosis. Virtual reality hypnosis provides the patient with visual stimuli, which is believed to require less effort and concentration by the patient, and allow for more concentration on the hypnotic induction and less on the pain. There appears to be positive results with this form of treatment in patients suffering from chronic neuropathic pain. However, more research is needed as results were based on case study reports and preliminary reductions in pain do not appear to sustain over time (Oneal, Patterson, Soltani, Teeley, & Jensen, 2008).

It is important to take into consideration a number of factors when implementing various treatment options with individuals suffering with chronic pain. Readiness to change is one factor which may influence treatment, as individuals who did not initially agree with the self-management program suggested for them were less satisfied with their treatment (Shutty, DeGood, & Tuttle, 1990). The examination of subgroups of patients who, based on specific behavioural and psychological characteristics, have been identified as responding differently to identical treatment options may aid in the formulation of individually tailored treatment plans that can enhance positive treatment outcome (Gatchel & Epker, 1999). Taking each patient as an individual, matching treatment to that person rather than using a one size fits all approach, and taking into account the degree of compliance and adherence of patients to treatment plan will likely aid in prescribing treatment options to individuals with chronic pain (Turk & Okifuji, 2002).

Chronic Pain and Mental Health

Numerous studies have found chronic pain to be associated with psychiatric disorders, including depressive, anxiety, somatoform, substance use, and personality disorders (Dersh, Polatin, & Gatchel, 2002; White et al., 2008). There is a 41% increased risk of being diagnosed with a psychiatric disorder if one has a chronic medical condition. Specifically, the more prevalent psychiatric disorders found in those diagnosed with chronic pain are affective, anxiety, and substance abuse disorders (Wells, Golding, & Burnam, 1988). Similar results were obtained in a study examining the United States general population, where strong relationships between chronic pain and mood and anxiety disorders were obtained, with the strongest associations involving panic disorder and post-traumatic stress disorder (McWilliams, Cox, & Enns, 2003a). In addition, increased pain-related disability did not appear to be associated with the presence of multiple as opposed to a single psychiatric disorder (McWilliams et al., 2003a). The results obtained must be interpreted with caution, however, as some of the samples examined do not appear to be generalizable to the population as a whole because they tend to capture individuals who are highly educated, rank at a higher socioeconomic status, and who are mainly Caucasian.

Tunks et al. (2008) conducted a review based on epidemiologic and population studies examining the relationship and effects of chronic pain and psychological comorbidities. Their review suggested that various mood and anxiety disorders have been found to be two to seven times more likely in chronic pain sufferers than in individuals not suffering with chronic pain. It was concluded that the severity of depression in particular was dependent on the severity of pain perceived by the patient; as the severity

of pain increased, so did the severity of depressive symptoms. Psychological factors also affected the prognosis of chronic pain, as prognosis was worse when comorbid psychological conditions were present. It is important for health care providers to be aware of these issues, as they may help guide treatment.

A second review conducted by Dersh et al. (2002) also examined the association between chronic pain and psychopathology, focusing on research which specifically examined depressive, anxiety, somatoform, substance and personality disorders. These authors concluded that the link cannot be fully explained by any single theoretical model and that the diathesis-stress model is the predominant theoretical approach to integrate the findings particularly in relation to depression and personality disorders. This model maintains that certain pre-existing characteristics such as negative schemas and maladaptive coping skills become intensified in individuals when dealing with the stress of suffering from chronic pain, and this in turn leads to the development of a diagnosable psychological disorder. The authors suggested that a prospective research endeavour will allow for verification of this model. However, they acknowledged some difficulties with this undertaking. It will require the recruitment of a large number of individuals, as only a percentage of them will go on to develop some form of chronic pain. As well, the assessment of the diathesis (pre-existing characteristics) will be confounded with the experience of pain. Finally, valid and reliable means of measuring the diathesis would have to be identified. The authors also noted a "chicken-and-egg dilemma" in understanding the link between chronic pain and psychopathology. For instance, depression might be an antecedent, a consequence, or a concomitant to chronic pain as it relates to a biological factor. If one accepts the diathesis stress model which states that

psychological vulnerabilities are exacerbated by the stress of chronic pain leading to diagnosable psychopathology, it remains unclear the effect that a psychological diagnosis has on pain itself. For example, if a chronic pain patient were to subsequently suffer from Major Depressive Disorder (MDD), how would the depression affect their experience of pain? One would expect that the diagnosis of depression would lead them to feel less motivated and more fatigued, thereby producing a cyclical relationship which creates a greater intensity of pain experienced and an exacerbation of depressive symptoms.

Gatchel (1991) proposed a three-stage model which attempts to detail the process from acute pain to chronic pain with associated disability and psychological distress. Stage one involves normal reactions to acute pain, such as fear, worry and anxiety. It is when the acute pain persists into chronic pain that the individual enters in to stage two of Gatchel's model, which is comprised of a greater range of both behavioural and psychological reactions such as learned helplessness, anger, and somatization. However, Gatchel states that the form in which these reactions are expressed depends mainly on a combination of pre-existing psychological characteristics and environmental factors. This stage is based upon a diathesis-stress model, where the experience of dealing with chronic pain exacerbates the pre-existing psychological vulnerability. The individual enters the final stage of the model where as the chronicity of the pain continues, habituation occurs and the suffering individual becomes entrenched in the "sick role" and abolishes former roles and responsibilities (Gatchel, 1991). Although this model appears to address the issue of the manner in which psychopathology is manifested in chronic pain patients, it needs to be validated by further research efforts.

The majority of studies examining the relationship between psychological factors and chronic pain have focused on depression (e.g., Buenaver, Edwards, Smith, Gramling, and Haythornthwaite, 2008; Haythornthwaite et al., 1991; Jann & Slade, 2007), as a large proportion of chronic pain patients also suffer from some form of depression (Miller & Cano, 2009). The issue with much of this research involves the variance in the diagnostic criteria used to define depression as well as the range of diagnostic tools that include self-report measures, projective tests, chart reviews, and structured and unstructured clinical interviews (Dersh et al., 2002). Additionally, there is a large overlap in symptomatology for chronic pain and depression such as fatigue, loss of motivation, lack of sleep, and change in weight (Jann & Slade, 2007).

Coexisting psychiatric disorders are 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 imperative to the multidimensional perspective of treatment.

Turk and Okifuji (2002) identified several patient beliefs that have been found to be important in chronic pain. These beliefs include the patient's ability to control his/her pain (which may cause hypervigilant behaviours), fear and avoidance (fear of intensifying pain causes avoidance of activities), and self-efficacy in coping with pain (self-efficacy appears to play a role in perception of and adjustment to pain and disability). Hence, it may be beneficial to tailor psychological treatments within the chronic pain population to challenge these beliefs, with the intention of relieving pain related symptoms.

Chronic Pain and Depression

It has been suggested that approximately 30-44% of chronic pain patients also suffer from severe forms of depression (Banks & Kerns, 1996). In addition, it has been found that individuals who were depressed and suffering with chronic pain report greater pain intensity, greater interference due to pain and more pain behaviours (Haythornthwaite et al., 1991). Due to the high comorbidity between chronic pain and depression, a number of models have been proposed in attempts to explain their co-existence.

Beck's model of cognitive distortions posits that chronic pain elicits negative schemas that are ingrained within the individual, and produce a negative view of the self, the world, and the future (Banks & Kerns, 1996). Lefebvre (1981) found that depressed patients with chronic pain are more likely to engage in cognitive distortions than either nondepressed pain patients patients or nondepressed patients who do not have chronic pain. Additionally, studies examining catastrophizing have found it to be linked to depressive symptoms, as individuals who tend to catastrophize also have a tendency to experience negative thoughts related to their pain as well as greater emotional distress (Sullivan et al., 1995). Buenaver et al. (2008) found that individuals experiencing headache pain were more likely to also experience depressive symptoms when compared to a control group. It has been proposed that catastrophizing can be viewed as an individual difference factor which remains dormant until activated by the presence of some form of pain (Buenaver et al., 2008). Depressed thoughts may have an effect on catastrophizing by interfering with the ability to initiate coping strategies to deal with the pain being experienced (Sullivan et al., 1995).

The learned helplessness model is another model which has been applied to chronic pain and depression. This model views the individual as continuously experiencing pain, believing there is nothing they can do to control the amount of pain experienced, leading to the development of a helpless attitude. This helplessness in turn increases the risk for the individual to develop symptoms related to depression (Banks & Kerns, 1996). The validity of the learned helplessness model has been tested in chronic pain populations, and results support this theory; however, slight differences were obtained across types of chronic pain experienced. In patients suffering with rheumatoid arthritis, helplessness mediates the relationship between disabling pain and depression, independent of cognitive distortion (Smith, Peck, & Ward, 1990). Similarly, in patients suffering with fibromyalgia, the helplessness model has been supported. However, in this population it was discovered that helplessness only partially mediates the relationship between pain and disability and depression (Nicassio, Schuman, Radojevic, & Weisman, 1999). More research is needed in order to identify the cause of the discrepancy in findings across pain disorders, with longitudinal research providing a prospective view of the mediating effects of helplessness on pain and mood.

The behavioural model claims that depression develops through the lack of positive reinforcement experienced by the individual suffering from pain (Sullivan & Turk, 2001). The individual becomes entrenched in a cycle of decreasing positive reinforcers where they restrict their behaviours in order to avoid pain which in turn, reduces their chance of receiving any additional positive reinforcement. The problem with the behavioural model is that it does not take into account depressive symptoms which developed simultaneously or prior to the onset of pain (Romano & Turner, 1985).

Ostelo et al. (2005) conducted a review examining the efficacy of behavioural treatments, specifically operant, cognitive and respondent treatment, in patients suffering with chronic low back pain. Results of the review suggest that behavioural treatments have not yet been proven to be more effective than usual treatments such as physiotherapy or patient education, nor have they been proven to be more effective than exercises prescribed to the patient. However, it was found that behavioural treatments do have an effect on pain intensity although the direction and the size of the effect were not explicated. This review is limited in that many of the studies examined had methodological problems. Errors in randomization was one such difficulty, where either inadequate measures were utilized to randomize participants to treatment or control groups, or the method of randomization was not explicitly described. Additional methodological limitations included inappropriate use of methods to ensure that patients and individuals who were assessing treatment outcome were blind to treatment conditions, inadequate compliance with interventions, and failing to screen out patients who were simultaneously receiving other forms of treatment. Future research in this area needs to focus on clarifying and upholding proper methodology, and examining patient characteristics which may contribute to a positive response to behavioural treatment. The authors of this review argue that at this point empirical research does not clarify whether patients suffering from chronic low back pain should be offered behavioural treatment as an option (Ostelo et al., 2005).

Banks and Kerns (1996) proposed a diathesis-stress approach to explain the relationship between pain and depression. They described a number of stressors which may act to activate cognitive or behavioural diathesis related to depressive

symptomatology (such as sensory and emotional aspects related to the pain, secondary losses endured, impairment and disability, and perceived nonvalidating responses from the medical system). Negative thoughts and depressive attributions are presumed to create feelings of hopelessness and helplessness which then lead to the development of symptoms related to depression. The overall idea is that pain perception is mediated by negative thoughts.

Three hypotheses with a temporal sequence perspective have been developed to address the comorbidity between pain and depression. In the antecedent hypothesis, depression is believed to precede pain and to increase one's risk of developing chronic pain (Currie & Wang, 2005). A review conducted by Fishbain, Cutler, Rosomoff, and Rosomoff (1997) examined a number of studies which attempted to evaluate the antecedent hypothesis (Breslau, Davis, Schultz, & Peterson, 1994; Casten, Parmelee, Kleban, Lawton, & Katz, 1995; Dworkin et al., 1992; Feuerstein, Carter, & Papciak, 1987; Gamsa & Vikis-Freibergs, 1991; Gatchel, Polatin, & Mayer, 1995; Kazis, Meenan, & Anderson, 1983; Leino & Magni, 1993; Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994; Spierings, Sorbi, Haimowitz, & Tellegen, 1996; Von-Korff, Resche, & Dworkin, 1993); however, very few were able to support its claims (Breslau et al., 1994; Leino & Magni, 1993; Magni et al., 1994).

The consequence hypothesis views depression as a product of pain (Currie & Wang, 2005). Support for this hypothesis is considerable as all the studies (Atkinson, Slater, Patterson, Grant, & Garfin, 1991; Bancroft & Rennie, 1995; Breslau et al., 1994; Brown, 1990; Cairns, Adkins, & Scott, 1996; Feuerstein et al., 1987; Holroyd, France, Nash, & Hursey, 1993; Lindsay & Wyckoff, 1981; Magni et al., 1994; Skevington, 1994;

Von-Korff, Deyo, Cherkin, & Barlow, 1993; Williamson & Schulz, 1995) examined in the Fishbain et al (1997) review yielding corroborative evidence.

Finally, the scar hypothesis involves the notion that a previous episode of depression leaves a permanent, psychological scar and predisposes the individual to experience future depressive episodes (Rohde, Lewinsohn, & Seeley, 1990). In relation to chronic pain, the scar hypothesis involves the idea that episodes of depression which occur prior to the onset of pain causes an increased vulnerability to experience depression post-pain (Fishbain et al., 1997). However, in the literature reviewed by Fishbain et al. (1997), the scar hypothesis was defined as having a genetic predisposition to recurrent depression. The literature examining the scar hypothesis that were included in the Fishbain et al. review generally showed that many individuals suffering with chronic pain had a higher incidence of first-degree relatives with a depressive spectrum disorder in comparison to controls, suggesting a biological predisposition (Blumer & Heilbronn, 1982; France, Krishnan, & Trainor, 1986; Katon, Egan, & Miller, 1985; Magni et al., 1987; Magni, Salmi, & DeLeo, 1984; Schaffer, Donlon, & Bittee, 1980). These results are not confirmation of the scar hypothesis, because participants were not identified as suffering with current or past depressive episodes. However, the findings do provide some support for the scar hypothesis in that there does tend to be a genetic predisposition to depressive episodes in those suffering with chronic pain.

Other hypotheses that have been forwarded and require further research investigation include a greater likelihood of depressed patients to report or experience pain as they have a heightened awareness of somatic symptoms (Fields, 1991), the potential mediating effects of anxiety (Roy-Byrne et al., 2008), and the biochemical

changes in depression which may intensify pain perception (Romano & Turner, 1985). In terms of treatment of chronic pain in patients, the influence of depression on pain has a negative effect, as it has been found that patients diagnosed with both pain and depression are less likely to follow through with a rehabilitation program, leading to a higher likelihood of relapse (Schneider, 2004).

Suicidality has also been examined in this population, as it was presumed that if chronic pain patients are at greater risk of suffering from depression, they should also be at a greater risk for suicidal behaviour. A review of the literature has suggested that those suffering with chronic pain appear to be more likely to engage in suicidal behaviours, with some studies indicating a greater rate of suicide completers in the chronic pain population than the general population (Fishbain et al., 1997).

Depression and Rumination

With the increased probability of experiencing some form of depression alongside chronic pain, an examination of the factors which contribute to depressed symptoms is warranted. Individuals suffering with depression appear to differ with respect to the duration of their depressive episodes. One explanation for this difference has been proposed by Nolen-Hoeksema, Morrow, and Fredrickson (1993), who argue that the duration of a depressed episode is related to the manner in which one responds to his or her depressed mood. The broad distinction made is that those who ruminate on their depressed mood will experience a longer episode than those who engage in distraction and experience relief from their depressed moods as a consequence (Nolen-Hoeksema et al., 1993). In this context, rumination is defined as any thoughts or behaviours the individual engages in which focus their attention on their symptoms, including any

potential causes or consequences of such symptoms. Rumination is differentiated from active, problem solving responses where the individual attempts to resolve troublesome situations related to their depression. Some examples of ruminative responses associated with a depressed episode include: "Why do I feel depressed?", or "I am unable to get work done when I am feeling this way". Distraction, on the other hand, refers to thoughts and behaviours which allow the individual to disengage from pondering about their symptoms, and instead engage in pleasant or neutral activities (Nolen-Hoeksema et al., 1993). This explanation has been termed the response style theory, where rumination of one's depressive symptoms is presumed to affect the course of the associated depressive episode (Nolen-Hoeksema, 1991). Support for this theory has been documented by Just and Alloy (1997) who found they were able to predict severity of a depressive episode based on individuals' ruminative responses.

Similar findings were obtained in examinations of both adult and adolescent populations (Kuehner, & Weber, 1999; Nolen-Hoeksema, Parker, & Larson, 1994; Schwartz, & Koenig, 1996). Specifically, both symptom-focused ruminative response style (ruminating on depressive symptoms) and self-focused ruminative response style (ruminating on the implications and consequences of one's distress) appear to intensify depressed mood and prolong current depressive episodes or increase the likelihood of a new depressive episode (Bagby, Rector, Bacchiochi, & McBride, 2004).

Research shows that there are sex differences in response styles to depressed mood, with women more likely than men to engage in rumination (Nolen-Hoeksema et al., 1993). Due to the finding that rumination increases the length and severity of depressed episodes, the sex difference established may in fact relate to the difference in

prevalence rates for depression in men and women (Nolen-Hoeksema, 1991). This sex difference in rumination style has been detected as early as in adolescent depression. Jose and Brown (2008) examined adolescents aged 10-17 on measures of depression, rumination and stress in an attempt to test the response style theory of Nolen-Hoeksema (1991) within an adolescent population. The authors found support for the notion that early adolescence is a time where women begin to diverge from men with respect to factors associated with depression. At age 12, a sex difference in rumination style was detected, and at age 13 sex differences were identified for measures of depression and stress. Stress was not found to be a moderator between rumination and depression and hence was not considered to account for the sex differences. The difference did however appear to be due to the cumulative effects of both stress and rumination together. More research examining the potential triggers which relate to the gender difference observed within this age range is required.

Within the literature a distinction has been made between two aspects of rumination known as brooding and reflection; where brooding refers to the comparison of one's own situation with an unachieved standard, and reflection describes an intentional act of engaging in cognitive problem solving in hopes of alleviating depressive symptoms (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The distinctions between differing facets of rumination lead one to the conclusion that not all rumination is necessarily maladaptive. Future works need to be more specific in the type of rumination that is being assessed.

While there is support that rumination about depressive symptoms can maintain and exacerbate a depressive episode, it is not known whether rumination about pain will

intensify the pain experience or the depressed mood of a person suffering with chronic pain. The next section focuses on the different ways that pain sufferers cope with their condition and that bear relevance to rumination and the pain experience.

Coping with Chronic Pain

With the diagnosis of chronic pain often come a number of costs to the individual that include decreased physical activity, reduction of restful sleep leading to decreased energy level, invariability of emotions, depression, employment issues, financial strain, damaged relationships, and chemical dependency (Swanson, 1999). Individuals engage in a variety of coping strategies in attempt to manage these additional stressors, along with the chronic pain itself. Coping styles in response to health concerns have been found to be stable over time, as individuals tend to engage in the same coping style over a six month time period (Endler et al., 2003). Lazarus and Folkman (1996) define coping as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1996, p.141). Coping strategies in response to chronic pain vary in their effectiveness, with some individuals engaging in coping strategies that are more harmful than beneficial to their overall well being.

A review of the literature examining coping strategies which have been associated with chronic pain demonstrates that much of the research has focused on those strategies which appear to have a negative effect on pain intensity and functional impairment. These strategies include avoidant, emotion-oriented, passive coping, as well as catastrohphizing. Avoidant strategies involve engaging in cognitions and activities which allow one to avoid the stressful situation, and emotion-oriented strategies revolve around

attempts to regulate emotional distress (Endler et al., 2003). Passive coping involves giving control of pain over to someone else (Ramírez-Maestre et al., 2008). Catastrophizing relates to strategies which involve negative self-statements and unrealistic negative thoughts about the future.

Among patients suffering with chronic pain, those who employ avoidant, emotion-oriented, and passive coping strategies tend to experience greater perceived pain severity and life interference, along with lower levels of functioning than patients who do not engage in these coping strategies (Endler et al., 2003; Ramírez-Maestre et al., 2008). Endler et al. (2003) investigated the predictability of patients' coping strategies over a six month time period. The authors discovered that over time, only emotion-oriented coping predicted subjective pain, with greater emotion-oriented coping at time one related to greater pain at time two. It is important to note that the investigators did not account for number of treatment sessions, which may have affected the results obtained. For example, perhaps those who engaged in more emotion-oriented coping received fewer treatment sessions, contributing to the higher levels of pain reported by these individuals.

Catastrophizing is another strategy which has been found to display negative effects on the chronic pain sufferer. It has been associated with higher pain intensity and is indirectly related to higher levels of depression and functional impairment (Esteve, Ramírez-Maestre, & López-Martínez, 2007). In addition, catastrophizers (defined as those scoring above 24 on the Pain Catastrophizing Scale) exhibit a greater amount of negative pain-related thoughts, greater emotional distress and greater amount of pain (Sullivan et al., 1995). It was discovered that individuals suffering with chronic pain who are classified as catastrophizers do in fact engage in the same coping strategies (e.g.,

distraction strategies) as do non-catastrophizers; however their employment of coping strategies does not lead to a reduction in pain. Thus, catastrophizing may be a separate factor from coping, yet, due to the lack of support for this claim, it is still too premature to consider catastrophizing as being an independent factor.

It appears as though the tendency to focus on the pain being experienced can lead to negative consequences. However, there may need to be a distinction made in the type of thoughts which an individual is engaged in; for example, contrasting self and non-self rumination tendencies. It has been found that when engaging in self-focused rumination, one's pain tolerance is increased; however, the nature of this occurrence has not been definitively explained (Stimmel, Crayton, Rice, & Raffeld, 2006). One speculation is that the greater cognitive attention placed on the self may distract from the pain being experienced (Stimmel et al, 2006). Hence, it may be beneficial in some circumstances to engage in focusing on the pain, whereas in others it may lead to more negative consequences.

Some effective coping strategies in response to chronic pain have been identified in the literature, although this area of research is lacking. Effective coping does not involve ignoring the pain, but rather, it is an active process which is directed towards other activities other than focusing on the pain itself (Drum, 1999). Coping strategies which have been associated with decreased levels of pain intensity and functional impairment include active coping strategies and engaging in distraction.

Engaging in activities involving distraction has been shown to be negatively correlated with pain intensity, indicating that the more an individual with chronic pain engages in distraction, the less pain is experienced (Cui, Matsushima, Aso, Masuda, &

Makita, 2009). In a similar vein, individuals with chronic pain who engage in more active

coping strategies such as carrying on in spite of the pain display higher levels of daily

functioning (Ramírez-Maestre et al., 2008).

Thus, it is clear that there are a number of coping strategies which are associated

with pain intensity, functional impairment and overall life interference. Research has also

demonstrated that tailoring treatment to coping style can aid in achieving more positive

treatment outcome. Certain coping styles have been found to be related to treatment

outcome. An aggressive, angry, and cynical coping style has been associated with poorer

treatment compliance (Cipher, Fernandez, & Clifford, 2002). Elderly pain patients whose

coping style matched the intervention type (e.g., problem-focused coping style matched

to problem-focused intervention) exhibited reduced pain and anxiety, compared to those

patients whose coping style did not match the intervention. In addition, it was found that

problem-focused interventions produced the better results in pain reduction than emotion-

focused interventions (Fry & Wong, 1991). Thus, coping is an important variable to

examine in chronic pain patients, both in terms of the experience of pain and treatment

outcome. For those treating patients suffering with chronic pain, it may be beneficial to

incorporate treatments which teach patients more effective coping strategies.

Men and women appear to cope with chronic pain differently. Women employ a

greater number of coping strategies than men in response to pain, and they tend to

employ emotion-focused coping strategies such as venting emotions (Affleck et al.,

1999). This finding may have an important affect on treatment outcome, as men and

women appear to respond to their pain in a different manner.

Although there is a great deal of research on coping strategies associated with chronic pain, there are some coping strategies which are not fully understood or examined within the literature. One such coping strategy is the tendency to ruminate. Due to the fact that rumination has been found to maintain and exacerbate depression, (as proposed by the response style theory), and due to the high comorbidity of depression and chronic pain, it is reasonable to assume that rumination may also have a negative effect on the experience of chronic pain. Other coping strategies which have not been examined extensively in the literature include negative cognitions (such as magnification), along with cognitive coping styles associated with pain (such as coping self-statements, ignoring sensation, distancing, and praying).

Chronic Pain and Social Support

Social support is an important variable that has been found to have an effect on an individual's ability to cope with chronic pain. Past research has demonstrated that in individuals suffering with a chronic pain condition, those who exhibited greater perceived social support also had better mental health (Raichle, Hanley, Jensen, & Cardenas, 2007). Individuals who have a strong social support system also tend to experience fewer emotional problems, and are able to better cope with their pain (Silver, 2004). López-Martínez et al (2008) found that perceived social support was associated with depressed mood and pain intensity, with those higher in social support satisfaction reporting lower levels of depressed mood and less intense pain. In addition, they found that individuals who had greater levels of satisfaction in social support engage in more active coping strategies (such as distracting themselves with something pleasant) rather than passive coping strategies (such as complaining to others). These researchers did not measure

actual levels of social support, rather, they examined the degree of satisfaction with social support received by the patient. It would have been interesting to examine the level (quantity) or quality of actual social support in response to the experience of pain with respect to coping strategies, mood and pain intensity. Other studies examining the effects of social support have found similar results to the studies above, demonstrating social support has a positive effect on pain intensity (Evers, Kraaimaat, Geenen, Jacobsm & Bijlsma, 2003; Klapow et al., 1995) and coping strategies (Cano, 2004; Holtzman, Newth, & Delongis, 2004). Thus, social support is an important variable to examine with respect to the treatment of chronic pain, because it may have an indirect effect on pain through its impact on coping strategies and mood.

Some researchers have looked at the relationship between spousal support and pain behaviours. Greater number of pain behaviours were observed when the spouse was present than when absent (Paulsen & Altmaier, 1995). The pain behaviours that were recorded included guarding (e.g., rigid movements while walking), bracing, rubbing, grimacing, verbal complaints, and sighing. Greater marital conflict was associated with greater display of pain behaviours (e.g., verbal complaints of pain, rubbing) on the part of the pain sufferer, and greater negative affective response and punitive behaviours (expressing irritability, anger) by the spouse (Schwartz, Slater, & Birchler, 1996). Punitive behaviours by the spouse predicted greater pain intensity and impairment on the part of the pain patient, whereas solicitous spousal behaviours (e.g., taking over duties, getting medication for the patient) did not predict patient impairment but did predict pain intensity. Furthermore, environmental stressors such as family conflict were related to greater distress and increased pain on the part of the patient (Feuerstein, Sult, & Houle,

1985). Overall, these studies point to the role of the social support system, including the spousal system, in pain behaviours and pain perception. It is not known how depression factors into the picture, although it is reasonable to assume that in situations involving marital conflict, depression is probably present to some degree and impacts on both the marital relationship and the patient's pain behaviours and perception.

Summary

Overall, disparate studies in the literature show a link among pain perception, depression, rumination, coping styles, and social support. More negative coping strategies (such as catastrophizing) have been associated with greater pain severity, higher levels of depression and increased functional impairment. Rumination is associated with more severe levels of depression. In addition, individuals who are more satisfied with their social support exhibit less depressed mood, less pain and more active coping strategies. Paradoxically, solicitous and punitive spousal behaviours are both related to greater pain intensity experienced by the patient. Spousal conflict is associated with greater pain behaviours and pain intensity. Many investigations examining the factors related to the experience of chronic pain fail to consistently take into account the effects of depression. It may be that depression is a moderator in the relationships between pain-related factors and the experience of chronic pain; with varying levels of depression having different effects on these relationships. It is therefore necessary to identify the potential moderating role of depression with respect to the relationship between pain-related factors and the pain experience itself, as this has not yet been examined within the literature.

The Present Study

Individuals suffering with chronic pain have access to a number of resources which are available to them, both internal and external to the individual. Internal resources include various coping strategies that may allow the individuals to better manage their experience of pain. In terms of external factors, social support from others is one of the more prominent factors which have been shown to have an effect on coping with chronic pain, with greater social support being associated with better overall mood and less pain.

The purpose of the current study was to examine in chronic pain patients the moderating role of depression in the relationship between coping strategies (internal resources) and perceived reactions from significant others (external resources) with the pain experience. The internal resource variables that were examined include pain-related negative cognitions (pain rumination and pain magnification) and pain-related cognitive coping styles (catastrophizing, coping self-statements, ignoring sensation, distancing, distraction, and praying). The external resource variables were significant others' perceived reactions to the patient's communication of pain. Individuals with chronic pain often feel that their repeated pain complaints are not received well by their spouses over time (Winterowd et al., 2003) and as consequence, they suffer in silence. Three perceived reactions from significant others were examined, including punishing responses, solicitous responses, and distracting responses.

The measurement of the pain experience includes pain severity (past and present), suffering due to pain, general and work interference in functioning as a result of the pain, and self-control. Self-control describes the perceived ability to solve problems along with

feelings of personal mastery and control and is conceptualized as the opposite of helplessness. Sex differences were also examined as a supplementary analysis, as the sample composition permitted such analyses to be carried out.

The following hypotheses were made at the start of the current study:

(1a)   Among patients with higher levels of depression severity, pain-related negative cognitions (pain rumination, pain magnification) will be positively associated with pain severity and general interference in functioning. A similar but weaker association is expected among patients with lower levels of depression severity.

(1b)   Among patients with higher levels of depression severity, pain-related negative cognitions (pain rumination, pain magnification) will be negatively associated with self-control. A similar but weaker association is expected among patients with lower levels of depression severity.

(2a)   Among patients with higher levels of depression severity, the use of coping strategies involving catastrophizing will be positively associated with pain severity and general interference in functioning. A similar but weaker association is expected among patients with lower levels of depression severity.

(2b)   Among patients with higher levels of depression severity, the use of coping strategies involving catastrophizing will be negatively associated with self-control. A similar but weaker association is expected among patients with lower levels of depression severity.

(3a)   Among patients with higher levels of depression severity, the use of coping strategies involving distraction and coping self-statements will be negatively associated with pain severity and general interference in functioning. A similar but weaker association is expected among patients with lower levels of depression severity.

(3b)   Among patients with higher levels of depression severity, the use of coping strategies involving distraction and coping self-statements will be positively associated with self-control. A similar but weaker association is expected among patients with lower levels of depression severity.

(4a)   Among patients with higher levels of depression severity, perceived punishing reactions from significant others will be positively associated with pain severity and general interference in functioning. A similar but weaker association is expected among patients with lower levels of depression severity.

(4b)   Among patients with higher levels of depression severity, perceived punishing reactions from significant others will be negatively associated with self-control. A similar but weaker association is expected among patients with lower levels of depression severity.

Method

The data for this project was derived from an on-going multicentre study on chronic pain that received ethics clearance from Optimum Ethics Review Board (see Appendix A). The researcher for this project (C. Iorio) is part of the team for the multicentre study and was involved in the recruitment of patient subjects and in the data

collection. The multicentre study was conducted in chronic pain centres in southern Ontario. These centres were selected as potential research sites because they assessed or treated a wide range of chronic pain conditions, and demonstrated a large patient base. Initial contact with these sites was made through the individual site clinic directors. Detailed information on the logistics of the multicentre study is provided below to demonstrate how the data for the proposed present thesis study is being collected. A subset of the data collected was extracted for the thesis, with a sample size of 201 cases.

Initial Contact with Clinical Sites

An initial letter (see Appendix B) was faxed to the clinic directors. The letter briefly outlined the multicentre study initiatives and notified them that a research team member will contact them to determine their potential interest in the study. If the clinic directors indicated interest at the time of the telephone call, a synopsis of the project (see Appendix C) was sent out to them, and an initial meeting was arranged to discuss study requirements (including permission to approach patients in the waiting room, availability of a private room to conduct the clinical interview, and access to patients' medical charts), along with study time commitments required. At the time of the meeting, the normal clinic procedures were discussed including average length of patient visits, treatments provided, and overall flow of the clinic in order to ensure that there is minimal disruption to the clinic. Upon the site director's cooperation and interest to facilitate the research within their clinic, final sites were chosen.

Requirements for a study site to be enrolled entail the following: permission to approach all English-speaking patients in their clinics' waiting room to recruit for the research project, a room to facilitate the diagnostic interview, access to involved patients'

charts with their consent, and availability of space to conduct all relevant chart reviews. Physicians were paid for the use of their space, where 1.25 to 1.50 hours was required for each patient seen in the study. This time consisted of approximately .25 to .50 hour of individual interviewing conducted by the research assistant, plus one hour for reviewing patient medical charts in a room reserved for the study. All patients of the participating chronic pain clinic over the age of 18 years and able to give informed consent, were offered an opportunity to participate in this research study.

Recruitment of Participants

Participants were recruited from the chronic pain clinics' waiting rooms. While waiting for their appointments with their physician, patients were approached by one of the research assistants. The research assistant introduced him/herself as a researcher conducting a multi-centre study that examines factors related to chronic pain. They went on to briefly describe the details of the study, including what is required on the part of the patients should they decide to participate (see below). If a patient showed interest in the multi-centre study he/she was asked to read over the subject informed consent form (see Appendix D) in a private room. The research assistant was available to answer any questions or concerns the patient had.

Through the consent form, patients were reminded in writing that the objective of the multi-centre study was to examine the incidence and associated features of anxiety and mood disorders within the chronic pain population. In terms of the procedure, the three phases of the multi-centre study were outlined within the consent form. The first phase included signing of the informed consent form, followed by a brief structured clinical interview using the Mini International Neuropsychiatric Interview Plus (MINI-

Plus) which will last approximately 30-40 minutes. Phase Two of the study involved completing a self-report questionnaire package which took approximately 25-30 minutes. Phase Three involved access to patient medical files, and it was outlined to patients that this was solely to determine pain diagnosis and current medications. Risks and benefits of participation were also outlined, indicating that potential risks include sadness from answering questions, and/or boredom from completing the self-report questionnaire package. The multi-centre research study aimed to provide physicians with a greater understanding of individuals suffering from chronic pain, and this was explained as one of the benefits of participation. Patients were told that their participation would be completely voluntary and that they could withdraw their participation at any time during the study. In terms of confidentiality, patients were assured that that all information obtained would be held with strict confidence, and their name would never be associated with any verbal or written information they provide. Patients were provided with the contact information for the primary study investigator, (Dr. Martin A. Katzman), along with the contact information for the ethics review board (Optimum Ethics Review Board), should they have any questions or concerns pertaining to the study or their involvement as a research participant. At the completion of their study visit, patients were compensated $50 for their time and participation.

All patients over the age of 18 years and able to give informed consent, who had presented to the clinic for an appointment were eligible and were offered an opportunity to participate in this research study. Once they were fully informed about the study and had given their informed consent, they were then able to proceed further into the study processes.

Training of Research Assistants and Interviewers

Interviewers were Psychology research assistants who completed their Bachelors or Masters degrees. In total, there were four examiners, including the current investigator (C. Iorio) who underwent extensive training of approximately one week. During this training, interviewers had the opportunity to gain all relevant information regarding the study design and procedures, their role as research assistants, and training on how to conduct 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 five practice interviews before starting field work. The training and field work were supervised by both Dr. Martin A. Katzman (psychiatrist), the primary investigator, and Dr. Monica Vermani (psychologist).

All interviews conducted with participants were taped, and every interview was reviewed by either Dr. Katzman or Dr. Vermani for diagnostic accuracy. In cases where the diagnosis was unclear, tapes were reviewed and discussed by the supervisors (Dr. Katzman and Dr. Vermani) to arrive at a consensus diagnosis. Data was carefully entered into an SPSS (version 16.0) spreadsheet and then re-checked for any errors in entry.

Procedure

Trained clinical interviewers were randomly sent to physician offices in order to recruit subjects for the study. On specific research days, all patients who visited the designated clinics were approached for their participation in the study. Among those who were interested, a meeting was held with them either before or after their medical appointment to provide them with more information about the research study. Those participants who agreed to participate went on to thoroughly read the consent form (see

Appendix D); if they felt comfortable, they signed the form thereby entering into the study.

Phase 1. Phase One included an introduction and overview of research study to potential subjects, followed by a review of the consent form. If the patient felt comfortable with the study protocol and signed the consent form, a review of inclusion/exclusion criteria was completed to ensure that the patient was eligible to participate in the study. Following verification of eligibility, the structured clinical interview (MINI-Plus) was completed.

Phase 2. In Phase Two, a questionnaire package consisting of self-report measures was given to each patient. The measures in the package that were relevant to the present thesis study included the Beck Depression Inventory (BDI-II), the West Haven-Yale Multidimensional Pain Inventory (MPI), the Coping Strategies Questionnaire (CSQ-R), and the Pain Catastrophizing Scale (PCS). More information on these self-report tools is presented in the *Measures* section below.

Phase 3. During Phase Three, the research assistants reviewed the patient's medical chart in order to obtain chronic pain diagnosis and a list of medications the patients were currently taking along with current treatments. The information collected was coded to protect the anonymity of the patients.

Measures

Mini International Neuropsychiatric Interview (M.I.N.I). The MINI (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 focuses mainly on current disorders, and only

explores lifetime diagnoses when it is deemed clinically relevant to the present diagnosis.

The MINI has good reliability and validity when compared to the Composite

International Diagnostic Interview (CIDI) and the Structured Clinical Interview for DSM-

IV (SCID). In comparison to the SCID, the MINI 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). When compared to the CIDI, the MINI 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).

An extended version of the MINI (MINI-Plus) was used to assess diagnoses,

because it covers a larger time frame (including current and lifetime diagnoses), along

with a section examining the somatoform disorders. The information obtained from the

MINI-Plus was used to describe the sample and to establish the presence of clinical

depression in the subjects.

Beck Depression Inventory II (BDI II; see Appendix E). The BDI-II (Beck et

al., 1996) is a 21 item self-report questionnaire which assesses the severity of depression

symptoms. Items are rated in a 4-point severity scale ranging from 0 - 3. Participants

were asked to read 21 groups of four statements, and pick the statement in each group

that best describes how they had been feeling in the past two weeks. The total score was

derived by summing the ratings from all 21 questions, and could potentially range from

0-63. The interpretive guidelines for the BDI-II cut-off scores 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 .90 (Osman et al., 1997). 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 will be used in this study as a measure of depression severity and as a moderator variable during the statistical analyses of the data.

Coping Strategies Questionnaire Revised (CSQ-R; see Appendix F). 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

(i)   catastrophizing (items 3, 6, 7, 14, 21 and 24), captures aspects of negative self-statements, catastrophizing thoughts and ideation,

(ii)   coping self-statements (items 4, 5, 11 and 20), such as telling oneself that one can cope with the pain no matter how bad it gets,

(iii)   ignoring sensation (items 10, 12, 13, 19 and 22), such as denying that the pain hurts or affects one in any way,

(iv)   distancing (items 1, 9, 18 and 27), such as thinking of the pain as being detached from oneself or separate from one's body,

(v)   distraction (items 2, 15, 16, 25, and 26), such as thinking of things that serve to distract one away from the pain, and

(vi)   praying (items 8, 17 and 23) such as telling oneself to pray that the pain will get better someday.

Each CSQ-R item is rated on a 7-point Likert scale that ranges from 0 (never do that) to 6 (always do that). A subcale 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. All six scales within the CSQ-R will be used within the study as a measure of cognitive coping strategies.

Pain Catastrophizing Scale (PCS; see Appendix G). The PCS (Sullivan et al., 1995) is a 13-item measure which assesses three components of negative thoughts that are associated with pain. The pain rumination subscale (items 8, 9, 10 and 11) measures the tendency to increase attentional focus on pain related thoughts such as worrying all the time about whether the pain will end. The pain magnification subscale (items 6, 7 and 13) assesses one's exaggeration of the threat value of pain stimuli, such as keep thinking of other painful events. Finally, the pain helplessness subscale (items 1, 2, 3, 4, 5 and 12) looks at the tendency to adopt a helpless orientation when coping with painful situations, such as feeling that one cannot go on. 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). For the purpose of the present study, only two of the three components, namely pain rumination and pain magnification, were assessed as pain-

related negative cognitions. The third component, pain helplessness, was excluded from the data analyses due to the large overlap in items that it had with the catastrophizing scale of the CSQ-R.

West Haven-Yale Multidimensional Pain Inventory (MPI; See Appendix H). The MPI (Kerns et al., 1985) was used to assess pain severity (current and past), suffering due to pain, general interference in daily functioning by the pain, interference in work functioning due to the pain, self-control, and perceived reactions of others to the patient's pain. This measure is divided into three sections. Within section A, items 1, 7, and 12 tap into respectively, pain severity at the present moment, pain during the last week, and suffering as a result of the pain. These items are rated on a scale from 0 to 6 with higher scores indicating greater pain severity. Still within section A, there are nine items (2, 3, 4, 8, 9, 13, 14, 17, and 19) that examine degree of general interference in the patient's functioning in day to day activities, work, social and recreational activities, family-related activities, marriage and other family relationships, household chores and friendships, as well as the change in enjoyment derived from these different areas. Each item is rated on a scale from 0 to 6 with higher scores indicating greater degree of general interference. A general interference score is obtained by summing up the responses over these nine items and dividing the score obtained by the total number of items (9) within the subscale. Item 3, which assesses work interference, was taken out of the general interference score to obtain a score which represents solely interference in work. Thus, the general interference score used in the current study was comprised of eight items (2, 4, 8, 9, 13, 14, 17, and 19), and the general interference score was obtained by summing up the responses over these eight items and dividing the score obtained by the total number of items (8) within

the subscale. The items 11 and 16 in Section A assess degree of self-control that a patient feels he or she has in his/her life and in dealing with problems. They are rated on a scale of 0 to 6 with higher scores indicating higher degrees of control. A total self-control score is computed by adding up the ratings to these two items and dividing the score by two. Section B of the MPI taps into three types of reactions the chronic pain patient perceives to have received from significant others in response to the patient's pain. They are punishing (items 1, 4, 7, and 10), solicitous (items 2, 5, 8, 11, 13, and 14) and distracting (items 3, 6, 9, and 12). Each item is rated on a scale that ranges from 0 (never) to 6 (very often). Higher scores indicate greater frequency that a significant other is perceived to have displayed a particular reaction in response to the patient's pain. The remaining items in section A and all the items in section 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).

Results

Sample Characteristics

A total of 201 pain patients (84 men, 115 women, 2 unidentified) participated in the study. The mean age of the sample was 47.43 years (SD = 11.58), with the mean age of women being 45.81 (SD = 11.51) and of men being 49.72 (SD = 11.42).

A little over one third (35.68%) of the sample were single while about one third (34.17%) were married. Within the sample, 28.14% obtained their high school diploma, 24.62% obtained a college degree and 21.11% received some form of post-secondary

education. The majority of the participants identified themselves as Caucasian (64.32%), with smaller percentages identifying themselves as European (11.56%), Caribbean (5.03%), North American Indian/Metis/Inuit (2.51%), African (2.01%), Latin American/Hispanic (2.01%), South Asian (1.01%), East Asian (0.50%), Filipino (0.50%), and 7.04% identifying as 'other'.

Over one third (37.19%) of the sample reported their annual family income to fall between $10, 000 to $20, 000. For a frame of reference as to the SES level of the sample, the low income cut-off rates for a family of four living in an urban area (population 100, 000 – 499, 999) in Canada for the year 2009 is $29, 455 (Statistics Canada, 2010). Approximately half of the sample was either temporarily not able to go to work/school (29.65%) or unemployed/not in school (20.60%). 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 2.

Table 3 summarizes the diagnostic classification findings derived from the structured clinical interview using the M.I.N.I. Overall, 89.50% of the sample reported suffering from at least one psychiatric disturbance (either currently or in their lifetime), with 50.00% of the total sample suffering from five or more psychiatric disturbances (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 major depressive episode (current) being reported most frequently (38.69%) followed by major depressive episode with melancholic features (28.15%), and dysthymia (current) (22.61%). A substantial portion of participants also reported having

experienced in the past at least one major depressive episode (30.15%). A much smaller percentage of the sample reported experience with bipolar disturbances with equal number of participants reported currently experiencing a manic episode or a hypomanic episode (2.01% each). A higher number reported past experience with bipolar disturbances: hypomanic episode (10.05%) and manic episode past (6.53%). With regard to the anxiety disorders, a considerable percentage of the sample (37.19%) met criteria for generalized anxiety disorder. A smaller subset met criteria for current panic disorder (10.55%), limited symptoms of panic disorder (20.10%), agoraphobia (33.67%), social phobia (19.60%), specific phobia (18.60%), obsessive compulsive disorder (11.06%) and post-traumatic stress disorder (14.57%). In addition, individuals within the sample also met criteria for past panic disorder (16.58%) and past agoraphobia (36.19%). In terms of substance use, a fair portion of the sample met criteria for some form of either alcohol or substance abuse or dependence, including current alcohol dependence (6.03%), alcohol abuse (5.03%), substance dependence (9.55%), and substance abuse (2.01%). Past abuse or dependence of substances was also reported; lifetime alcohol dependence (24.62%), lifetime alcohol abuse (12.56%), lifetime substance dependence (22.61%) and lifetime substance abuse (1.01%). A small percentage of the sample met criteria for an eating disorder, with 0.50% meeting criteria for anorexia and 2.51% meeting criteria for bulimia nervosa. A relatively smaller portion of the sample met criteria for somatization disorder (1.51%), hypochondriasis (7.54%), body dysmorphic disorder (5.53%), and pain disorder (2.51%). Almost half of the sample (43.72%) met criteria for at least minimal risk of suicidality, as defined by the MINI. For those who displayed an imminent risk of suicide, confidentiality was broken and the patient's physician was notified. This occurred in only

a couple of cases in which no active suicidal thoughts were deemed to be present in the follow-up assessment by the attending physician.

Interestingly, more women than men reported meeting the criteria for all diagnostic categories with these exceptions in which a reverse pattern was observed: manic episode (past), hypomanic episode (past), alcohol dependence (lifetime), alcohol abuse (current and lifetime), substance dependence (lifetime), and substance abuse (current and lifetime).

With respect to depression severity scores as measured by the BDI-II, the mean level of depression severity within the sample fell within the moderate range ($M = 21.91$, $SD = 13.19$, range = 0 to 55). There was a significant difference in depression severity [$t(192) = -2.94, p = .042$] between the sexes in which the women ($M = 23.49$, $SD = 14.11$, range = 0 to 55) were more depressed than the men (M = 19.71, $SD = 11.63$, range = 0 to 48), although for both sexes their average depression severity was within the BDI moderate range.

Statistical Analytic Strategy

In order to analyze the data, hierarchical regression analyses were used to investigate the moderating role of depression in the relationship between a set of predictors and a criterion variable. The four sets of predictors in the study were (i) degree of pain-related cognitive response style (pain rumination, pain magnification), (ii) perceived reactions of others to the patient's pain (punishing, solicitous, and distracting), (iii) pain-related negative cognitive coping strategies (catastrophizing, ignoring sensation, and distancing), and (iv) pain-related positive cognitive coping strategies (coping self-statements, distraction, and praying). The criterion variables were (i) present pain

intensity, (ii) pain intensity in the past week (iii) suffering due to pain (iv) general interference in functioning, (v) work interference, and (vi) self-control. The moderator variable was depression severity.

Separate hierarchical regressions on each of the criterion variables were carried out, with the predictor and moderator variables entered into the equation in step one, followed by all 2-way interactions between the predictors and moderator entered in step two. The specific regressions that were undertaken are outlined below:

A. Regression sets with present pain intensity as the criterion.

(i)   Present pain intensity regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   Present pain intensity regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   Present pain intensity regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   Present pain intensity regressed on significant other's perceived reactions to patient's pain (punishing responses, solicitous responses, and distracting responses)

B. Regression sets with pain intensity past week as the criterion.

(i)   Pain intensity past week regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   Pain intensity past week regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   Pain intensity past week regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   Pain intensity past week regressed on significant other's perceived reactions to patient's pain (punishing responses, solicitous responses, and distracting responses)

C. Regression sets with suffering due to pain as the criterion.

(i)   Suffering due to pain regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   Suffering due to pain regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   Suffering due to pain regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   Suffering due to pain regressed on significant other's perceived reactions to patient's pain (punishing responses, solicitous responses, and distracting responses)

D. Regression sets with general interference in functioning as the criterion.

(i)   General interference in functioning regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   General interference in functioning regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   General interference in functioning regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   General interference in functioning regressed on significant other's perceived reactions to patient's pain (punishing responses, solicitous responses, and distracting responses)

E. Regression sets with work interference in functioning as the criterion.

(i)   Work interference in functioning regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   Work interference in functioning regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   Work interference in functioning regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   Work interference in functioning regressed on significant other's perceived reactions to patient's pain (punishing responses, solicitous responses, and distracting responses)

F. Regression sets with self-control as the criterion.

(i)   Self-control regressed on pain-related negative cognitions (pain rumination and pain magnification)

(ii)   Self-control regressed on pain-related negative cognitive coping styles (catastrophizing, ignoring sensation and distancing)

(iii)   Self-control regressed on pain-related positive cognitive coping styles (coping self-statements, distraction and praying)

(iv)   Self-control regressed on significant other's perceived reactions to

patient's pain (punishing responses, solicitous responses, and distracting

responses)

As the sample size and composition permitted, sex differences were also

undertaken, with these same analyses being examined for men and women separately.

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 was screened for accuracy and

missing items. The data was screened thoroughly, as each variable was inspected to

ensure scores for each variable were within range (Tabachnick & Fidell, 2007). For those

participants with a small number (less than 5%) of missing items within a scale or

subscale, the missing item was replaced with the mean value for the total sample

(Tabachnick & Fidell, 2007, p.67). Fifteen participants did not respond to a small number

of items (less than 5%) from the BDI-II; thus, the mean value for the full sample was

inserted. For those participants with a large number (more than 5%) of missing items

within a scale or subscale, a total score for that scale or subscale was not calculated and

was excluded from the analyses.

The number of cases considered to adequately support the multiple regressions (as

part of the moderator analysis) was estimated through the use of the following equation:

$N \geq 50+8m$, with N representing the approximate number of cases required and m

signifying the number of independent variables within the study design. In the current

study there were 11 predictor variables, 4 criterion variables, and 1 moderator variable.

The estimated sample size required was calculated to be 138 participants. The sample size for the current study is 201, which is larger than the minimum recommended.

Univariate and multivariate outliers. In addition to screening for accuracy and missing items, the data was 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 $\pm$ 3.29 was identified as a univariate outlier. Within the current database, a small number of cases were identified as significant univariate outliers. A decision was made not to transform or delete the outliers until the multivariate outliers were also examined, because although transformation or deletion of the cases may increase normality of the distribution, they may also decrease generalizability and/or interpretability of the data obtained. Multivariate outliers, which are cases with unusual combination of scores on two or more variables (Tabachnick & Fidell, 2007, p. 73), were screened by examining Mahalanobis distance and Cook's distance using SPSS. The Mahalanobis distance measures the distance of a case from the clustering of the remaining cases around a centroid, which is the intersection of the means of all the variables (Tabachnick & Fidell, 2007, p. 74). Although a case may show significance when analyzed using Mahalanobis distance, this case may not significantly influence the regression coefficient. Therefore, Cook's distance was also examined as it is useful in identifying the influence of each outlier in producing a significant change in at least one of the regression equations (Stevens, 2002). Influential outliers are defined as those with a Cook's D > 1.00. A few multivariate outliers were identified through the Mahalanobis distance analysis; however,

upon further examination using Cook's distance, no outliers were considered to be influential. Thus the raw scores of these cases were not altered.

Normality, linearity and homoscedasticity. Prior to the regression analysis, assumptions of normality, linearity and homoscedasticity were assessed using box and whisker plots along with histograms. The analyses revealed some variables which deviated from normality; however, these deviations were not severe. The scores for these variables were not transformed, as to avoid unnecessary increased difficulty in interpretation of the transformed variables.

Multicollinearity. An analysis of the intercorrelations among all variables was used to test for multicollinearity (see Table 4). Multicollinearity is present if two or more predictor variables are highly correlated with one another, and this can cause problems with respect to interpretation of the results. In the analysis for the present study, multicollinearity was not present, as there were no variables within the correlation matrix which reached the cut-off value of $r = .90$ which would suggest potential multicollinearity (Tabachnick & Fidell, 2007, p. 125).

Correlational Findings

A number of the variables were significantly inter-correlated (see Table 4 for complete correlation matrix). Coinciding with past research, BDI-II scores (measuring depressive symptomatology) were positively correlated with all variables measuring pain intensity: present pain intensity ($r = .20, p<.01$), pain in the past week ($r = .28, p<.01$), and suffering due to pain ($r = .38, p<.01$). BDI-II scores were also positively correlated with additional pain-related variables: general interference ($r = .53, p<.01$), significant others' perceived punishing responses ($r = .44, p<.01$), catastrophizing ($r = .63, p<.01$),

rumination ($r = .52$, $p<.01$), magnification ($r = .56$, $p<.01$), and praying ($r = .21$, $p<.01$). BDI-II scores were found to be negatively correlated with the following variables: self-control ($r = -.59$, $p<.01$), significant others' perceived solicitous responses ($r = -.22$, $p<.01$), significant others' perceived distracting responses ($r = -.17$, $p<.05$), coping self-statements ($r = -.15$, $p<.05$), and ignoring sensation ($r = -.20$, $p<.01$).

Strong relationships ($r \geq .60$) were demonstrated between the following variables: general interference was positively correlated with work interference ($r = .62$, $p<.01$) and with suffering due to pain ($r = .61$, $p<.01$); significant others' perceived distracting responses was positively correlated with significant others' perceived solicitous responses ($r = .74$, $p<.01$); pain- related rumination was positively correlated with pain-related catastrophizing ($r = .67$, $p<.01$); and finally, pain-related magnification was positively correlated with pain-related catastrophizing ($r = .70$, $p<.01$) and with pain-related rumination ($r = .75$, $p<.01$).

Regression Analyses

As previously mentioned, several hierarchical multiple regressions were conducted to determine the potential moderator role of depression in the relationships between several pain-related variables. Prior to entering variables into the regression equation, all predictor and moderator variables were standardized (because they were all continuous variables), and product terms were created which represent the interaction between each predictor and moderator variable (Frazier, Tix & Barron, 2004). According to Frazier et al. (2004) the unstandardized (β) coefficients should be examined over the standardized (β) regression coefficients. Thus, unstandardized coefficients were examined.

Upon obtaining a significant interaction between a predictor and the moderator which would signify a moderator relationship, further analyses were conducted to determine the effect of the predictor on the criterion variable at different levels of the moderator as defined by the interpretive guidelines for the BDI-II (Beck, 1996): minimal (BDI scores of 0 to 13), mild (scores 14 -19), moderate (scores 20 – 28), and severe (scores 29 – 63). To this end, the sample was first divided into each of the four levels of depression severity. Then within each severity category, regression analyses were carried out to determine whether the predictors were associated with the criterion variable.

Regression Findings

The results from the regression analyses are reported below and organized according to the criterion variable looked at in the analyses. Table 5 presents the descriptive statistics of all the variables used in the regression analyses within the pooled sample and by sex of the patient.

Analysis using present pain intensity as the criterion. A hierarchical multiple regression was conducted with pain rumination and magnification as the two predictor variables and depression severity as the moderator. In step 1 of the analysis, all variables were entered into the equation. A significant effect was found [$\Delta R^2 = .15$, $F(3, 187) = 10.71$, $p < .001$] with pain rumination ($\beta = .38$, $t = 2.55$, $p = .012$) and depression severity ($\beta = .25$, $t = 2.07$, $p = .039$) as significant predictors In step 2 of the analysis, both interaction terms (depression severity x pain rumination; depression severity x pain magnification) were entered into the equation. No significant results were obtained.

A similar hierarchical multiple regression was conducted with significant others' perceived solicitous, punishing and distracting responses as the predictor variables, and

depression severity as the moderator. Results demonstrated a significant effect in step 1 $[\Delta R^2 = .13, F(4, 173) = 6.53, p < .001]$ with depression severity as a significant predictor $(\beta = .55, t = 4.79, p < .001)$. No significant results were obtained at step 2.

The analysis with distraction, coping self-statements, and praying as the predictor variables, and depression severity as the moderator showed a significant effect in step 1 $[\Delta R^2 = .16, F(4, 185) = 8.91, p < .001]$ with praying $(\beta = .24, t = 2.12, p = .036)$ and depression severity $(\beta = .43, t = 4.25, p < .001$ as significant predictors. There was also a significant effect at step 2 $[\Delta R^2 = .04, F(3, 182) = 3.33, p = .021]$. Both depression severity $(\beta = .44, t = 4.15, p < .001)$ and praying $(\beta = .20, t = 1.83, p = .068)$ were significant predictors in themselves. There was also a near significant praying by depression severity interaction effect $(\beta = -.21, t = -1.83, p = .069)$ if a more liberal critical alpha level of .10 were to be adopted for interpretation. Figure 1 displays the relationship between praying and present pain intensity at different categorical levels of depression severity. Upon further exploration of the interaction, a significant relationship was discovered only at the minimal level of depression severity $(\beta = .73, t = 3.99, p < .001)$.

A hierarchical multiple regression was conducted with distancing, ignoring and catastrophizing as the predictor variables, and depression as the moderator. Results demonstrated a significant effect in step 1 $[\Delta R^2 = .15, F(4, 181) = 7.73, p < .001]$ with catastrophizing as a significant predictor $(\beta = .40, t = 3.08, p = .002)$. No significant results were obtained at step 2.

Analysis using pain intensity in the past week as the criterion. A hierarchical multiple regression was conducted with pain rumination and magnification as the

predictor variables, and depression as the moderator. Results yielded a significant effect in step 1 [$\Delta R^2 = .13$, $F(3, 186) = 9.32$, $p < .001$] with pain rumination as the significant predictor ($\beta = .33$, $t = 3.0$, $p = .003$). No significant results were obtained at step 2.

Analysis with significant others' perceived solicitous, punishing and distracting responses as the predictor variables, and with depression as the moderator revealed a significant main effect in step 1 [$\Delta R^2 = .07$, $F(4, 172) = 3.32$, $p = .012$] with depression severity as a significant predictor ($\beta = .26$, $t = 2.90$, $p = .004$). No significant results were obtained at step 2.

Results from a hierarchical multiple regression with distraction, coping self-statements, and praying as the predictor variables, and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .16$, $F(4, 184) = 8.41$, $p < .001$] with praying ($\beta = .27$, $t = 3.24$, $p = .001$) and depression severity ($\beta = .24$, $t = 2.36$, $p = .001$) as significant predictors. No significant results were obtained at step 2.

Findings from the analysis with distancing, ignoring and catastrophizing as the predictor variables, and depression as the moderator demonstrated a significant effect in step 1 [$\Delta R^2 = .12$, $F(4, 180) = 5.83$, $p < .001$] with catastrophizing as a significant predictor ($\beta = .29$, $t = 3.08$, $p = .002$). At step 2, results were near significant [$\Delta R^2 = .04$, $F(3, 177) = 2.42$, $p = .067$] for the interaction effect between ignoring sensation and depression severity ($\beta = -.20$, $t = -2.35$, $p = .020$). Follow-up analysis suggested a significant interaction (critical alpha level of .10) only at the minimal level of depression severity ($\beta = .28$, $t = 1.90$, $p = 0.063$). Figure 2 shows the relationship between ignoring sensation and pain intensity in the past week at different levels of depression severity.

Analysis using suffering due to pain as the criterion. A hierarchical multiple regression with pain rumination and magnification as the predictor variables, and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .26$, $F(3, 186) = 21.81$, $p < .001$] with pain rumination ($\beta = .55$, $t = 4.98$, $p < .001$) and depression severity ($\beta = .22$, $t = 2.63$, $p = .009$) as significant predictors. No significant results were obtained at step 2.

Analysis with significant others' perceived solicitous, punishing and distracting responses as the predictor variables, and depression as the moderator revealed a significant effect in step 1 [$\Delta R^2 = .16$, $F(4, 172) = 8.18$, $p < .001$] with depression severity as a significant predictor ($\beta = .46$, $t = 4.98$, $p < .001$). No significant results were obtained at step 2.

Findings from the regression with distraction, coping self-statements, and praying as the predictor variables, and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .19$, $F(4, 184) = 10.74$, $p < .001$] with praying ($\beta = .18$, $t = 2.07$, $p = .04$) and depression severity ($\beta = .41$, $t = 5.14$, $p < .001$) as significant predictors. No significant results were obtained at step 2.

Analysis with distancing, ignoring and catastrophizing as the predictor variables, and depression as the moderator demonstrated a significant effect in step 1 [$\Delta R^2 = .21$, $F(4, 180) = 12.17$, $p < .001$] with catastrophizing as a significant predictor ($\beta = .41$, $t = 4.19$, $p < .001$). No significant results were obtained at step 2.

Analysis using general interference as the criterion. The regression results from pain rumination and magnification as the predictor variables and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .31$, $F(3, 177) = 26.68$, $p < .001$]

with pain rumination ($\beta = 1.82$, $t = 2.58$, $p = .011$) and depression severity ($\beta = 3.49$, $t = 6.20$, $p < .001$) as significant predictors. No significant results were obtained at step 2.

Results with significant others' perceived solicitous, punishing and distracting responses as the predictor variables and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .29$, $F(4, 167) = 16.77$, $p < .001$] with depression severity as a significant predictor ($\beta = 4.03$, $t = 7.36$, $p < .001$). No significant results were obtained at step 2.

The findings with distraction, coping self-statements, and praying as the predictor variables and depression as the moderator revealed that praying ($\beta = 1.13$, $t = 2.13$, $p = .035$) and depression severity ($\beta = 3.61$, $t = 7.57$, $p < .001$) were significant in step 1 [$\Delta R^2 = .32$, $F(4, 174) = 20.59$, $p < .001$]. No significant results were obtained at step 2.

The analysis with distancing, ignoring and catastrophizing as the predictor variables and depression as the moderator yielded a significant effect in step 1 [$\Delta R^2 = .32$, $F(4, 170) = 20.11$, $p < .001$] with catastrophizing ($\beta = 1.12$, $t = 1.96$, $p = .051$) and depression severity ($\beta = 2.97$, $t = 5.21$, $p < .001$) as significant predictors. No significant results were obtained at step 2.

Analysis using work interference as the criterion. A hierarchical multiple regression with pain rumination and magnification as the predictor variables and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .17$, $F(3, 70) = 4.66$, $p = .005$] with pain rumination as a significant predictor ($\beta = 1.40$, $t = 2.93$, $p = .005$). No significant results were obtained at step 2.

The analysis including significant others' perceived solicitous, punishing and distracting responses as the predictor variables and depression as the moderator

demonstrated no significant effect both at step 1 [$\Delta R^2 = .06$, $F(4, 66) = 1.01$, $p = .407$] and at step 2 ($\Delta R^2 = .04$, $F(3, 63) = 1.00$, $p = .397$).

The findings with distraction, coping self-statements, and praying as the predictor variables and depression as the moderator revealed distraction to be a significant predictor ($\beta = .81$, $t = 2.67$, $p = .009$) in step 1 [$\Delta R^2 = .19$, $F(4, 67) = 3.97$, $p = .006$]. No significant results were obtained at step 2.

A regression with distancing, ignoring and catastrophizing as the predictor variables and depression as the moderator showed catastrophizing ($\beta = .87$, $t = 2.08$, $p = .041$) and ignoring sensation ($\beta = -.72$, $t = -2.14$, $p = .036$) to be significant predictors in step 1 ($\Delta R^2 = .13$, $F(4, 68) = 2.51$, $p = .050$). In step 2 there was a near significant interaction [$\Delta R^2 = .09$, $F(3, 65) = 2.58$, $p = .061$] between depression severity and catastrophizing ($\beta = -.79$, $t = -2.03$, $p = .046$). Follow-up analysis showed that catastrophizing was a significant predictor of work interference only at the minimal level of depression severity ($\beta = 1.81$, $t = 3.14$, $p = .004$). Figure 3 reveals the relationship between catastrophizing and work interference at different levels of depression severity.

Analysis using self-control as the criterion. A hierarchical multiple regression with pain rumination and magnification as the predictor variables and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .37$, $F(3, 185) = 36.86$, $p < .001$] with depression severity as a significant predictor ($\beta = -.74$, $t = -7.55$, $p < .001$). No significant results were obtained at step 2.

A hierarchical multiple regression with significant others' perceived solicitous, punishing and distracting responses as the predictor variables and depression as the moderator showed a significant effect in step 1 [$\Delta R^2 = .34$, $F(4, 172) = 21.85$, $p < .001$]

with significant others' perceived distracting responses (β = .34, t = 2.66, p = .009) and depression severity (β = -.73, t = -7.52, p < .001) as significant predictors. No significant results were obtained at step 2.

The analysis with distraction, coping self-statements, and praying as the predictor variables and depression as the moderator revealed a significant effect in step 1 [ΔR^2 = .38, $F(4, 183)$ = 28.04, p < .001] with coping self-statements (β = .21, t = 2.42, p = .017) and depression severity (β = -.80, t = -9.53, p < .001) as significant predictors. No significant results were obtained at step 2.

Results with distancing, ignoring and catastrophizing as the predictor variables and depression as the moderator showed that ignoring sensation (β = .25, t = 2.72, p = .007) and depression severity (β = -.76, t = -7.20, p < .001) were significant predictors at step 1 [ΔR^2 = .39, $F(4, 180)$ = 28.98, p < .001]. No significant results were obtained at step 2.

Supplementary Analysis

The total sample consisted of 84 men and 115 women which allowed supplementary analysis on sex differences to be carried out. Hierarchical multiple regression analyses were conducted separately for the men and for the women in the same manner as the previous analyses for the total sample (with both genders combined). Results from these analyses are summarized in Tables 5 to 10 for women and Tables 11 to 16 for men. For the purpose of conciseness and brevity, only a summary of significant findings from these analyses are reported below for each criterion variable. The reader is referred to Tables 5 to 16 for more detailed statistical information.

Women.

Present pain intensity (see Table 6). Depression was found to significantly

predict present pain intensity in women suffering from chronic pain in the regressions

involving these sets of predictors: pain rumination and pain magnification (β = .34, t =

2.02, p = .046), perceived solicitous, punishing, and distracting responses from

significant others (β = .68, t = 4.52, p < .001), and distraction, coping self-statements, and

praying (β = .45, t = 3.53, p = .001). With regards to the coping strategies, results

indicated praying as a significant predictor of present pain intensity (β = .40, t = 2.80, p =

.006).

Pain in past week (see Table 7). Depression was found to significantly predict

pain in the past week in women suffering from chronic pain in the regressions involving

these sets of predictors: perceived solicitous, punishing, and distracting responses from

significant others (β = .31, t = 2.64, p = .010) and distraction, coping self-statements, and

praying (β = .24, t = 2.60, p = .011). In addition, rumination (β = .32, t = 1.98, p = .046)

and praying (β = .37, t = 3.53, p = .001) were also significant predictors.

Pain suffering (see Table 8). Depression significantly predicted suffering due to

pain in women suffering from chronic pain in the regressions involving these sets of

predictors: pain rumination and pain magnification (β = .31, t = 2.58, p = .011),

perceived solicitous, punishing, and distracting responses from significant others (β = .52,

t = 4.58, p < .001), and distraction, coping self-statements, and praying (β = .43, t = 4.35,

p < .001). Coping strategies including rumination (β = .59, t = 3.78, p < .001), praying

(β = .23, t = 2.00, p = .048) and catastrophizing (β = .32, t = 2.62, p = .010) also

significantly predicted suffering due to pain in women.

General interference (see Table 9). Depression significantly predicted general interference in functioning in women suffering from chronic pain in the regressions involving these sets of predictors: pain rumination and pain magnification ($\beta = 3.68$, $t = 4.92$, $p < .001$), perceived solicitous, punishing, and distracting responses from significant others ($\beta = 4.08$, $t = 6.04$, $p < .001$), distraction, coping self-statements, and praying ($\beta = 3.46$, $t = 5.76$, $p < .001$), and distancing, ignoring and catastrophizing ($\beta = 3.19$, $t = 4.08$, $p < .001$). Praying was also found to significantly predict general interference in functioning in women ($\beta = 1.37$, $t = 1.99$, $p = .050$).

Work interference (see Table 10). Praying as a coping strategy was found to be a significant predictor ($\beta = 1.18$, $t = 2.47$, $p = .020$). Further analysis revealed a significant interaction between depression severity and distancing ($\beta = 1.89$, $t = 2.24$, $p = .033$). Upon further examination of the interaction, no significant relationships were found between work interference and distancing at any of the levels of depression severity. The reader is referred to Figure 4 for a visual display of the interaction effects.

Self-control (see Table 11). Depression was found to be a significant predictor of self-control in women suffering from chronic pain in the regressions involving these sets of predictors: pain rumination and pain magnification ($\beta = -.76$, $t = -5.67$, $p < .001$), perceived solicitous, punishing, and distracting responses from significant others ($\beta = -.76$, $t = -6.18$, $p < .001$), distraction, coping self-statements, and praying ($\beta = -.83$, $t = -7.78$, $p < .001$), and distancing, ignoring and catastrophizing ($\beta = -.80$, $t = -5.82$, $p < .001$). Ignoring sensations as a coping strategy was also found to significantly predict self-control in women ($\beta = .30$, $t = 2.57$, $p = .012$).

Men.

Present pain intensity (see Table 12). Rumination was a significant predictor (β =.59, t = 2.85, p = .006) of present pain intensity in male pain patients as was the interaction between praying and depression severity (β = -.52, t = -2.44, p = .017). Upon further examination of the interaction, no significant relationships were found between present pain intensity and praying at any of the levels of depression severity. Another regression analysis with distancing, ignoring and catastrophizing showed distancing to be a significant predictor (β = -.38, t = -2.06, p = .043) as well as the interaction between distancing and depression severity (β = -.49, t = -2.08, p = .041; see Table 9). Upon further examination of the interaction, a significant relationship was found between present pain intensity and distancing at the severe level of depression severity alone (β = -.98, t = -2.90, p = .010). The reader is referred to Figure 5 for a visual display of the interaction effects.

Pain in past week (see Table 13). Rumination was found to be a significant predictor (β = .38, t = 2.45, p = .017). A second hierarchical multiple regression with distraction, coping self-statements, and praying as the predictor variables revealed a significant effect at step 2 (ΔR^2 = .11, $F(3, 71)$ = 3.22, p = .028). Further analysis revealed none of the variables within the equation to be significant predictors.

Pain suffering (see Table 14). Depression was a significant predictor (β = .38, t = 2.70, p = .009) along with rumination (β = .54, t = 3.23, p = .002) and catastrophizing (β = .57, t = 3.35, p = .001).

General interference (see Table 15). Depression was a significant predictor of general interference in men suffering from chronic pain in the regressions involving these

sets of predictors: pain rumination and pain magnification (β = 3.05, t = 3.26, p = .002), perceived solicitous, punishing, and distracting responses from significant others (β = 3.93, t = 3.97, p < .001), distraction, coping self-statements, and praying (β = 3.73, t = 4.50, p < .001), and distancing, ignoring and catastrophizing (β = 2.67, t = 3.14, p = .002). Rumination (β = 2.77, t = 2.63, p = .011) and catastrophizing (β = 2.71, t = 3.07, p = .003) were also found to significantly predict general interference in men.

Work interference (see Table 16). Rumination was found to be a significant predictor (β = 1.70, t = 3.26, p = .003).

Self-control (see Table 17). Depression was a significant predictor of self-control in men suffering from chronic pain in the regressions involving these sets of predictors: pain rumination and pain magnification (β = -.81, t = -5.10, p < .001), perceived solicitous, punishing, and distracting responses from significant others (β = -.71, t = -4.34, p < .001), distraction, coping self-statements, and praying (β = -.77, t = -5.53, p < .001), and distancing, ignoring and catastrophizing (β = -.81, t = -4.77, p < .001). Perceived distracting responses by significant others was also found to be a significant predictor (β = .51, t = 2.41, p = .019).

Discussion

The purpose of the present study was to examine if differences would be observed in the ability of pain-related factors to predict the experience of chronic pain (including pain intensity, suffering, functionality, and self-control) at various levels of depression severity. The pain-related factors examined include cognitive response styles, cognitive coping strategies and perceived reactions of significant others to the patient's experience of pain.

Review of Original Hypotheses

It was postulated that in comparison to individuals experiencing lower levels of depressive symptoms, those with higher levels would demonstrate a stronger positive relationship between pain-related negative cognitions and pain severity along with interference in functioning (hypothesis 1a), and reveal a negative relationship with self-control (hypothesis 1b). A stronger, positive relationship was also predicted to occur between catastrophizing and both pain severity and functional interference (hypothesis 2a), and a negative relationship was predicted with self-control in those reporting higher levels of depressive symptoms (hypothesis 2b). Furthermore, among those with higher levels of depressive symptoms it was predicted that there would be a more robust relationship between distraction and coping self-statements with pain severity and interference in functioning as compared to patients suffering with lower levels of depression severity (hypothesis 3a). A stronger negative relationship was also predicted to emerge between distraction and coping self-statements with self-control among those with higher than lower levels of depressive symptoms (hypothesis 3b). Lastly, it was hypothesized that those experiencing higher levels of depressive symptoms would demonstrate a stronger positive relationship between perceived punishing reactions from significant others and pain severity and functional interference (hypothesis 4a), as well as a stronger negative relationship with self-control as compared to those reporting lower levels of depressive symptoms (hypothesis 4b).

Findings

Overall, the findings did not support any of the predictions that were related to depression severity playing a moderator role between the pain-related factors and pain

experience. However, other interesting and notable findings were revealed. The most consistent result was that greater depression predicted greater pain (current and past week), greater impairment (general and work-related), lower degree of self-control, and greater suffering due to the pain. This strongly suggests the central role that depression plays in the pain experience, but the question remains as to how it relates to other pain-related factors to predict pain intensity, suffering, and impairment. As discussed more fully below, the results in the present study show that some of the pain-related factors which were not previously examined in the literature did predict the experience of pain regardless of the level of depression severity. Due to the lack of research involving these factors in relation to the experience of pain, it was difficult to develop hypotheses related to these factors prior to initiation of the study. Nevertheless, these findings potentially extend the current literature although future research is necessary to confirm and uphold results obtained.

A very consistent finding was that ruminating on one's pain was associated with greater pain experience. Specifically, the more a patient ruminates on the pain, the greater the pain intensity (current and past), suffering due to pain, and interference in both general and work activities. This finding is important to explore further, as pain-specific rumination as a coping strategy had not been examined within the chronic pain population. Looking to past research on rumination as a response style to depression, the studies suggest that rumination serves to maintain and exacerbate depressive episodes (Bagby et al., 2004; Nolen-Hoeksema et al., 1993). Thus, results obtained in the present study suggest that rumination may have a similar relationship with pain as is does with

depression. Future investigations may aid in further establishing rumination as a negative cognition in coping with chronic pain.

Along the same lines as rumination, the cognitive coping style of catastrophizing appears to be associated in a negative manner with the experience of chronic pain. Congruent with previous works (Esteve et al., 2007; Sullivan et al., 1995) that linked catastrophizing with negative pain-related factors, the present study found that those who catastrophized in response to their pain reported greater pain intensity (both current and past), more suffering due to pain, and greater impairment in their work and general activities. Unlike rumination, however, the results show a pattern to suggest that depressive severity does appear to have an effect on the relationship between catastrophizing and work interference. In patients reporting minimal levels of depressive symptoms, the more they engage in catastrophizing the greater interference in work activities they experience. It may be the case that those suffering with less severe levels of depressive symptoms do not have a past history of depressive episodes. As a result of not having experienced depression before, they might be more susceptible to the effects of catastrophizing that normally accompany depression, and therefore experience greater work impairment. To explore this possibility, frequency of past depressive episodes within the sample was examined. It was discovered that of those patients who suffer from a minimal level of depression severity, 66.13% did not suffer from a past major depressive episode compared to 33.87% that did suffer from at least one past episode. The fact that a greater number of individuals suffering with minimal levels of depression did not suffer from a past depressive episode may support the rationale for the results obtained.

Furthermore, it may appear unusual that depression severity was found to influence the relationship between catastrophizing and work interference and not influence the relationship between catastrophizing and interference in general activities. Perhaps patients who have mild levels of depression are more likely than the more severely depressed patients to be employed and therefore more likely to report work impairment. An examination of the sample in the present study showed that 40.68% of minimally depressed patients were either employed full-time or part-time or were full-time or part-time students compared to 25.17% who were mildly depressed, 30.30% who were moderately depressed, and 10.91% who were severely depressed. A comparison of the percentages obtained from minimally depressed and severely depressed patients support this proposition.

Based on results obtained from the present study, certain coping strategies appear to be associated with more negative pain experiences whereas others are associated with more positive pain experiences. Praying and distraction were associated with negative pain experiences, whereas ignoring one's painful sensations and engaging in coping self-statements were associated with more positive pain experiences.

A more detailed examination of the findings showed that praying is associated with greater pain intensity (current and past week), suffering due to pain, and general impairment. Perhaps praying may be viewed as a "last resort" coping strategy, whereby an individual suffering with high levels of pain and impairment feels helpless and turns to external factors to aid in their coping. Praying may be considered a passive coping strategy, where the patient surrenders personal control over their pain. However, looking to the correlation matrix (Table 4), it can be seen that praying is not associated with self-

control. Alternately, those who suffer with greater pain and impairment might be more likely to turn to prayer for a source of comfort than those with less pain because of their greater suffering. A third explanation might involve depression. The findings suggest that praying is linked to greater pain among those with lower levels of depression. It may be that when one is not experiencing a full bout of depression, the presence of negative cognitions is muted. Thus, those who have more severe depressive episodes might be more likely to employ the depression-related coping strategies such as rumination (Nolen-Hoeksema et al., 1993) and catastrophizing (Esteve, Ramírez-Maestre, & López-Martínez, 2007; Sullivan et al., 1995) as opposed to praying. In contrast, those who are less depressed might be more hopeful and optimistic for divine intervention to reduce their pain.

Distraction is another coping strategy which appears to be associated with a more negative pain experience. It is interesting that engaging in distraction predicts more negative outcomes, whereas ignoring sensations predicts more positive outcomes. Upon further comparison of the factors measured by each subscale, it is understood that while the construct of ignoring sensations measures the degree to which the patient engages in denying that the pain exists, hurts or affects them, the distraction subscale measures the degree to which they think about or engage in activities they find pleasure in or individuals who they enjoy spending time with. The difficulty in using a measure which is based upon pleasurable events in chronic pain patients is that approximately 50% of the current sample suffers with moderate to severe depressive symptoms. These individuals often also experience lack of pleasure or enjoyment in activities (Beck & Alford, 2009) which is one of the core symptoms of depression. Thus, if a patient is engaging in

distraction (as defined by the measure used in the present study), their thinking might be focused on pleasurable experiences that they no longer can enjoy. This form of distraction may in fact increase negative mood and increase pain as individuals start to reflect on how they no longer participate or find enjoyment in activities they had previously. A more appropriate measure of distraction would be one which asks patients the degree to which they engage in activities which provide them with the opportunity to momentarily concentrate on something other than the pain. Looking at the results from another perspective, it may be that engaging in distraction is equivalent to using a blanket to cover up a mess; the pain still remains and therefore has the ability to affect the individual. In contrast, ignoring or denying that the pain itself exists may have more positive consequences because the individual is convinced that the pain is no longer present or is irrelevant, rather than attempting to disguise the pain. Literature examining the effects of hypnosis on pain may aid in further clarifying this rationale. Attempts at disentangling the effects of distraction and hypnotic dissociation (referring to repressing or suppressing cognitive processes) on the experience of pain have demonstrated that dissociation appears to be responsible for a greater impact on pain relief (Barabasz & Watkins, 2005). This finding may support the notion that separating oneself from the pain may have more positive consequences on pain severity in contrast to attempting to engage in a distracting activity. Another explanation for the finding that distraction is related to increased interference in employment activities could be overexertion. It may be that the more an individual engages in distraction from their pain, the more they tend to exceed their physical limits, which in turn leads to more pain and less ability to function in other activities such as work.

Turning now to the coping strategies which have been found to be associated with more positive pain experiences, the role of engaging in coping self-statements and ignoring one's painful sensations are examined. Those who engage in ignoring their sensations of pain, or deny that the pain hurts or exists, have a greater sense of control over their pain and also display decreased interference in work-related activities. The results show a trend suggesting that depression might have an effect on the relationship between ignoring sensations and pain, specifically pain in the past week. Those patients who reported minimal depressive symptoms and who engaged in ignoring sensations of pain tended to report more pain in the past week. This pattern of finding is unexpected because in general, ignoring sensations of pain seems to be a positive coping strategy that is associated with less interference with work and greater control over pain. It may be that ignoring painful sensations does aid in reducing work impairment and increasing perceived ability to manage one's pain. However, this coping strategy may not lead to actual decreases in pain intensity experienced by the patient.

The final coping strategy which has been associated with more positive pain experiences is coping self-statements, where the individual engages in positive statements surrounding their own ability to cope with the pain. It appears that the more patients tell themselves that they can manage their pain, the greater their sense of self-control over their pain. This finding is important because it relates to the rationale for self-management chronic pain programs which attempt to increase patients' control over certain aspects of their pain experience. These programs involve changing patients' thinking patterns from believing their pain is completely out of their control to recognizing that there are certain aspects which they are able to exert control over, such

as pacing their activities to avoid experiencing flare-ups (Otis, 2007). Findings obtained through the current study appear to support the use of self-management pain programs, because increasing levels of self-control over pain is associated with more active coping strategies. In combination, increased self-control and improved ability to cope with pain may in fact decrease pain itself along with increasing functionality in various domains.

The other pain-related factors investigated in the study involve perceived reactions from significant others in response to the patient's experience of pain. Although perceived punishing and solicitous reactions from others did not predict any of the pain-related variables, it was discovered that patients who had significant others who they perceived as distracting them reported more positive pain experiences. At first glance it may seem odd that when patients engage in distraction on their own, they experience greater pain. Yet, when they are distracted by a significant other, they reported more positive effects on their experience of pain. The difference observed may simply be the result of another variable, namely social interaction. Perhaps distracting responses from others provides an opportunity for interaction with others, thereby producing a more positive effect on pain intensity experienced. It is also worth noting that, as reviewed above, the construct of distraction used as part of the current study measures the degree to which an individual engages in or thinks about a pleasurable activity or person. This is different from the measure of distracting responses from others which assesses degree of engagement in activities such as reading, talking about something else, involving the individual in an activity and so on. Thus, the difference in results observed may also be related to the difference in constructs measured.

Supplementary Findings

The current sample had a large number of participants, consisting of 84 men and 115 women. The higher representation of women within the sample is consistent with the literature that shows women to have a higher prevalence rate of chronic pain than men (Crook et al., 1984; Munce & Stewart, 2007; Tsang et al., 2008; Wijnhoven et al., 2006). Supplementary analyses examining sex differences found that for women, greater depression severity was associated with greater pain (present and past week), pain suffering, general interference, and with less sense of self-control. Among female pain patients, those who pray, ruminate on their pain, and catastrophize also report more negative pain-related experiences. In addition, those who try to ignore their pain tend to have a greater sense of control over their pain. Furthermore, distancing was related to greater interference in employment activities.

Like their female counterparts, male pain patients who ruminate and catastrophize also report more negative pain-related experiences. In addition, depression was associated with greater pain suffering, general interference, and with less sense of self-control, however, these relationships were weaker in comparison to women based on the finding that men in the sample suffer with lower levels of depression. Unlike the female patients, the men who engaged in distancing from their pain and those who had significant others who they perceived as distracting them from their pain reported more positive pain-related experiences. Interestingly, depressive symptoms appear to affect the relationship between present pain and distancing as well as present pain and praying. It appears that among the more severely depressed men, those who distance, or who remove themselves, from their pain report less present pain. Praying was also found to be related

to greater pain in men, however, there was no differentiation found across different levels of depressive symptoms.

Overall, both men and women who ruminate and catastrophize about their pain experience more negative pain-related consequences. Depression affects the relationship between distancing and pain severity for men, and between distancing and work interference for women. Moreover, how depression affects these relationship differs between the sexes. In men who have severe depressive symptoms, the more they distanced from their pain the less pain they reported experiencing. In contrast, women who used distancing as a coping strategy experienced greater interference with their abilities at work. If distancing can be conceptualized as a more passive coping strategy, (as the individual is in a sense avoiding the experience of chronic pain), it appears that for men, a more passive approach to coping with pain appears to reduce their negative experiences, whereas for women, a more active approach (such as ignoring sensations) to coping with chronic pain reduces negative experiences related to their pain.

Comparison of Findings with Previous Literature

Past researchers who demonstrated relationships between coping strategies and pain intensity or functional impairment may have obtained different results than the current study as there were some methodological differences in the study design. In particular, past researchers have identified distraction and avoidant behaviours as positive coping strategies, whereas the current study demonstrates that engaging in distraction and ignoring sensations (a form of avoidance) may have a negative effect on the experience of chronic pain depending on the pain-related factor examined. Review of previous work reveals that a number of past studies did not examine the presence of psychopathology

within the sample (Ramírez-Maestre et al., 2008; Schwartz et al., 1996; Sullivan et al, 1995), and therefore also did not account for depression severity in their analyses.

Other factors which may have contributed to the difference in findings obtained include definition of chronic pain, cultural differences of the sample and measures used to assess pain intensity, functional impairment and coping strategies. The definition of chronic pain was unclear in one past study, because the investigators did not clarify the diagnosis of the participants (Sullivan et al, 1995). Two of the studies examining coping strategies utilized by chronic pain patients were conducted outside of North America (Cui et al., 2009; Ramírez-Maestre et al., 2008). The potential difference in cultural values and beliefs may have influenced results obtained as employment of certain coping strategies may be more prevalent or acceptable in one culture over another.

With respect to the measures employed, past research assessed pain mainly through the use of the McGill Pain Questionnaire (MPQ; Ramírez-Maestre et al., 2008) as well as the numeric analogue scale (NAS; Schwartz et al., 1996) rather than use of the MPI. The difference in measurement tools may have affected results obtained as the MPQ assesses pain through the use of descriptor words along with a visual analogue scale (VAS) which is similar to the NAS. The MPI, on the other hand, asks patients to rate the level of pain they are experiencing on a continuum ranging from 1 to 6. Although similar to the VAS and NAS, the MPI scale has a more restricted range and does not take into account any other factors related to pain intensity as does the MPQ. Thus, in comparison to the MPQ it provides a clearer picture with respect to the degree to which pain is being experienced rather than the type of pain which is occurring.

Additional differences in measures used include those related to functional impairment and coping strategies. Both the Impairment and Daily Functioning Inventory and the Sickness Impact Profile (SIP) were used to assess impairment in ability to function in past investigations. Compared to the MPI general interference subscale, the SIP simply assesses impairment related to back pain and the Impairment and Daily Functioning Inventory does not appear to be as broad a measure as it does not assess for inability to function in family-related activities, marriage and other family relationships, or degree of enjoyment. Coping strategies were also assessed using different measures in previous studies, which may have resulted in the current measures utilized assessing different aspects of the specific coping strategy under investigation.

Strengths and Limitations

There are several strengths and limitations associated with the present study which should be considered. Beginning with some of the limitations, it was determined that a number of the variables that were examined were correlated with one another. Although the correlations were not high enough to raise concerns about multicollinearity, the overlap among them makes clear interpretations of the findings more difficult. Another more significant implication of the overlap among the variables has to do with the possibility of inflated Type I error, given the number of regression analyses that were conducted. For the most part, the significance level of the tests were extremely small ($p < .001$) which reduces the concern. Also, employing the interpretive guidelines of the BDI resulted in an unequal number of patients falling into each depression severity category, with a greater number of patients falling in the extreme ranges and less falling in the middle. The mild ($n=36$) and moderate ($n=38$) categories had fewer individuals

than the minimal (n=62) and severe categories (n=59). An ideal situation would be to have equal number of patients in each BDI category so that interpretation of the results would not be affected by the unequal weighting.

With respect to generalizing the findings from the present study to the entire chronic pain population, caution needs to be exercised. Factors related to the variety in clinics from which data was collected must be considered; such as differences in location, treatment procedures, and sex of the physician which were not controlled for. In addition, chronic pain patients are treated at different settings, and those who are treated in hospital chronic pain management programs that specialize in multidisciplinary treatment of individuals tend to have a longer history of pain and ineffective treatments. The patients in the present study were recruited from community pain clinics that did not provide comprehensive multidisciplinary care. As well, the patients were a heterogeneous group in the type of pain that they presented, the duration of their condition, and treatment history. All these factors could influence their pain severity, depression severity, the coping strategies employed, and the degree of optimism and self-control they have. However, measures were taken in order to uphold as much consistency as possible, including restricting participating pain clinics to the GTA, and recruiting clinics which treat patients suffering from a variety of chronic pain. Findings from the current sample may be more generalizable to a population which suffers from a variety of chronic pain conditions and who have not exhausted most treatment options.

Another potential limitation of the current study is the fact that participants were compensated for their time. Although compensation was equivalent to the amount of time patients were asked to participate it may have affected responses provided, with some

patients agreeing to participate solely to be compensated, thus invalidating some of the responses. Although not collected as part of this study, duration of chronic pain diagnosis may have aided in the explanation of the findings. If, for example, participants were relatively recently diagnosed with chronic pain (< 5 years), they may not be experiencing the same levels of depression and pain severity or interference as someone who has been suffering for a longer period of time. It may be beneficial to replicate findings in a population which has been suffering with chronic pain for 10+ years and have undergone a variety of treatments to determine if severity levels of depression and decreased ability to engage in positive coping strategies are discovered in this population.

This study is different from the previous works in the area because it examined constructs and measures that were specific to the pain experience and therefore more appropriate for use in pain research. In contrast, previous studies have relied on more generic measures. For example, both Endler et al. (2003) and Cui et al. (2009) used a measure which assesses general coping strategies in stressful situations rather than measures which assess coping with pain specifically. The findings from the present study would therefore be more applicable to the pain population.

Another strength of the study lies in the use of a clinical sample instead of a general community sample. The participants were recruited from pain clinics which confirms that the primary complaint for these individuals was pain and that their pain intensity was sufficiently high to warrant medical intervention. This increases the generalizability of the findings from the present study to the pain population.

Unlike previous works (e.g., Cui et al., 2009; Endler et al., 2003; Esteve et al., 2007; Sullivan et al., 1995), the present study has taken into consideration depression as

an important predictor of the pain experience. Ignoring depression as a contributor to the experience of pain makes interpretation of the results difficult because depression could be simultaneously related to both pain perception and a third factor (such as rumination) which predicts pain perception.

The current study has examined an aspect of the chronic pain condition which previous work has neglected. Through the examination of the role of depression in the experience of chronic pain, we are able to appreciate that the results from this study appear to indicate that depression does not appear to be a strong moderator in various relationships between coping strategies and significant others' reactions with the experience of chronic pain, although it does effect some relationships. Although some limitations exist, this project has implications for future interventions with chronic pain patients.

Conclusions and Future Directions

Overall, it appears that a number of coping strategies are valuable in predicting the experience of chronic pain. Specifically, rumination, catastrophizing, praying and distraction are associated with negative pain experiences, and ignoring painful sensations along with engaging in coping self-statements are associated with more positive pain experiences. Distracting patients from their pain is associated with greater self-efficacy in terms of control over pain. Depression was not found to be a moderator between the pain-related factors and the pain experience. Instead, it was found to have direct relationship with the pain experience. Supplementary findings suggest that different coping strategies predict the pain experience in men and women.

A coping strategy which was not examined in the present study was physical exercise. Although individuals suffering with a chronic pain condition may not be able to engage in strenuous exercise, they may be able to engage in some form of physical activity tailored to their physical limitations. Researchers have found that physical activity tends to decrease depressive symptoms (Conn, 2010; Jerstad, Boutelle, Ness, & Stice, 2010). Hence, it would be beneficial to examine the relationship between exercise and pain while taking into account depressive symptoms in future research.

The finding that depression does not appear to moderate the relationship between coping strategies and significant others' reactions and the experience of chronic pain suggests treatment tailored specifically to level of depression severity may not be useful. Rather, treatment options aimed at modifying factors which have been identified as causing increases in pain intensity and functional impairment, and decreases in self-control may be more beneficial.

The type of social support that was examined in the present study was limited to reactions from significant others as opposed to support from friends or other sources because many chronic pain patients tend to live isolated lives and their primary source tends to be those who live with them. However, another form of social support which would be relevant to this population, and may be valuable to examine in future research is support from health care professionals who are part of the patient's treatment team (such as general practitioners, physiotherapists, nurses, etc). Research examining social support from health care providers in adolescents suffering with cancer has found that perceived support from health care providers is associated with and both reduced symptom distress and better mental health (Corey, Haase, Azzouz, & Monahan, 2008). Support from health

care professionals has not been examined within the chronic pain population, yet, it may

be beneficial to determine if the support received from those aiding in the patient's

treatment has a different effect on their chronic pain experience or depressive symptoms

in comparison to support received from significant others.

Another factor related to social support which should be taken into consideration

is that past research examined social support from spouses, which seems to imply that the

couple is a heterosexual couple. Researchers have not examined social support from

same-sex couples in individuals suffering with chronic pain. There may be differences in

support from heterosexual couples in comparison to same-sex couples, as men and

women provide different types of support with women providing more emotional support

than men (e.g., Trobst, Collins, & Embree, 1994). Even within heterosexual couples, the

sex of the source of support as it relates to the pain experience would be a variable

worthy of examination.

It is questionable whether depression is a mediator in the relationship between

coping and experience of pain. Research could investigate this, where depression may

account for all the variance observed between these two factors. If this is the case, it

would have a large impact on treatment as the focus would be on decreasing depression

as this would in itself decrease the effect coping would have on pain. The present study

needs to be replicated with its methodological limitations addressed where possible. At

any rate, the impact of depression on the pain experience cannot be understated. It would

be essential to account for it in all future pain research to help understand its role and its

association with other contributing factors to pain perception and pain management with

implications for proper pain assessment and treatment.

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Table 1

Pharmacological Treatment of Chronic Pain

Authors	Sample	Treatment	Results
Sabatowski et al. (2004)	238 patients with post-herpetic neuralgia (PHN)	Pregabalin 150mg/day (n=81), 300 mg/day (n=76), or placebo (n=81) for 8 weeks	Endpoint mean pain scores significantly reduced; decreased sleep interference & significant improvement in Health-related quality-of-life (HRQOL) measure
Goldstein et al. (2004)	353 patients diagnosed with major depressive disorder	Duloxetine 20mg, 40mg, 80mg, and placebo for 8 weeks of treatment	Duloxetine shown to reduce pain severity as measured by the visual analogue scale and the Somatic Symptom Inventory
Raskin et al. (2006)	449 patients with diabetic peripheral neuropathic pain (DPNP)	Duloxetine 60 mg twice daily (BID) (N = 334) or duloxetine 120 mg once daily (QD) (N = 115) for up to 28 weeks	Both doses provided significant pain relief as measured by the Brief Pain Inventory (BPI)
Begré et al. (2008)	505 patients suffering from both chronic pain and depressive symptoms	Treated with 0-450 mg of venlafaxine daily and followed up 3 months later	Found venlafaxine beneficial in reducing symptoms of depression & pain

(continued)

Table 1 *(continued)*

Authors	Sample	Treatment	Results
Zissis et al. (2007)	60 neurology and headache clinic out-patients meeting diagnostic criteria for tension-type headache (TTH)	Venlafaxine XR (150 mg/day, n = 34) or placebo (n = 26) for 12 weeks	Those treated with venlafaxine XR had decrease in number of days with headache compared to placebo
Rowbotham et al. (1998)	229 individuals suffering with postherpetic neuralgia (PHN)	Double-blind, randomized, placebo-controlled 8 week trial; 4 week titration period (max. dose of 3600 mg/d), 4 week stable dosing period	Those receiving gabapentin demonstrated significant reduction in average daily pain scores, as well as improvement in pain and sleep interference
Kalso et al. (1995)	15 patients experiencing neuropathic pain following treatment for breast cancer	Randomized, placebo-controlled, double-blind 4 week study; doses of amitriptyline were escalated from 25 - 100 mg/d	Amitriptyline significantly relieved neuropathic pain following treatment for breast cancer, yet, adverse effects seem to deter patients from engaging in regular use of the drug

Table 2

Demographic Characteristics by Gender and Pooled Sample

Demographic characteristics	Men (n = 84)	Women (n =115)	Pooled sample (N=199)
Age (years)	$M = 49.72$ (SD = 11.42)	$M = 45.81$ (SD = 11.51)	$M = 47.43$ (SD = 11.58)
Marital status (frequency)			
Single	30 (35.71%)	40 (34.78%)	71 (35.68%)
Cohabiting	8 (9.52%)	16 (13.91%)	24 (12.06%)
Married	31 (36.90%)	37 (32.17%)	68 (34.17%)
Divorced/Separated	14 (16.67%)	16 (13.91%)	30 (15.08%)
Widowed	1 (1.19%)	6 (5.22%)	7 (3.52%)
Highest education level (frequency)			
Elementary	10 (11.90%)	12 (10.43%)	22 (11.06%)
High school	29 (34.52%)	27 (23.48%)	56 (28.14%)
Post-secondary	19 (22.62%)	23 (20.00%)	42 (21.11%)
College degree	13 (15.48%)	35 (30.43%)	49 (24.62%)
Bachelor degree	7 (8.33%)	10 (8.70%)	17 (8.54%)
Master's degree	2 (2.38%)	6 (5.22%)	8 (4.02%)
PhD degree	1 (1.19%)	0	1 (0.50%)
Ethnicity (frequency)			
Caucasian	61 (72.62%)	67 (58.26%)	128 (64.32%)
African	0	4 (3.48%)	4 (2.01%)
Arab	0	0	0
West Indian	0	0	0
Caribbean	7 (8.33%)	3 (2.61%)	10 (5.03%)
European	6 (7.14%)	17 (14.78%)	23 (11.56%)
East Asian	0	1 (0.87%)	1 (0.50%)
Filipino	0	1 (0.87%)	1 (0.50%)
Latin American/Hispanic	1 (1.19%)	3 (2.61%)	4 (2.01%)
North American Indian/Metis/Inuit	2 (2.38%)	3 (2.61%)	5 (2.51%)
South Asian	1 (1.19%)	1 (0.87%)	2 (1.01%)
Other	2 (2.38%)	11 (9.57%)	14 (7.04%)

Table 2 *(continued)*

Demographic characteristics	Men *(n =84)*	Women *(n =115)*	Pooled sample *(N=199)*
Annual family income			
$10,000 – $20,000	29 (34.52%)	45 (39.13%)	74 (37.19%)
$20,001 – $40,000	10 (11.90%)	15 (13.04%)	25 (12.56%)
$40,001 – $60,000	15 (17.86%)	19 (16.52%)	35 (17.59%)
$60,000 – $80,000	7 (8.33%)	12 (10.43%)	19 (9.55%)
$80,000 – $100,000	7 (8.33%)	9 (7.83%)	16 (8.04%)
> $100,000	9 (10.71%)	6 (5.22%)	15 (7.54%)
Employment status (frequency)			
Working/in school full time	19 (26.62%)	17 (14.78%)	36 (18.09%)
Working/in school part time	4 (4.76%)	11 (9.57%)	15 (7.54%)
Work within the home	1 (1.19%)	5 (4.35%)	6 (3.02%)
Unemployed/not in school	14 (16.67%)	27 (23.48%)	41 (20.60%)
Temporarily not able to go to work/school	27 (32.14%)	31 (26.96%)	59 (29.65%)
Retired	12 (14.29%)	18 (15.65%)	30 (15.08%)

Table 3

Frequency of Psychiatric Disturbances as Assessed with the M.I.N.I Structured Clinical

Interview

Psychiatric disturbances	Men (n = 84)	Women (n =115)	Pooled sample (N=199)
Mood Disorders			
Major Depressive Episode (Current)	31 (36.90%)	45 (39.13%)	77 (38.69%)
Major Depressive Episode (Past)	21 (25.00%)	39 (33.91%)	60 (30.15%)
Major Depressive Episode (with Melancholic Features)	21 (25.00%)	36 (31.30%)	58 (28.15%)
Dysthymia (Current)	15 (17.86%)	30 (26.09%)	45 (22.61%)
Dysthymia (Past)	0	2 (1.74%)	2 (1.01%)
Manic Episode (Current)	0	4 (3.48%)	4 (2.01%)
Manic Episode (Past)	6 (7.14%)	7 (6.09%)	13 (6.53%)
Hypomanic Episode (Current)	1 (1.19%)	3 (2.61%)	4 (2.01%)
Hypomanic Episode (Past)	9 (10.71%)	11 (9.57%)	20 (10.05%)
Anxiety Disorders			
Panic Disorder (Current)	7 (8.33%)	13 (11.30%)	21 (10.55%)
Panic Disorder (Lifetime)	6 (7.14%)	27 (23.48%)	33 (16.58%)

Table 3 *(continued)*

Psychiatric disturbances	Men *(n = 84)*	Women *(n =115)*	Pooled sample *(N=199)*
Panic Disorder (Limited Symptoms)	12 (14.29%)	28 (24.35%)	40 (20.10%)
Agoraphobia (Past)	21 (25.00%)	52 (45.22%)	74 (36.19%)
Social Phobia	7 (8.33%)	31 (26.96%)	39 (19.60%)
Specific Phobia	13 (15.48%)	23 (20.00%)	37 (18.60%)
Obsessive Compulsive Disorder	2 (2.38%)	19 (16.52%)	22 (11.06%)
Post-Traumatic Stress Disorder	8 (9.52%)	21 (18.26%)	29 (14.57%)
Generalized Anxiety Disorder	27 (32.14%)	46 (40.00%)	74 (37.19%)
Substance-Related Disorders			
Alcohol Dependence (Current)	5 (5.95%)	7 (6.09%)	12 (6.03%)
Alcohol Dependence (Lifetime)	27 (32.14%)	22 (19.13%)	49 (24.62%)
Alcohol Abuse (Current)	5 (5.95%)	5 (4.35%)	10 (5.03%)
Alcohol Abuse (Lifetime)	16 (19.05%)	9 (7.83%)	25 (12.56%)
Substance Dependence (Current)	7 (8.33%)	12 (10.43%)	19 (9.55%)

Table 3 *(continued)*

Psychiatric disturbances	Men (n = 84)	Women (n = 115)	Pooled sample (N = 199)
Substance Dependence (Lifetime)	21 (25.00%)	24 (20.87%)	45 (22.61%)
Substance Abuse (Current)	3 (3.57%)	1 (0.87%)	4 (2.01%)
Substance Abuse (Lifetime)	2 (2.38%)	0	2 (1.01%)
Eating Disorders			
Anorexia	0	0	1 (0.50%)
Bulimia	2 (2.38%)	3 (2.61%)	5 (2.51%)
Somatoform Disorders			
Somatization Disorder	0	3 (2.61%)	3 (1.51%)
Hypochondriasis	6 (7.14%)	9 (7.83%)	15 (7.54%)
Body Dysmorphic Disorder	1 (1.19%)	9 (7.83%)	11 (5.53%)
Pain Disorder	1 (1.19%)	4 (3.48%)	5 (2.51%)
Suicidality Risk	35 (41.67%)	52 (45.22%)	87 (43.72%)

Table 4

Bivariate Correlations Among Pain Intensity, Functioning, Self-Control, Significant Others' Reactions, Pain-Related Negative

Cognitions, Pain-Related Cognitive Coping Styles, and Depression Severity (N = 201)

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1																
2	.62**	1															
3	-.39**	-.15	1														
4	.20**	.20	-.27**	1													
5	-.02	-.01	.18*	-.28**	1												
6	-.05	.09	.25**	-.18*	.74**	1											
7	.44**	.30*	-.41**	.34**	.03	.05	1										
8	-.13	.02	.24**	.05	.08	.16*	-.00	1									
9	-.21**	-.20	.29**	-.05	.15	.15*	-.11	.54**	1								
10	.04	.08	.01	.11	.16*	.12	.11	.26**	.42**	1							
11	.04	.35**	.13	.03	.36**	.51**	.18*	.38**	.30**	.42**	1						
12	.27**	.30**	-.06	.15*	.18*	.30**	.43**	.15*	.11	.32**	.45**	1					
13	.53**	.12	-.59**	.44**	-.22**	-.17*	.63**	-.15*	-.20**	-.03	-.10	.21**	1				
14	.41**	.41**	-.41**	.18*	-.02	-.03	.67**	.06	-.18*	-.01	.05	.34**	.52**	1			
15	.31**	.27*	-.39**	.25**	.02	-.01	.70**	-.11	-.16*	.06	.06	.32**	.56**	.75**	1		
16	.16*	.13	-.10	.01	-.33**	-.17*	.10	-.05	-.13	-.07	-.04	.04	.20**	.15*	.06	1	
17	.38**	.33**	-.16*	.15*	.03	.06	.33**	.07	-.01	.01	.13	.30**	.28**	.32**	.25**	.13	1
18	.61**	.54**	-.22**	.16*	.02	.01	.47**	.02	-.11	.02	.09	.27**	.38**	.49**	.33**	.16*	.50**

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

1. General Interference Subscale
2. Work Interference Subscale
3. Self-Control Subscale
4. Others' Punishing Responses
5. Others' Solicitous Responses

6. Others' Distracting Responses
7. Catastrophizing Subscale
8. Coping Self-Statements Subscale
9. Ignoring Sensation Subscale
10. Distancing Subscale

11. Distraction Subscale
12. Praying Subscale
13. BDI-II Scale
14. Pain Rumination Subscale
15. Pain Magnification Subscale

16. Present Pain Intensity
17. Pain Intensity in Past Week
18. Suffering due to Pain

Table 5

Mean (Standard Deviation) of Scores Related to the Pain-Related Factors and Pain

Experience Within the Pooled Sample and by Sex.

Variables	Pooled sample ($N = 199$)	Men ($n = 84$)	Women ($n = 115$)
Pain-related negative cognitions			
Pain rumination	9.64 (4.68)	9.93 (4.44)	9.39 (4.86)
Pain magnification	5.07 (3.44)	5.25 (3.37)	4.91 (3.50)
Pain –related cognitive coping styles			
Catastrophizing	17.35 (8.98)	16.57 (7.52)	17.85 (9.91)
Coping self-statements	15.84 (5.26)	15.14 (4.86)	16.38 (5.51)
Ignoring sensation	11.67 (7.22)	11.21 (6.70)	12.12 (7.53)
Distancing	6.60 (6.43)	6.30 (5.85)	6.85 (6.87)
Distraction	15.58 (7.45)	15.15 (6.62)	15.87 (8.04)
Praying	9.41 (5.80)	8.46 (5.53)	10.12 (5.94)
Reactions from significant others			
Solicitous	2.92 (1.62)	2.71 (1.35)	3.08 (1.78)
Punishing	1.74 (1.59)	1.56 (1.37)	1.85 (1.72)
Distracting	2.15 (1.40)	1.98 (1.12)	2.28 (1.58)
Pain experience			
Pain severity (current)	4.10 (1.43)	3.96 (1.34)	4.18 (1.49)
Pain severity (past week)	4.79 (1.04)	4.75 (0.97)	4.83 (1.09)
Pain suffering	4.79 (1.12)	4.78 (1.09)	4.79 (1.15)
Interference (general)	26.37 (7.20)	25.37 (7.22)	27.04 (7.16)
Interference (work)	8.79 (2.56)	8.81 (2.31)	8.73 (2.81)
Self-control	3.57 (1.37)	3.49 (1.28)	3.63 (1.43)

Table 6

Hierarchical Multiple Regression with Present Pain Intensity as the Criterion and Depression as the Moderator (Women Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.15***
Rumination	.16	.22	.23	1.03	
Magnification	.04	.23	.06	.25	
Depression	.24	.17	.34	2.02*	
Step 2					.001
Rumination x Depression	-.05	.26	-.07	-.26	
Magnification x Depression	.05	.23	.07	.28	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.18***
Solicitous	.11	.21	.15	.73	
Punishing	-.13	.15	-.19	-1.25	
Distracting	.56	.20	.08	.38	
Depression	.47	.15	.68	4.52***	
Step 2					.003
Solicitous x Depression	.01	.21	.01	.06	
Punishing x Depression	-.05	.13	-.06	-.47	
Distracting x Depression	-.06	.19	-.07	-.37	

(continued)

Table 6 *(continued)*

Variables	B	SEB	β	t	ΔR^2
Predictors: Distraction, Coping self-statements, Praying					
Step 1					.26***
Distraction	.07	.14	.10	.68	
Coping Self-Statements	.14	.13	.20	1.56	
Praying	.28	.14	.40	2.80**	
Depression	.32	.13	.45	3.53**	
Step 2					.04
Coping Self-Statements x Depression	.001	.11	.001	1.38	
Praying x Depression	-.05	.15	-.07	-.50	
Distraction x Depression	-.17	.12	-.20	-1.70	
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.17***
Distancing	.02	.14	.03	.24	
Ignoring	.07	.15	.11	.72	
Catastrophizing	.24	.17	.33	1.94	
Depression	.21	.18	.29	1.67	
Step 2					.01
Distancing x Depression	.06	.12	.08	.66	
Ignoring x Depression	-.08	.16	-.12	-.77	
Catastrophizing x Depression	-.06	.13	-.07	-.50	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 7

Hierarchical Multiple Regression with Pain in the Past Week as the Criterion and

Depression as the Moderator (Women Only)

Variables	B	SEB	β	t	ΔR²
Predictors: Pain Rumination, Pain Magnification					
Step 1					.13**
Rumination	.30	.16	.32	1.98*	
Magnification	-.07	.17	-.07	-.43	
Depression	.16	.12	.17	1.34	
Step 2					.01
Rumination x Depression	.13	.19	.13	.68	
Magnification x Depression	-.03	.17	-.03	-.18	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.11*
Solicitous	.09	.16	.09	.56	
Punishing	.11	.12	.11	.99	
Distracting	.05	.15	.05	.35	
Depression	.29	.12	.31	2.64**	
Step 2					.000
Solicitous x Depression	.01	.16	.01	.05	
Punishing x Depression	-.02	.10	-.02	-.12	
Distracting x Depression	-.01	.15	-.01	-.08	

Table 7 *(continued)*

Variables	B	SEB	β	t	ΔR^2
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.24***
Distraction	.01	.10	.01	.06	
Coping Self-Statements	.08	.10	.08	.86	
Praying	.36	.11	.37	3.53***	
Depression	.24	.09	.24	2.60***	
Step 2					.03
Distraction x Depression	-.09	.09	-.08	-.92	
Coping Self-Statements x Depression	-.09	.08	-.08	-.91	
Praying x Depression	-.04	.11	-.04	-.34	
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.13**
Distancing	.07	.10	.07	.70	
Ignoring	-.90	.11	-.10	-.90	
Catastrophizing	.17	.13	.17	1.32	
Depression	.19	.13	.19	1.50	
Step 2					.02
Distancing x Depression	-.02	.09	-.02	-.25	
Ignoring x Depression	-.17	.11	-.18	-1.54	
Catastrophizing x Depression	-.11	.10	-.10	-1.01	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 8

Hierarchical Multiple Regression with Pain Suffering as the Criterion and Depression as the Moderator (Women Only)

Variables	B	SEB	β	t	ΔR²
Predictors: Pain Rumination, Pain Magnification					
Step 1					.30***
Rumination	.52	.16	.59	3.78***	
Magnification	-.24	.16	-.27	-1.66	
Depression	.28	.12	.31	2.58**	
Step 2					.01
Rumination x Depression	-.13	.18	-.14	-.74	
Magnification x Depression	.04	.16	.04	.24	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.22***
Solicitous	.18	.16	.20	1.25	
Punishing	.06	.11	.07	.60	
Distracting	-.07	.15	-.07	-.48	
Depression	.47	.11	.52	4.58***	
Step 2					.03
Solicitous x Depression	-.03	.16	-.03	-.16	
Punishing x Depression	-.19	.10	-.16	-1.69	
Distracting x Depression	.01	.14	.01	.07	

Table 8 *(continued)*

Variables	B	SEB	β	*t*	ΔR²
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.25***
Distraction	.03	.11	.03	.28	
Coping Self-Statements	.04	.10	.04	.40	
Praying	.20	.11	.23	2.00*	
Depression	.40	.10	.43	4.35***	
Step 2					.01
Distraction x Depression	.04	.10	.03	.35	
Coping Self-Statements x Depression	-.04	.10	-.03	-.37	
Praying x Depression	-.10	.12	-.12	-1.01	
Predictors: Distancing, Ignoring, Catastrophizing; Moderator: Depression					
Step 1					.25***
Distancing	.10	.10	.10	1.02	
Ignoring	-.11	.11	-.12	-1.11	
Catastrophizing	.31	.12	.32	2.62**	
Depression	.21	.13	.23	1.78	
Step 2					.03
Distancing x Depression	-.07	.09	-.07	-.81	
Ignoring x Depression	.03	.11	.03	.30	
Catastrophizing x Depression	-.15	.10	-.14	-1.48	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 9

Hierarchical Multiple Regression with General Interference as the Criterion and

Depression as the Moderator (Women Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.32***
Rumination	.15	.97	1.11	1.14	
Magnification	-.11	1.03	-.79	-.77	
Depression	.54	.75	3.68	4.92***	
Step 2					.000
Rumination x Depression	-.03	1.16	-.20	-.17	
Magnification x Depression	.04	1.04	.23	.22	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.32***
Solicitous	.13	.92	.84	.91	
Punishing	-.04	.67	-.25	-.37	
Distracting	-.10	.89	-.68	-.77	
Depression	.59	.68	4.08	6.04***	
Step 2					.01
Solicitous x Depression	.01	.96	.04	.04	
Punishing x Depression	-.003	.57	-.02	-.03	
Distracting x Depression	.09	.84	.54	.64	

(continued)

Table 9 *(continued)*

Variables	B	SEB	β	*t*	ΔR²
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.35***
Distraction	.10	.67	.06	.10	
Coping Self-Statements	-.04	.61	-.30	-.48	
Praying	.19	.69	1.37	1.99*	
Depression	.51	.60	3.46	5.76***	
Step 2					.01
Distraction x Depression	.09	.62	.51	.83	
Coping Self-Statements x Depression	.06	.55	.38	.69	
Praying x Depression	-.09	.79	-.68	-.86	
Predictors: Distancing, Ignoring, Catastrophizing; Moderator: Depression					
Step 1					.30***
Distancing	.09	.62	.62	.99	
Ignoring	-.12	.67	-.86	1.30	
Catastrophizing	.06	.76	.39	.51	
Depression	.47	.78	3.19	4.08***	
Step 2					.01
Distancing x Depression	.02	.55	.13	.23	
Ignoring x Depression	.08	.72	.57	.79	
Catastrophizing x Depression	-.03	.60	-.16	-.27	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 10

Hierarchical Multiple Regression with Work Interference as the Criterion and Depression as the Moderator (Women)

Variables	B	SEB	β	t	ΔR^2
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.32**
Distraction	.33	.41	.78	1.91	
Coping Self-Statements	-.13	.61	-.49	-.80	
Praying	.44	.48	1.18	2.47*	
Depression	.12	.62	-.44	-.72	
Step 2					.16
Distraction x Depression	.28	.62	.81	1.31	
Coping Self-Statements x Depression	.32	1.09	1.59	1.46	
Praying x Depression	.65	.70	1.99	2.83	
Predictors: Distancing, Ignoring, Catastrophizing; Moderator: Depression					
Step 1					.15
Distancing	.28	.60	.72	1.20	
Ignoring	-.38	.50	-1.00	-1.99	
Catastrophizing	.14	.68	.38	.55	
Depression	-.02	.82	-.09	-.11	
Step 2					.23*
Distancing x Depression	.48	.84	1.89	2.24*	
Ignoring x Depression	.37	.73	1.35	1.87	
Catastrophizing x Depression	-.44	.78	-1.46	-1.87	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 11

Hierarchical Multiple Regression with Self-Control as the Criterion and Depression as the Moderator (Women Only)

Variables	B	SEB	β	t	ΔR²
Predictors: Pain Rumination, Pain Magnification					
Step 1					.43***
Rumination	-.16	.17	-.22	-1.30	
Magnification	.02	.19	.03	.17	
Depression	-.56	.13	-.76	-5.67***	
Step 2					.002
Rumination x Depression	.07	.20	.09	.45	
Magnification x Depression	-.08	.18	-.10	-.55	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.37***
Solicitous	-.10	.17	.12	.73	
Punishing	-.03	.12	.04	.31	
Distracting	.20	.16	.26	1.59	
Depression	-.57	.12	-.76	-6.18***	
Step 2					.02
Solicitous x Depression	-.17	.17	-.21	-1.24	
Punishing x Depression	.08	.10	.08	.77	
Distracting x Depression	.17	.15	.20	1.32	

Table 11 *(continued)*

Variables	B	SEB	β	t	ΔR²
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.43***
Distraction	-.04	.12	.05	.44	
Coping Self-Statements	.14	.11	.19	1.70	
Praying	.02	.12	.03	.24	
Depression	-.63	.11	-.83	-7.78***	
Step 2					.02
Distraction x Depression	-.002	.10	-.002	-.02	
Coping Self-Statements x Depression	-.16	.10	-.19	-1.97	
Praying x Depression	.06	.13	.09	.71	
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.44***
Distancing	-.10	.11	.14	-1.26	
Ignoring	.21	.12	.30	2.57**	
Catastrophizing	-.003	.13	-.004	-.03	
Depression	-.59	.14	-.80	-5.82***	
Step 2					.02
Distancing x Depression	-.05	.10	-.06	-.61	
Ignoring x Depression	-.12	.12	-.17	-1.40	
Catastrophizing x Depression	.01	.10	.01	.09	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 12

Hierarchical Multiple Regression with Present Pain Intensity as the Criterion and

Depression as the Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.16**
Rumination	.42	.21	.59	2.85**	
Magnification	-.06	.19	-.08	-.40	
Depression	.02	.19	.04	.19	
Step 2					.02
Rumination x Depression	-.26	.32	-.43	-1.34	
Magnification x Depression	.23	.24	.32	1.31	
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.05
Distraction	-.04	.21	-.06	-.26	
Coping Self-Statements	.08	.18	.12	.69	
Praying	.02	.18	.03	.16	
Depression	.22	.17	.34	1.94	
Step 2					.12*
Distraction x Depression	.04	.30	.07	.22	
Coping Self-Statements x Depression	-.09	.18	-.14	-.76	
Praying x Depression	-.34	.21	-.52	-2.44*	

Table 12 *(continued)*

Variables	B	SEB	β	*t*	ΔR^2
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.12
Distancing	-.11	.18	-.15	-.86	
Ignoring	.14	.18	.20	1.07	
Catastrophizing	.31	.21	.49	2.29	
Depression	.06	.20	.09	.46	
Step 2					.13**
Distancing x Depression	-.32	.24	-.49	-2.08*	
Ignoring x Depression	-.07	.22	-.11	-.49	
Catastrophizing x Depression	-.22	.20	-.37	-1.85	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 13

Hierarchical Multiple Regression with Pain in the Past Week as the Criterion and Depression as the Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.14**
Rumination	.37	.16	.38	2.45*	
Magnification	-.03	.15	-.03	-.19	
Depression	.05	.14	.06	.42	
Step 2					.04
Rumination x Depression	-.36	.24	-.45	-1.87	
Magnification x Depression	.31	.18	.32	1.81	
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.05
Distraction	.01	.16	.01	.05	
Coping Self-Statements	.01	.13	.01	.09	
Praying	.10	.13	.10	.74	
Depression	.20	.13	.22	1.70	
Step 2					.11*
Distraction x Depression	-.24	.23	-.35	-1.54	
Coping Self-Statements x Depression	-.07	.14	-.08	-.61	
Praying x Depression	-.11	-.16	-.13	-.81	

Table 13 *(continued)*

Variables	B	SEB	β	*t*	ΔR^2
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.21**
Distancing	-.24	.13	-.25	-2.02	
Ignoring	.23	.13	.25	1.91	
Catastrophizing	.46	.15	.54	3.65	
Depression	-.06	.14	-.07	-.49	
Step 2					.05
Distancing x Depression	-.10	.18	-.12	-.67	
Ignoring x Depression	-.14	.16	-.17	-1.02	
Catastrophizing x Depression	-.14	.15	-.18	-1.19	

*$p \leq .05$ ** $p \leq .01$ ***$p \leq .001$

Table 14

Hierarchical Multiple Regression with Pain Suffering as the Criterion and Depression as the Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.22***
Rumination	.46	.17	.54	3.23**	
Magnification	-.09	.16	-.10	-.63	
Depression	.11	.15	.14	.97	
Step 2					.05
Rumination x Depression	-.38	.26	-.53	-2.07	
Magnification x Depression	.21	.19	.24	1.25	
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.12*
Distraction	.07	.17	.09	.54	
Coping Self-Statements	.01	.14	.14	.10	
Praying	.11	.15	.15	.84	
Depression	.30	.14	.38	2.70**	
Step 2					.08
Distraction x Depression	-.22	.25	-.36	-1.42	
Coping Self-Statements x Depression	-.09	.15	-.11	-.71	
Praying x Depression	-.05	.17	-.07	-.40	

Table 14 *(continued)*

Variables	B	SEB	β	*t*	ΔR^2
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.21**
Distancing	-.20	.14	-.24	-1.69	
Ignoring	.11	.15	.14	.93	
Catastrophizing	.43	.17	.57	3.35***	
Depression	.07	.16	.09	.52	
Step 2					.04
Distancing x Depression	-.002	.21	-.004	-.02	
Ignoring x Depression	-.09	.19	-.12	-.63	
Catastrophizing x Depression	-.20	.17	-.29	-1.70	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001

Table 15

Hierarchical Multiple Regression with General Interference as the Criterion and

Depression as the Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.30***
Rumination	.37	1.05	2.77	2.63**	
Magnification	-.16	.97	-1.11	-1.15	
Depression	.37	.94	3.05	3.26**	
Step 2					.01
Rumination x Depression	-.004	1.63	-.03	-.02	
Magnification x Depression	-.09	1.21	-.68	-.57	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.24***
Solicitous	.20	1.18	1.72	1.46	
Punishing	.03	.96	.21	.22	
Distracting	-.02	1.27	-.21	-.17	
Depression	.47	.99	3.93	3.97***	
Step 2					.04
Solicitous x Depression	-.01	1.66	-.12	-.07	
Punishing x Depression	-.09	1.03	-.81	-.79	
Distracting x Depression	-.19	1.17	-1.93	-1.13	

Table 15 *(continued)*

Variables	B	SEB	β	t	ΔR^2
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.29***
Distraction	.13	1.03	1.13	1.10	
Coping Self-Statements	-.19	.86	-1.48	-1.72	
Praying	.12	.88	.87	.99	
Depression	.46	.83	3.73	4.50***	
Step 2					.04
Distraction x Depression	-.17	1.54	-1.85	-1.20	
Coping Self-Statements x Depression	-.03	.94	-.21	-.22	
Praying x Depression	-.05	1.10	-.45	-.41	
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.39***
Distancing	-.02	.75	-.12	-.17	
Ignoring	-.10	.76	-.72	-.94	
Catastrophizing	.35	.89	2.71	3.07**	
Depression	.36	.85	2.67	3.14**	
Step 2					.04
Distancing x Depression	.01	1.17	.10	.08	
Ignoring x Depression	.03	1.00	.26	.26	
Catastrophizing x Depression	-.20	.89	-1.66	-1.87	

*$p \leq .05$ ** $p \leq .01$ ***$p \leq .001$

Table 16

Hierarchical Multiple Regression with Work Interference as the Criterion and Depression as the Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.34**
Rumination	.69	.52	1.70	3.26**	
Magnification	-.03	.52	-.08	-.16	
Depression	-.25	.50	-.76	-1.52	
Step 2					.03
Rumination x Depression	-.34	.79	-.94	-1.18	
Magnification x Depression	.20	.66	.50	.76	

*$p \leq .05$ ** $p \leq .01$ ***$p \leq .001$

Table 17

Hierarchical Multiple Regression with Self-Control as the Criterion and Depression as the

Moderator (Men Only)

Variables	B	SEB	β	t	ΔR^2
Predictors: Pain Rumination, Pain Magnification					
Step 1					.32***
Rumination	-.05	.18	-.07	-.39	
Magnification	.03	.17	.04	.24	
Depression	-.55	.16	-.81	-5.10***	
Step 2					.01
Rumination x Depression	-.07	.28	-.11	-.40	
Magnification x Depression	.12	.21	.15	.74	
Predictors: Solicitous, Punishing, Distracting Responses					
Step 1					.33***
Solicitous	-.13	.20	-.20	-1.03	
Punishing	-.05	.16	-.08	-.49	
Distracting	.31	.21	.51	2.41*	
Depression	-.47	.16	-.71	-4.34***	
Step 2					.02
Solicitous x Depression	.04	.28	.07	.24	
Punishing x Depression	.13	.17	.23	1.31	
Distracting x Depression	.01	.29	.01	.04	

Table 17 *(continued)*

Variables	B	SEB	β	*t*	ΔR^2
Predictors: Distraction, Coping Self-Statements, Praying					
Step 1					.34***
Distraction	.001	.17	.001	.01	
Coping Self-Statements	.14	.14	.20	1.37	
Praying	.14	.15	.18	1.26	
Depression	-.54	.14	-.77	-5.53***	
Step 2					.03
Distraction x Depression	.12	.26	.23	.89	
Coping Self-Statements x Depression	-.14	.15	-.20	-1.30	
Praying x Depression	.06	.18	.09	.52	
Predictors: Distancing, Ignoring, Catastrophizing					
Step 1					.37***
Distancing	.01	.15	.02	.11	
Ignoring	.09	.15	.13	.83	
Catastrophizing	-.08	.18	-.13	-.71	
Depression	-.54	.17	-.81	-4.77***	
Step 2					.03
Distancing x Depression	.21	.22	.36	1.64	
Ignoring x Depression	-.14	.19	-.22	-1.13	
Catastrophizing x Depression	-.07	.18	-.11	-.64	

*p ≤ .05   ** p ≤ .01   ***p ≤ .001
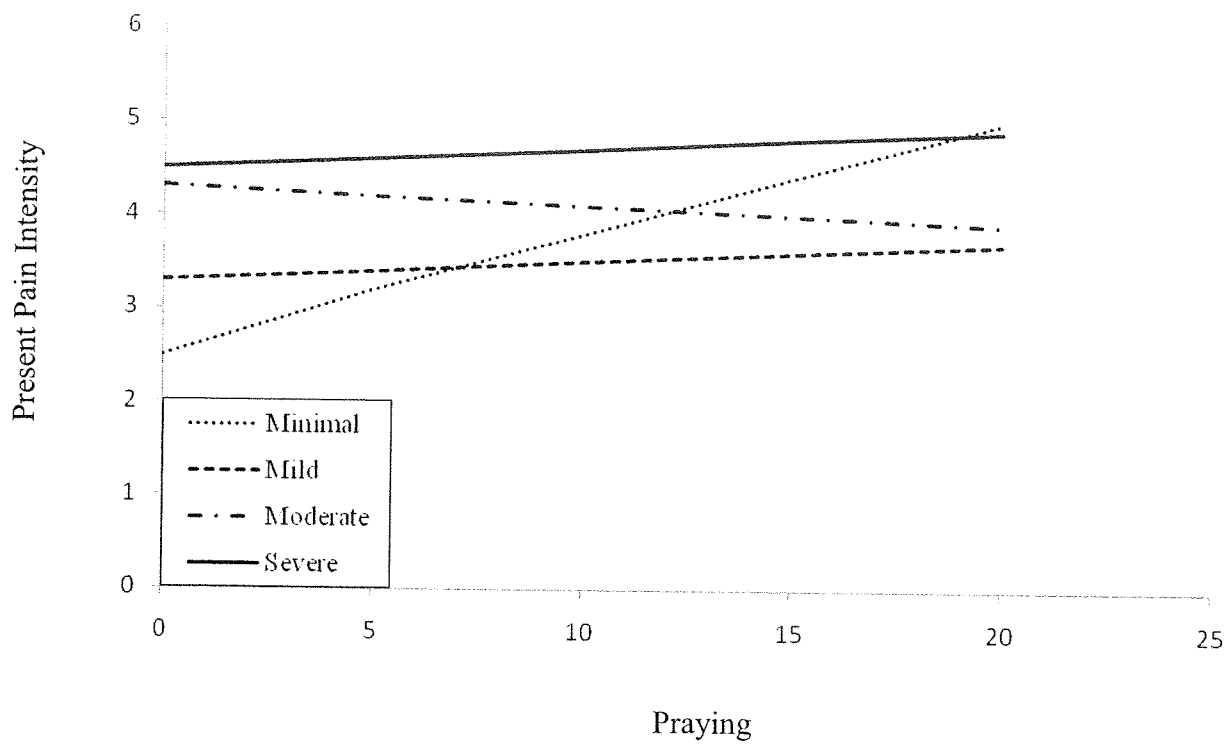
Figure 1. Relationship Between Praying and Present Pain Intensity at Different Levels of Depression Severity.
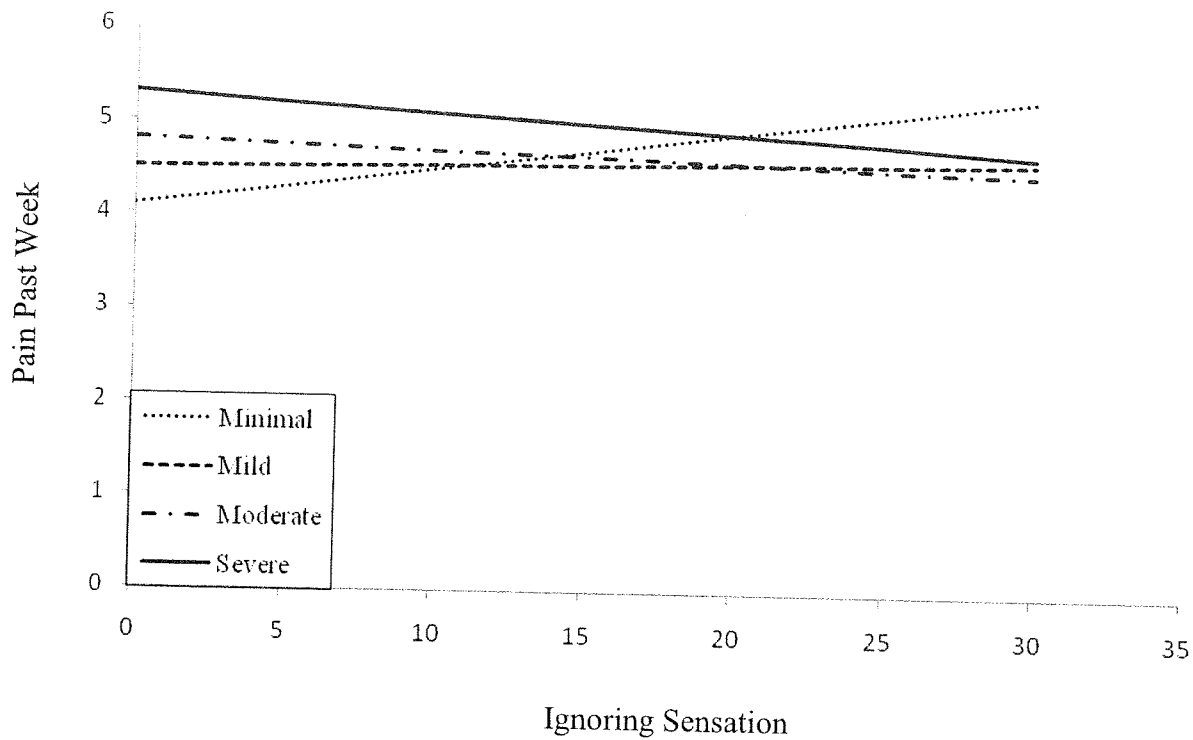
Figure 2. Relationship Between Ignoring Sensation and Pain in the Past Week at Different Levels of Depression Severity.
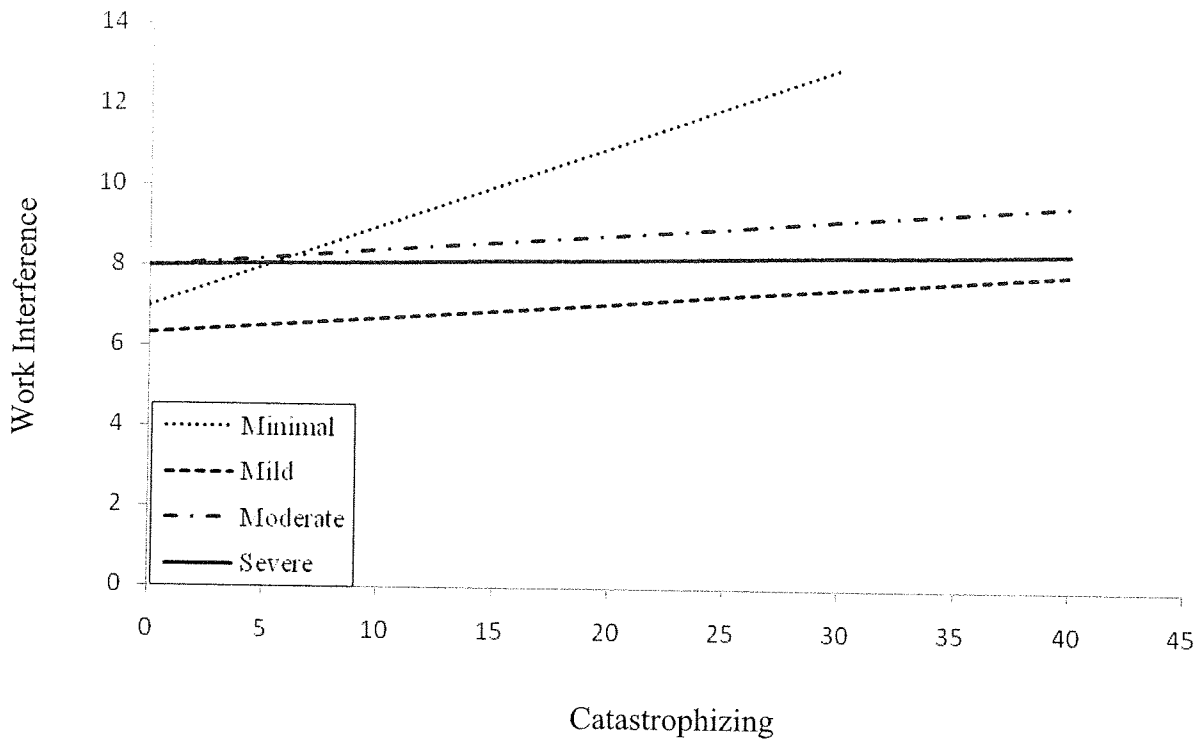
Figure 3. Relationship Between Catastrophizing and Work Interference at Different

Levels of Depression Severity.
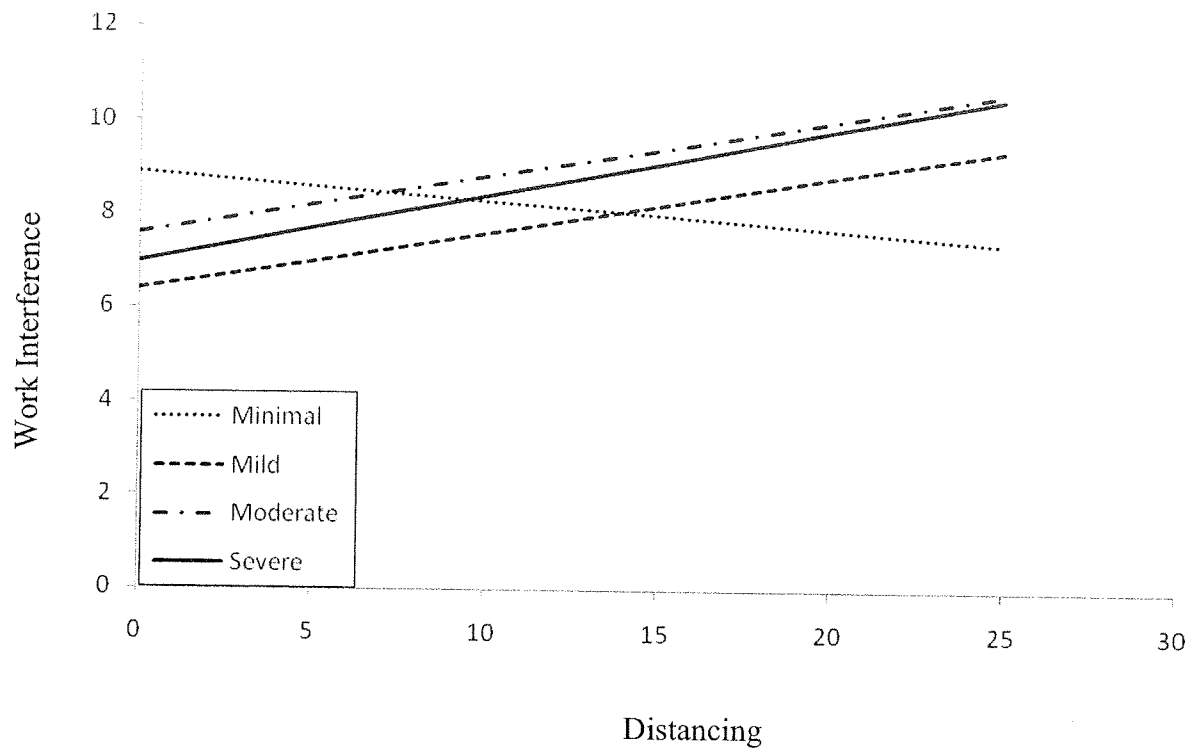
*Figure 4.* Relationship Between Distancing and Work Interference in Women at Different Levels of Depression Severity.
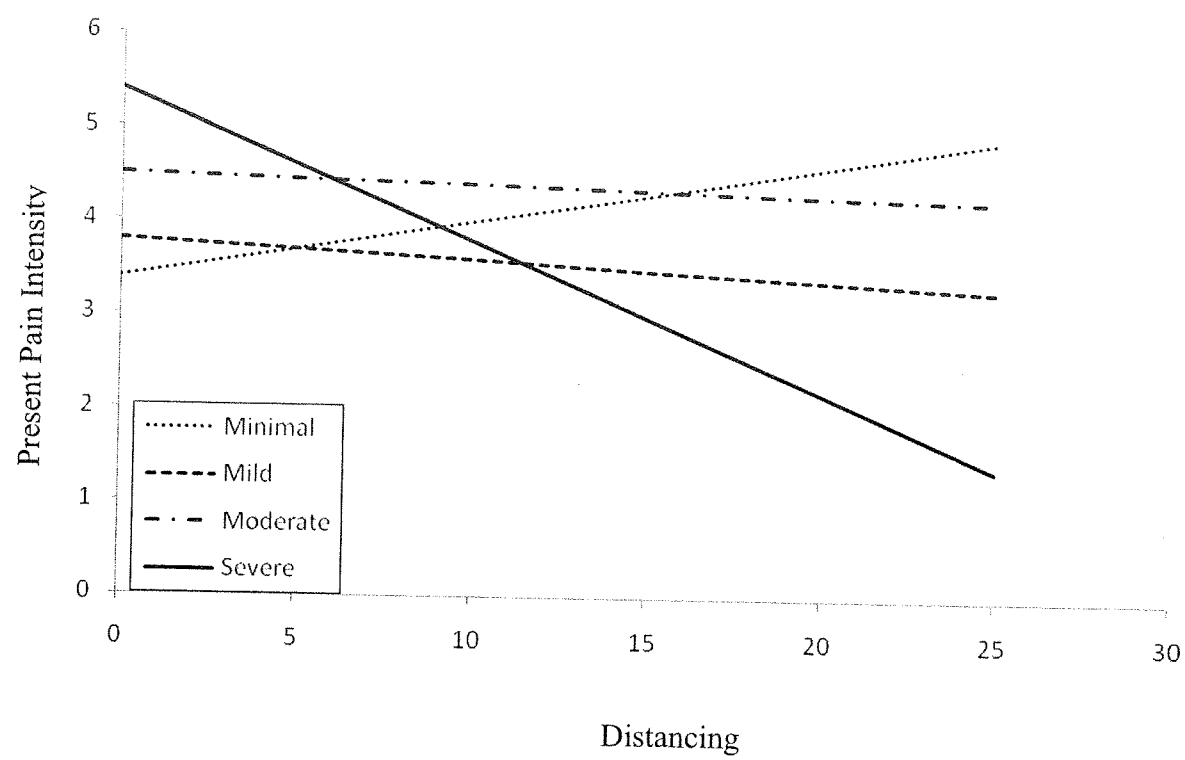
Figure 5. Relationship Between Distancing and Work Present Pain Intensity in Men at Different Levels of Depression Severity.
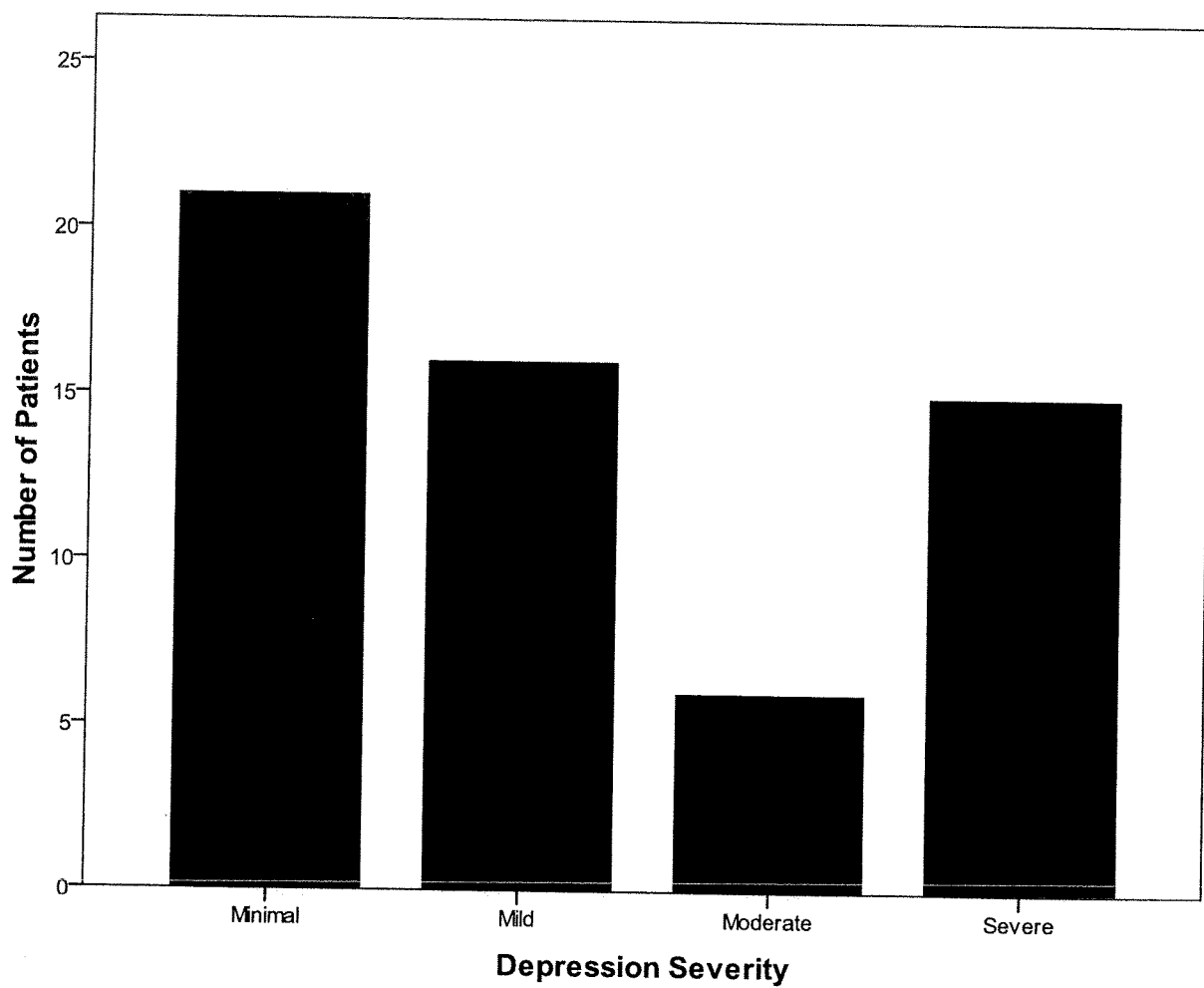
Figure 6. Number of Patients Within Each Depression Severity Category who had Prior

Episodes of Depression.

Appendix A

Approval Letter

OPTIMUM

                                  Dr. Martin Katzman
                                  START Clinic for Mood and Anxiety Disorders
                                  790 Bay Street, Suite 900
                                  Toronto, ON M5G 1N8

This is to notify you that following review of the documents detailed below, the status of approval has been allocated to the research project by the Ethics Review Board of Optimum Clinical Research Inc.

TITLE: **EXAMINING THE ROLE OF DEPRESSION, ANXIETY DISORDERS AND INSOMNIA IN PATIENTS VISITING A PAIN CLINIC**
DATE: **VERSION 1 APRIL 28, 2009**
               VERSION 2 MAY 13, 2009
               VERSION 3 JUNE 2, 2009
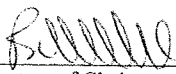
Status of Approval

At the meeting held on April 30, 2009, the Board reviewed the above protocol Version 1 dated April 28, 2009. Some changes and clarifications were requested. At the meeting held on May 14, 2009, the revised protocol, Version 2 dated May 13, 2009 was reviewed and approved. At the meeting held on June 4, 2009, the revised protocol, Version 3 dated June 2, 2009 was reviewed and approved.
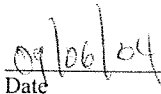
The approved consent form was revised at the meeting held on June 4, 2009. The attached final site-specific, stamped consent form dated **June 4, 2009** received approval at the meeting held on June 4, 2009. If the form is required in any language other than English, a copy of the translated form, along with confirmation that translation of the approved version was made, must be forwarded to the Board.

The Board provided approval for Dr. M. Katzman to conduct the above study.

This approval is valid for one (1) year from the date of initial approval, **to expire May 14, 2010.**

_____   _____
Signature of Chair   Date

BILL WILSON
_____
Name of Chair

Appendix B

Initial Letter Sent to Physicians

Dear Dr. _____,

I am writing to inquire about your potential interest in becoming involved in a study which examines comorbidities in chronic pain. It is our belief that patients suffering with anxiety and mood disorders are often under-diagnosed in chronic pain clinics. We are undertaking a study to examine the percentage of people seen at a chronic pain clinic found to meet criteria for a variety of anxiety and mood disorders as assessed by the MINI (a structured clinical interview).

This research study will essentially include the following:

- A structured clinical interview of patients in your waiting room (while upholding the greatest efforts not to disturb your clinic and its standard operation)
- The opportunity to review client charts (of consenting participants)

For your time, you would be compensated in the amount of $50.00 per patient enrolled.

We will contact you to determine your interest and potential collaboration in this novel research endeavour. Should you have any questions, please do not hesitate to contact me.

Sincerely,

_____

Martin A. Katzman BSc, MD, FRCPC

_____

Christina Iorio BA (Hons.)

Appendix C

Synopsis of Study

MAP

Mood and Anxiety in Pain

Examining the Role of Anxiety and Mood Disorders in Patients visiting a Pain Clinic

Principal Investigator: Dr. Martin Katzman

Project Overview

The current study will examine the prevalence of anxiety, insomnia and depression in patients suffering with pain disorders, currently attending pain clinics across the country, to determine the rates of the previous mentioned disorders that go undetected and undiagnosed. Patients at various chronic pain clinics across Canada will be assessed via the Mini International Neuropsychiatric Interview (MINI; Sheehan et. al., 1998) and various self-report questionnaires to determine rates of detection of anxiety, insomnia and depression.

Objectives:

(a) To determine the percentage of people seen at a chronic pain clinic found to meet criteria on the MINI for MDD, PD, SP, GAD, OCD, PTSD and Bipolar Mood Disorder.

(b) To examine features of mood and anxiety disorders which are associated with chronic pain.

Research Design:

Methodology
This multicentre study is to be conducted in chronic pain centres, specifically, in chronic pain clinics across the Greater Toronto Area, as well as in other centres across Canada. These sites are to be selected by contacting various site clinic directors directly at their primary care practices. Upon interest shown by the clinic director in the research study, subsequent meetings are to be arranged to discuss requirements and study time commitments required. Upon the site director's cooperation and interest to facilitate the research within their clinic, final sites will be chosen.

Inclusion Criteria
Requirements for a study site to be enrolled entail the following: consent to approach all English speaking patients in their clinics' waiting room for consent to participate in the research study; a room to facilitate the diagnostic interview, access to involved patients' charts, as well as a space being provided to conduct all relevant chart reviews.

Exclusion Criteria

All patients within the chronic pain clinic, under the age of 18 years and/or unable to give informed consent will be excluded from the study.

Participants

Participants are to be recruited from the chronic pain clinics' waiting rooms. While waiting for their appointments with their clinicians, patients will be approached and offered admission into the study. All patients over the age of 18 years and able to give informed consent, who had presented to the clinic for an appointment are eligible and will be offered an opportunity to participate in this research study. Once educated about the study and after providing their informed consent, patients will then able to proceed further into the study processes.

Interviewers, training procedure, and supervision

Interviewers will be psychology students with either their Bachelors or Masters or Doctorate (Psy.D/Ph.D) degrees or Registered Nursing personnel. All interviewers are to undergo extensive training, and will be supervised weekly.

Research Protocol/Procedures

Phase 1:
Trained clinical assessors will be randomly sent to physician offices in order to facilitate procedures for the following study until the recruitment of required subjects is completed. On specific research days, all patients who visited the designated clinics will be educated about the research study and offered an opportunity to participate in the study. Those subjects who agree to participate will go on to thoroughly read the consent form and if they feel comfortable, sign it, thereby entering into the study. The patient/subject will then be administered the MINI (Sheehan et. al., 1998) as a structured clinical interview in order to make an objective diagnosis.

Phase 2:
Subjects will then be administered a self-report questionnaire package to complete.

Phase 3:
The clinical assessors will review the patient's medical chart in order to obtain chronic pain diagnosis and a list of medications the patients is currently taking.

Upon completion of the study visit, the patient will be compensated in the amount of $50.

Appendix D

Subject Informed Consent Form

INFORMED CONSENT FORM

STUDY TITLE:

Examining the Role of Depression, Anxiety Disorders and Insomnia in Patients visiting a Pain Clinic

Sponsor: START Clinic for Mood and Anxiety Disorders
790 Bay St., Suite 900 Toronto, ON M5G 1N8

Study Investigators: Dr. Martin Katzman M.D., FRCPC
Telephone Number: 416-598-9344
Fax Number: 416-598-8198

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 do not understand. Please take sufficient time to consider the information in this consent form, ask any questions that you may have and if you choose, seek advice from a doctor or others before you decide whether or not to take part.

You are being asked to participate in this study because you are attending a pain clinic.

The purpose of this study is to evaluate the incidence of anxiety, insomnia and depression in patients with pain disorders, and to determine the rates of these disorders that go undetected and undiagnosed. Additionally, this study is intended to examine the features of mood and anxiety disorders which are associated with chronic pain.

This study will be conducted in various pain clinics across Canada. It is intended that 269 patients will participate in this study. Your participation in this study will last approximately 1 hour.

PROCEDURES:

This study consists of three Phases, which will all occur on one day:

Phase 1) You will be asked to review this informed consent form. If you decide to participate, you will be interviewed and asked some mental health questions by a trained research professional. This interview should take 30-40 minutes.

START Clinic   Page 1 of 4   Patient Initials: _____
Pain Clinic Study   Version Date: June 4, 2009

Please note that this interview will be audio-recorded in order to verify the information collected. Only the research team (including trained clinical assessors and the principal investigator) will have access to these recordings.

Based on the results of this interview, you may be asked to continue on to Phase 2.

Phase 2) You will be given a series of self-administered questionnaires to complete. This may take 25-30 minutes.

- It is very important that you answer each question as truthfully as possible.

- Take as much time as you need to answer each question, and be assured that all responses are anonymous.

After completing the questionnaires, you will be given a chance to discuss any concerns you may have and ask any additional questions regarding the study that you may wish.

Phase 3) A researcher will review your relevant medical files within the pain clinic.

COSTS/COMPENSATION:

There will be no costs to you as a result of your participation in this study. Upon completion of both phase one and two, you will be compensated in the amount of $50.00. You will receive your compensation at the completion of your study visit.

RISKS ASSOCIATED WITH THE STUDY:

The risks that you may experience as a result of participation in this study include sadness from answering questions about these issues and/or boredom from filling out these questionnaires. You may choose to stop participating at any time or skip any questions that may be too difficult for you.

BENEFITS:

There may be no benefit to you as a result of your participation in this study. Information gained from this study may help physicians better detect features that correlate with the presence of various mood and anxiety disorders in patients with chronic pain.

CONFIDENTIALITY:

- Your medical records that are related to this trial will be maintained in strict confidence. Confidentiality will be protected to the extent permissible by law. During this study your medical records will only indicate your participation in this study.

- Dr. Katzman and his research team will have access to your medical records, consent forms and research documents. They are required by law to handle this information in a strictly confidential manner.

- Your name or any information that could identify you will not appear in any reports or publications of the results of 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 able to be identified on such records.

All research records will be retained for at least 25 years. You have the right to request information about your study data held by the study doctor, and to correct any inaccuracies, if necessary.

By signing this form, you consent for the study doctor and/or study staff to notify your primary care physician of your participation in this study, and to collect and use your personal and medical data for the purposes of this study only. This consent does not have an expiration date. You may withdraw your consent at any time by contacting the study doctor.

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 doctor may withdraw you from the study if he/she feels that it is in your best interest, if you fail to follow directions for participating in the study, if it is discovered that you do not meet the study requirements, or for administrative reasons.

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 Doctor, Dr. Martin Katzman at 416-598-9344.

If you have any questions regarding your rights as a research subject, you can contact your family doctor, lawyer, or write to Optimum Ethics Review Board at 604 Taunton Rd. W., Oshawa, Ontario L1H 7K4 or by fax (905) 723-7590 or email: optimumerb@bellnet.ca.

<u>CONSENT:</u>

Study Title: Examining the Role of Depression, Anxiety Disorders and Insomnia in Patients visiting a Pain Clinic

Patient initials: _____ Patient Date of Birth: _____

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 RESEARCH TEAM MEMBERS HAS BEEN EXPLAINED AND THAT I RECEIVED SATISFACTORY ANSWERS TO ALL QUESTIONS WHICH I ASKED. I HAVE READ AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, UNDERSTAND THIS CONSENT FORM AND I VOLUNTARILY AGREE TO PARTICIPATE IN THIS RESEARCH TRIAL. I HAVE RECEIVED A COPY OF THIS CONSENT FORM.

Name of Patient (printed)_____

_____   _____
Signature of Patient   Date (dated by patient)

Name of Person who explained Informed Consent _____
(printed)

_____   _____
Signature of Person who explained Informed Consent   Date (dated by person who explained informed consent)

Appendix E

Beck Depression Inventory-II (BDI-II)

Beck Depression Inventory

CRTN: _____ CRF number: _____

Baseline

Page 14   patient inits: _____

BDI-II

Date:

Name: _____   Marital Status: _____ Age: _____ Sex: _____

Occupation: _____   Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today.** Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness
- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism
- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure
- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure
- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings
- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6. Punishment Feelings
- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike
- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

8. Self-Criticalness
- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes
- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying
- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

<Roche>

Beck Depression Inventory

Baseline

V 0477

CRTN: _____   CRF number: _____   Page 15   patient inits: _____

---

11. Agitation

0   I am no more restless or wound up than usual.

1   I feel more restless or wound up than usual.

2   I am so restless or agitated that it's hard to stay still.

3   I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0   I have not lost interest in other people or activities.

1   I am less interested in other people or things than before.

2   I have lost most of my interest in other people or things.

3   It's hard to get interested in anything.

13. Indecisiveness

0   I make decisions about as well as ever.

1   I find it more difficult to make decisions than usual.

2   I have much greater difficulty in making decisions than I used to.

3   I have trouble making any decisions.

14. Worthlessness

0   I do not feel I am worthless.

1   I don't consider myself as worthwhile and useful as I used to.

2   I feel more worthless as compared to other people.

3   I feel utterly worthless.

15. Loss of Energy

0   I have as much energy as ever.

1   I have less energy than I used to have.

2   I don't have enough energy to do very much.

3   I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0   I have not experienced any change in my sleeping pattern.

1a   I sleep somewhat more than usual.

1b   I sleep somewhat less than usual.

2a   I sleep a lot more than usual.

2b   I sleep a lot less than usual.

3a   I sleep most of the day.

3b   I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0   I am no more irritable than usual.

1   I am more irritable than usual.

2   I am much more irritable than usual.

3   I am irritable all the time.

18. Changes in Appetite

0   I have not experienced any change in my appetite.

1a   My appetite is somewhat less than usual.

1b   My appetite is somewhat greater than usual.

2a   My appetite is much less than before.

2b   My appetite is much greater than usual.

3a   I have no appetite at all.

3b   I crave food all the time.

19. Concentration Difficulty

0   I can concentrate as well as ever.

1   I can't concentrate as well as usual.

2   It's hard to keep my mind on anything for very long.

3   I find I can't concentrate on anything.

20. Tiredness or Fatigue

0   I am no more tired or fatigued than usual.

1   I get more tired or fatigued more easily than usual.

2   I am too tired or fatigued to do a lot of the things I used to do.

3   I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0   I have not noticed any recent change in my interest in sex.

1   I am less interested in sex than I used to be.

2   I am much less interested in sex now.

3   I have lost interest in sex completely.

Appendix F

Coping Strategies Questionnaire-Revised (CSQ-R)

Coping Strategies Questionnaire – Revised (CSQ-R)

Individuals who experience pain have developed a number of ways to cope with, or deal with, their pain. These include saying things to themselves when they experience pain, or engaging in different activities. Below are a list of things that patients have reported doing when they feel pain. For each activity, I want you to indicate, using the scale below, how much you engage in that activity when you feel pain, where a 0 indicates you never do that when you experience pain, a 3 indicates you sometimes do that when you experience pain, and a 6 indicates you always do it when you are experiencing pain. Remember, you can use any point along the scale.

0	1	2	3	4	5	6
Never do that			Sometimes do that			Always do that

When I feel pain...

	Statement	Rating
1	I try to feel distant from the pain, almost as if the pain was in somebody else's body.	
2	I try to think of something pleasant.	
3	It's terrible and I feel it's never going to get any better.	
4	I tell myself to be brave and carry on despite the pain.	
5	I tell myself that I can overcome the pain.	
6	It's awful and I feel that it overwhelms me.	
7	I feel my life isn't worth living.	
8	I pray to God it won't last long.	
9	I try not to think of it as my body, but rather as something separate from me.	
10	I don't think about the pain.	
11	I tell myself I can't let the pain stand in the way of what I have to do.	
12	I don't pay any attention to it.	
13	I pretend it's not there.	
14	I worry all the time about whether it will end.	
15	I replay in my mind pleasant experiences of the past.	
16	I think of people I enjoy doing things with.	
17	I pray for the pain to stop.	
18	I imagine that the pain is outside my body.	
19	I just go on as if nothing happened.	
20	Although it hurts, I just keep on going.	
21	I feel I can't stand it any more.	
22	I ignore it.	
23	I rely on my faith in God.	
24	I feel like I can't go on.	
25	I think of things I enjoy doing.	
26	I do something I enjoy, such as watching TV or listening to music	
27	I pretend it's not a part of me.	

Appendix G

Pain Catastrophizing Scale (PCS)

Pain Catastrophizing Scale
Sullivan MJL, Bishop S, Pivik J. (1995)

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

Instructions:

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

RATING	0	1	2	3	4
MEANING	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time

Number	Statement	Rating
1	I worry all the time about whether the pain will end.	
2	I feel I can't go on.	
3	It's terrible and I think it's never going to get any better	
4	It's awful and I feel that it overwhelms me.	
5	I feel I can't stand it anymore	
6	I become afraid that the pain will get worse.	
7	I keep thinking of other painful events	
8	I anxiously want the pain to go away	
9	I can't seem to keep it our of my mind	
10	I keep thinking about how much it hurts.	
11	I keep thinking about how badly I want the pain to stop	
12	There's nothing I can do to reduce the intensity of the pain	
13	I wonder whether something serious may happen.	

Appendix H

West Haven-Yale Multidimensional Pain Inventory (MPI)

WEST HAVEN-YALE MULTIDIMENSIONAL PAIN INVENTORY
Kerns, Turk & Rudy (1985)

BEFORE YOU BEGIN, PLEASE ANSWER 2 PRE-EVALUATION QUESTIONS BELOW:

1. Some of the questions in this questionnaire refer to your "significant other". A significant other is *a person with whom you feel closest.* This includes anyone that you relate to on a regular or infrequent basis. It is very important that you identify someone as your "significant other". Please indicate below who your significant other is (check one):

□Spouse   □ Partner/Companion   □ Housemate/Roomate
□Friend   □ Neighbor   □ Parent/Child/Other relative
□ Other (please describe): _____

2. Do you currently live with this person? □YES   □NO

When you answer questions in the following pages about "your significant other", always respond in reference to the specific person you just indicated above.

A.
In the following 20 questions, you will be asked to describe your pain and how it affects your life. Under each question is a scale to record your answer. Read each question carefully and then circle a number on the scale under that question to indicate how that specific question applies to you.

1. Rate the level of your pain at the present moment.
       0   1   2   3   4   5   6
No pain   Very intense pain

2. In general, how much does your pain problem interfere with your day to day activities?
       0   1   2   3   4   5   6
No intereference   Extreme interference

3. Since the time you developed a pain problem, how much has your pain changed your ability to work?
       0   1   2   3   4   5   6
No change   Extreme change
____ Check here, if you have retired for reasons other than your pain problem

4. How much has your pain changed the amount of satisfaction or enjoyment you get from participating in social and recreational activities?

       0   1   2   3   4   5   6
No change   Extreme change

5. How supportive or helpful is your spouse (significant other) to you in relation to your pain?
       0   1   2   3   4   5   6
Not at all supportive   Extremely supportive

6. Rate your overall mood during the past week.

       0   1   2   3   4   5   6

Extremely low mood   Extremely high mood

7. On the average, how severe has your pain been during the last week?

       0   1   2   3   4   5   6

Not at all severe   Extremely severe

8. How much has your pain changed your ability to participate in recreational and other social activities?

       0   1   2   3   4   5   6

No change   Extreme change

9. How much has your pain changed the amount of satisfaction you get from family-related activities?

       0   1   2   3   4   5   6

No change   Extreme change

10. How worried is your spouse (significant other) about you in relation to your pain problem?

       0   1   2   3   4   5   6

Not at all worried   Extremely worried

11. During the past week, how much control do you feel that you have had over your life?

       0   1   2   3   4   5   6

Not at all in control   Extremely in control

12. How much suffering do you experience because of your pain?

       0   1   2   3   4   5   6

No suffering   Extreme suffering

13. How much has your pain changed your marriage and other family relationships?

       0   1   2   3   4   5   6

No change   Extreme change

14. How much has your pain changed the amount of satisfaction or enjoyment you get from work?

       0   1   2   3   4   5   6

No change   Extreme change

__ Check here, if you are not presently working.

15. How attentive is your spouse (significant other) to your pain problem?

       0   1   2   3   4   5   6

Not at all attentive   Extremely attentive

16. During the past week, how much do you feel that you've been able to deal with your problems?

    0   1   2   3   4   5   6

Not at all   Extremely well

17. How much has your pain changed your ability to do household chores?

    0   1   2   3   4   5   6

No change   Extreme change

18. During the past week, how irritable have you been?

    0   1   2   3   4   5   6

Not at all irritable   Extremely irritable

19. How much has your pain changed your friendships with people other than your family?

    0   1   2   3   4   5   6

No change   Extreme change

20. During the past week, how tense or anxious have you been?

    0   1   2   3   4   5   6

Not at all tense or anxious   Extremely tense or anxious

B.

In this section, we are interested in knowing how your significant other (this refers to the person you indicated above) responds to you when he or she knows that you are in pain. On the scale listed below each question, **circle a number** to indicate how often your significant other generally responds to you in that particular way when you are in pain.

1. Ignores me.

    0   1   2   3   4   5   6

Never   Very often

2. Asks me what he/she can do to help.

    0   1   2   3   4   5   6

Never   Very often

3. Reads to me.

    0   1   2   3   4   5   6

Never   Very often

4. Expresses irritation at me.

    0   1   2   3   4   5   6

Never   Very often

5. Takes over my jobs or duties.

    0   1   2   3   4   5   6

Never   Very often

6. Talks to me about something else to take my mind off the pain.

         0   1   2   3   4   5   6
Never   Very often

7. Expresses frustration at me.

         0   1   2   3   4   5   6
Never   Very often

8. Tries to get me to rest.

         0   1   2   3   4   5   6
Never   Very often

9. Tries to involve me in some activity

         0   1   2   3   4   5   6
Never   Very often

10. Expresses anger at me.

         0   1   2   3   4   5   6
Never   Very often

11. Gets me some pain medications.

         0   1   2   3   4   5   6
Never   Very often

12. Encourages me to work on a hobby.

         0   1   2   3   4   5   6
Never   Very often

13. Gets me something to eat or drink.

         0   1   2   3   4   5   6
Never   Very often

14. Turns on the T.V. to take my mind off my pain

         0   1   2   3   4   5   6
Never   Very often

C.

Listed below are 18 common daily activities. Please indicate how often you do each of these activities by circling a number on the scale listed below each activity. Please complete all 18 questions.

1. Wash dishes.

         0   1   2   3   4   5   6
Never   Very often

2. Mow the lawn.

       0   1   2   3   4   5   6

Never   Very often

3. Go out to eat.

       0   1   2   3   4   5   6

Never   Very often

4. Play cards or other games.

       0   1   2   3   4   5   6

Never   Very often

5. Go grocery shopping.

       0   1   2   3   4   5   6

Never   Very often

6. Work in the garden.

       0   1   2   3   4   5   6

Never   Very often

7. Go to a movie.

       0   1   2   3   4   5   6

Never   Very often

8. Visit friends.

       0   1   2   3   4   5   6

Never   Very often

9. Help with the house cleaning.

       0   1   2   3   4   5   6

Never   Very often

10. Work on the car.

       0   1   2   3   4   5   6

Never   Very often

11. Take a ride in a car.

       0   1   2   3   4   5   6

Never   Very often

12. Visit relatives.

       0   1   2   3   4   5   6

Never   Very often

13. Prepare a meal.

0	1	2	3	4	5	6

Never   Very often

14. Wash the car.

0	1	2	3	4	5	6

Never   Very often

15. Take a trip.

0	1	2	3	4	5	6

Never   Very often

16. Go to a park or beach.

0	1	2	3	4	5	6

Never   Very often

17. Do a load of laundry.

0	1	2	3	4	5	6

Never   Very often

18. Work on a needed house repair.

0	1	2	3	4	5	6

Never   Very often