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Fear of Pain in Patients with Advanced Cancer

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Abstract

Pain is one of the most prevalent symptoms in patients with advanced cancer and, according to anecdotal evidence, perhaps the most feared. Surprisingly, fear of pain has been the subject of little research within cancer care. On the other hand, there is a large literature in the area of chronic non-malignant pain that is relevant to this issue. It suggests that fear of pain contributes to pain severity and to limitations in daily activities in various populations with chronic non-malignant pain. However, little is known about the extent to which such findings might generalize from patients with chronic non-malignant pain to those with chronic cancer pain. Therefore, this research examined the extent to which fear of pain is associated with functional limitations in patients with advanced cancer. In particular, this study compared patients with chronic cancer and non-cancer pain on measures of fear of pain and other related constructs. The primary objective was to investigate, among patients with chronic pain due to advanced cancer, the relationships between fear of pain, catastrophizing, anxiety sensitivity, depression, physical symptoms, pain severity, and limitations in function. A secondary objective was to compare the relationship observed in cancer patients to those observed in patients experiencing chronic non-malignant pain. A total of 235 patients with chronic pain were recruited (117 patients with advanced cancer who received a referral for pain management and 118 patients with a primary complaint of chronic non-malignant pain). Participants completed self-report questionnaires. Findings revealed similarities between the groups for fear of pain, catastrophizing, anxiety sensitivity, physical symptoms, and limitations in function; however, they differed on level of depression and pain severity. Fear of pain and catastrophizing independently predicted disability in both groups; fear of

pain predicted pain severity in patients with non-malignant pain. Catastrophizing predicted pain severity in both groups. Fear of pain mediated the relationship between anxiety sensitivity and limitations in function. This study provides an empirical perspective on fear of pain and other psychological constructs among patients with advanced cancer; it integrates the literature on cancer and non-cancer chronic pain, and confirms the value of psychological adjuncts to pain management in cancer.

Introduction

"Pain is a more terrible lord of mankind than even death itself. "
(Schweitzer, 1931)

Pain is one of the most prevalent symptoms in advanced cancer (e.g., Bonica, Ventafridda, & Twycross, 1990; Donnelly, Walsh, & Rybicki, 1995; see van den Beuken-van Everdingen, et al. 2007 for a review) and, according to anecdotal evidence, perhaps the most feared (Breitbart, 1994; Bond, 1985; Cohen, & Mount, 2000; Coyle, & Foley, 1985; Foley, 1985; Hassed, 1999; Hauck, 1986; Levin, Cleeland, & Reuven, 1985; Strang, 1998; van den Beuken-van Everdingen, et al. 2007) . When Levin, Cleeland, and Reuvan surveyed public attitudes toward cancer pain, more than two-thirds of the respondents reported that uncontrolled pain could lead a person to stop life-prolonging treatment or consider suicide. In fact, studies of terminally ill patients have reported similar findings. For example, Wilson et al. (2000) found that 46% of a sample of palliative care patients could imagine circumstances in which they would consider receiving euthanasia or assisted suicide; most commonly, the circumstance in which they would seek to hasten their deaths involved scenarios of uncontrollable pain. Wilson et al. concluded that many patients would seek to end their lives "in the event that their worst fears about pain and symptoms indeed came true" (p. 2458).

Despite evidence suggesting that cancer patients fear pain to a great extent regardless of whether they actually have pain, surprisingly few studies have focused on the issue of pain-related fear in patients with malignant disease. In contrast, however, the literature on chronic non-malignant pain presents a major emphasis on the importance of psychological variables, including fear of pain, on measures of adjustment and limitations

in activities. A large body of research shows that emotional variables, such as fear of pain, contribute to avoidance of physical activity and limitations in daily activities in various populations with chronic non-malignant pain. Moreover, findings reveal that fear of pain may sometimes play a more important role in avoidance and disability than pain itself, suggesting that psychological variables may be important contributors to the experience of chronic pain. However, little is known about the extent to which such findings might generalize from patients with chronic non-malignant pain to those with chronic cancer pain. Such a gap between the cancer and the non-malignant literatures suggests a need for studies that compare the two groups on a common set of measures. In this way, we can investigate the relevance for cancer pain of a conceptual framework that is well developed in other areas of pain research (e.g., Asmundson, Norton, & Norton, 1999; Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Vlaeyen, & Linton, 2000). This will also serve to highlight the issue of fear of pain among patients with cancer.

A primary objective of this study was to investigate, among patients with chronic pain due to advanced cancer, the relationships between fear of pain, other cognitive/affective variables, and disease-related variables, with limitations in function and pain severity. A secondary objective is to compare the relationships observed in cancer patients to those observed in patients experiencing chronic non-malignant pain.

Understanding Pain

World War II Studies

Until a few decades ago, our understanding of pain was based largely on biomedical explanations. Such an approach suggested that pain was a direct consequence of physiological damage and that healing of the injured tissue should consequently eliminate any pain that is experienced. The idea that pain sensations could also be influenced by psychological factors was not well documented until World War II, when it was observed that a significant number of soldiers experienced no pain despite having sustained severe injuries (Beecher, 1946). Beecher later concluded that the soldiers' lack of pain was influenced by the meaning they attributed to their experience (Beecher, 1957). Beecher's findings provided researchers with important evidence that pain was not just a consequence of tissue damage, but that it was also influenced by psychological factors.

Gate Control Theory

Melzack and Wall (1965) followed Beecher's findings by introducing the Gate Control Theory, forming the initial basis for our current understanding of pain. The Gate Control Theory was a first attempt at integrating physiological and psychological factors into a comprehensive conceptualization of pain. Their model was based on the understanding that pain perception was not just a consequence of tissue pathology, but that it included an interaction between physical, psychological and social factors.

The Gate Control Theory proposes that the central nervous system plays an important role in the perception of pain (Melzack & Wall, 1965). Melzack and Wall believed that the opening and closing of a gating mechanism within the spinal cord

modulated the flow of neural impulses to and from the brain, thereby influencing how pain is experienced. The opening and closing of the gate is triggered by the stimulation of specific pain fibers that inhibit or exacerbate sensory pain, but also by the brain functions related to attention, emotion, and cognitive processes. This theory was instrumental in generating extensive research and expanding our knowledge of the mechanisms involved in pain.

Body-Self Neuromatrix

More recently, Melzack (1999) extended the Gate Control Theory by proposing a novel extension that further elaborates on the role of the brain in the experience of pain. Melzack proposed that pain is influenced by a genetically determined network of neurons called the "neuromatrix," which appears modifiable through learning and sensory experience. The neuromatrix produces a pattern of nerve impulses that contributes to sensory, cognitive and emotional aspects of pain. The development of this theory has important implications for understanding different pain experiences such as those found in phantom limb pain (which is not triggered by sensory input) or in Beecher's soldiers (who had massive sensory input without pain).

Definition of Pain

Over the years, an increasing number of studies have demonstrated the interaction between emotions and cognitions on painful medical conditions, as well as the impact of psychosocial therapies on patients suffering from these conditions (see Gamsa, 1994a; Gamsa, 1994b; Gatchel, Bo Peng, Peters, Fuchs, & Turk, 2007; Keefe, Lumley, Anderson, Lynch, & Carson, 2001 for reviews). This is depicted in the model in Figure 1,

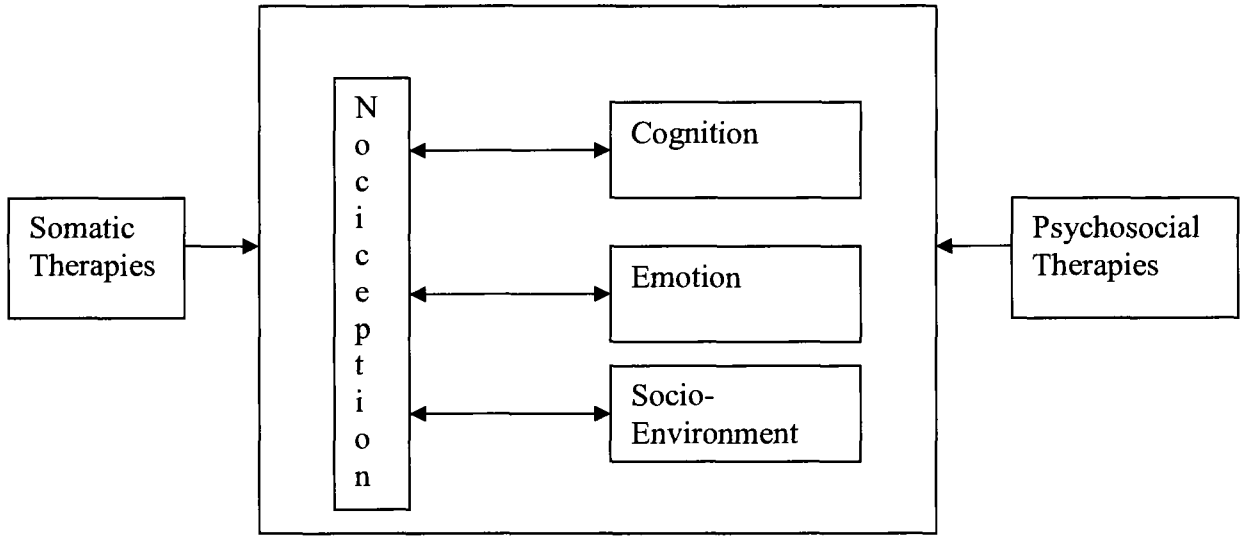

Figure 1. Multidimensional concept of cancer pain (Breitbart & Holland, 1990).

which illustrates the relationship between sensory aspects of pain (nociception) with psychological and social variables (Breitbart & Holland, 1990).

Researchers now recognize that a biomedical approach, in which pain occurs in direct proportion to the amount of tissue damage, is not sufficient to explain the overall experience of pain. In fact, The International Association for the Study of Pain (IASP) emphasizes that pain is a multidimensional phenomenon, which it defines as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey & Bogduk,1994, p. 210). This definition is generally accepted and permits wide latitude for recognizing the potential role of psychological variables in pain.

Chronic Non-Malignant Pain

Definition

Chronic pain is most commonly defined as pain "which persists a month beyond the usual course of an acute disease or reasonable time for an injury to heal, or pain that recurs at intervals for months or years" (Bonica, 1990, p. 180). Because of the variability in healing time for different injuries/illnesses, health care professionals typically use a cut-off point of 3 months. Moreover, no distinction is made between chronic cancer pain and chronic non-malignant pain.

Chronic pain is often diagnosed in patients with diverse physical illnesses such as fibromyalgia, musculoskeletal problems, arthritis and rheumatic diseases, migraine headaches, and cancer. In some cases, chronic pain persists despite the lack of evidence of identifiable physiological damage (Bonica, 1990; Melzack & Wall, 1999).

Prevalence

The prevalence of chronic pain in Canada is high, although specific estimates of prevalence have varied across studies because of methodological differences and the operationalization of the pain construct. For example, early surveys conducted by Crook, Rideaut, and Browne (1984) and Millar (1996) reported prevalence rates ranging from 11% to 17%. A more recent survey found that 29% of adult Canadians suffered from chronic non-malignant pain (Moulin, Clark, Speechley, & Morley-Forster, 2002). In another study, Birse and Lander (1998) surveyed a sample of Edmonton residents and found that 44% of respondents experienced chronic pain with back (21%), head (15%), and neck (12%) pain being reported most frequently. In the United States, it has been

estimated that more than 33% of Americans suffer from chronic pain (Bonica, 1990; Harstall, 2003).

Psychological Aspects of Chronic Non-Malignant Pain

Understanding pain as a multidimensional phenomenon led researchers to devote their attention to understanding how various psychological factors such as depression, anxiety, maladaptive cognitions, fear, and anxiety sensitivity contribute to pain and disability.

Depression and Chronic Pain

Depression is common in individuals suffering from chronic pain although, again, prevalence rates vary widely across different studies. For example, Sullivan, Reesor, Mikail, and Fisher (1992) reviewed the literature on depression in patients with chronic low back pain and found prevalence rates ranging from 3% to 45%. Bair, Robinson, Katon, and Kroenke (2003) have reported prevalence rates varying between 1.5% and 100% in diverse samples of chronically ill patients. It has been argued that such variability in rates may be due to a lack of consensus between studies on the definition and diagnosis of depression. For example, some studies only consider a diagnosis of major depressive disorder (MDD) while others include other forms of depression such as dysthymic disorder and minor depressive disorder. Still others have reported the prevalence of depression based on self-report measures, often using diverse cut-off scores. Moreover, inconsistencies in rates may also be due to symptomatology associated with depression. Some symptoms such as fatigue, insomnia, and loss of appetite, overlap with symptoms associated with chronic pain (Koenig, George, Peterson, & Pieper, 1997;

Romano & Turner, 1985; Sullivan, Reesor, Mikail, & Fisher, 1992; Wilson, Mikail, D'Eon, & Minns, 2001).

Although some patients who are depressed may develop pain complaints (Magni, Schifano, & Deleo, 1985; von Knorring, Perris, Eisemann, Eriksson, & Perris, 1983) findings from prospective studies suggest that patients with chronic pain are more likely to become depressed. For example, Fishbain, Cutler, Rosomoff, and Rosomoff (1997) conducted an extensive review of the literature and concluded that depression is likely a consequence rather than a precursor of chronic pain. A similar conclusion has also been presented by Gamsa (1990).

Early Theoretical Models of Fear and Avoidance in Chronic Pain

Chronic pain is common and poses considerable burden on individuals and society in the form of health care costs, lost days of work, and disability payments (Health Canada, 2009). As a result, understanding the complexities of chronic pain has become the focus of many studies. Findings associated with this area of research have produced several models attempting to explain how emotions and cognitions contribute to chronic pain and how chronic pain develops into a debilitating condition.

Pain Behaviour Model. Fordyce (1976) developed one of the first models of pain and disability, emphasizing the importance of operant conditioning of pain-related behaviours. His model introduced the role of the environmental factors as reinforcers in the development and maintenance of chronic pain. According to Fordyce, the experience of pain following an injury may lead to behaviours such as moaning, limping, and grimacing being adopted by the suffering individual. Operant pain behaviour develops when these behaviours are maintained even after the injured tissue has healed. Fordyce

argued that environmental contingencies, such as attention solicited from others and avoidance of pain-related activities, provide the chronic pain sufferer with secondary gains that reinforce, shape, and maintain illness-related behaviours. Fordyce's model emphasized the conditioning of overt behaviours as being responsible for the development and maintenance of chronic pain problems. Moreover, this model had important clinical implications since it provided clinicians with a behavioural understanding of chronic pain.

Fear and Avoidance Model. Other researchers have explained avoidance behaviours associated with chronic pain in terms of anxiety-related constructs. Lethem, Slade, Troup, Lethem, and Bentley (1983) proposed a model that included fear of pain as its main construct, and posited that fear largely influences how individuals respond to their pain. Lethem et al. argued that following injury, possible responses toward activities include either avoidance or confrontation. How individuals respond is strongly influenced by psychosocial factors such as personality and prior history with pain. For example, acute pain as a result of injury is adaptive because it indicates that activities should be avoided to minimize pain and promote healing. Once the injury has healed and confrontation is adopted, leading to the resumption of activities, the likelihood of developing problems with pain decreases. When avoidance is adopted, however, the likelihood of developing pain-related anxiety increases, and the avoidance of activities may be maintained even though sensory pain is no longer present.

Cognitive Model. In a similar vein, Philips (1987) also focused on avoidance but considered that cognitive factors, as well as reinforcement principles, were central to understanding avoidance behaviour. Philips proposed that thoughts and beliefs, such as

expectations about future pain, previous experience with pain, and beliefs about one's ability to control pain, contribute to the persistence of chronic pain behaviour. Moreover, these expectations or cognitions could be reinforced by avoidance behaviour. Essentially, Philips' model reflected a cycle between cognitions impacting on behaviour that further reinforces the cognitions. Philips argued that when activities are avoided, the chronic pain sufferer never disconfirms his or her fear of pain, leading to physical disuse (Kottke, 1996) and deconditioning syndromes (e.g. Lee, Ooi, & Nakamura, 1995), and further avoidance.

To summarize, these early models attempted to explain why some individuals develop problems associated with chronic pain. Since then, a number of studies have focused on psychological variables such as pain beliefs, expectations, attention, coping, self-efficacy, mood, and how these relate to pain and physical functioning (e.g. see Jensen, Turner, Romano, & Karoly, 1991 for a review; Turk & Rudy, 1992). Furthermore, several models have recently been developed focusing on specific psychological constructs.

Recent Theoretical Models of Fear and Avoidance

In addition to fear of pain, some investigators have included specific variables such as catastrophizing and anxiety sensitivity as important psychological constructs contributing to fear and avoidance in individuals suffering from chronic pain.

The importance of catastrophizing as a central construct in pain research was revealed in early experimental studies on stress and coping with pain induced in the laboratory (Chaves & Brown, 1987; Spanos, Radtke-Bodorik, Ferguson, & Jones, 1979). More recently, studies have shown that catastrophic thoughts are important determinants

of a number of problems, such as anxiety disorders and depression, as well as chronic pain. Catastrophizing is defined as the use of specific maladaptive cognitive strategies, such as exaggeration or negative interpretation of a potential outcome or threat value of an experience (Sullivan et al. 2001).

Another construct that has been associated with chronic pain is anxiety sensitivity. Anxiety sensitivity, defined as a tendency to respond fearfully to anxiety-related bodily sensations, arising from the belief that these sensations are harmful. Anxiety sensitivity or fear of bodily sensations is considered one of three basic fears that exacerbate or amplify other concerns (the other two fears being fear of illness, injury and death, and fear of negative evaluation) (Reiss, 1991; Reiss & McNally, 1985). Some investigators argue that anxiety sensitivity is a trait-like construct that may pre-dispose individuals to fear symptoms of anxiety and display behaviours that involve fear and avoidance (Lilienfeld, Jacob, & Turner, 1989). However, the emerging consensus is that anxiety sensitivity is conceptually distinct from trait anxiety, with trait anxiety referring to the general tendency to exhibit symptoms of anxiety (Lilienfeld, 1996; Reiss, 1997). Moreover, a number of studies have suggested that anxiety sensitivity may be a pre-disposing factor in a variety of anxiety disorders such as panic disorder, post-traumatic stress disorder and more recently, chronic pain (e.g., Taylor, 1999).

Cognitive-Behavioural Model. Vlaeyen, Kole-Snijders, Boeren, and van Eek (1995) proposed a more integrative cognitive-behavioural model depicted in Figure 2. This model elaborates on the psychological mechanisms contributing to fear of movement/(re)injury. In particular, it posits that following a painful experience, cognitions such as catastrophizing elicit pain-related fears that contribute to avoidance of

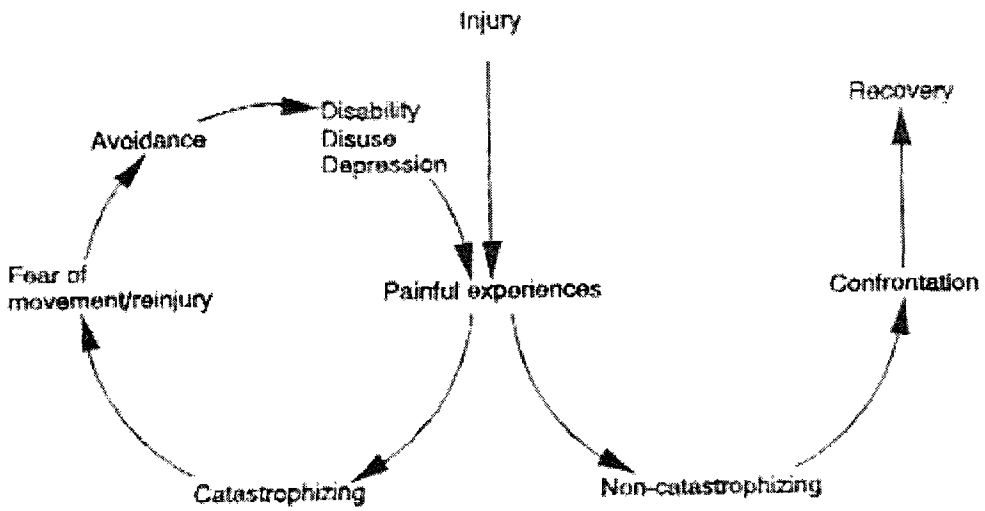

Figure 2. Cognitive - behavioral model of fear of movement/(re)injury (Vlaeyen, Kole-Snijders, Boeren, & van Eek,1995).

activity in turn leading to limitations in function, physical disuse or deconditioning, and depression. This model suggests that individuals who do not catastrophize are likely to resume activities that may be painful, thereby promoting healing and increasing mobility. Such a model clearly illustrates the role of catastrophic cognitions in pain-related fear, and how fear of movement mediates the relationship between catastrophizing and limitations in activity. It also provides clinicians with a useful basis for understanding how cognitions contribute to problems with chronic pain. This model was recently revised (see Figure 3) to depict physiological arousal and its influence on fear and avoidance (Norton & Asmundson, 2003). Recently, Cook, Brawer, and Vowles (2006) tested the Vlaeyen et al. model using structural equation modeling and found patterns of relationships that are consistent with it.

Diathesis-Stress Model. In 2002, Turk proposed the diathesis-stress model of chronic pain depicted in Figure 4. Incorporating research findings (e.g. Asmundson & Taylor, 1996), Turk introduced anxiety sensitivity as a pre-disposing or vulnerability factor in individuals suffering from chronic pain, as well as other cognitive factors such as catastrophizing and fear of pain, as important determinants of physical function. Turk proposed that individuals who become injured and are pre-disposed to fear bodily sensations are more hypervigilant to pain-related sensations and are likely to misinterpret these sensations in a negative way. As a result they respond fearfully, avoiding activities believed to cause pain for fear of causing further injury and increasing their pain even more. Contrary to the model proposed by Vlaeyen, Kole-Snijders, Boeren, and van Eek (1995), this model suggests a bi-directional relationship between catastrophizng and fear of pain as opposed to a unidirectional circular response of cause and effect. In this model,

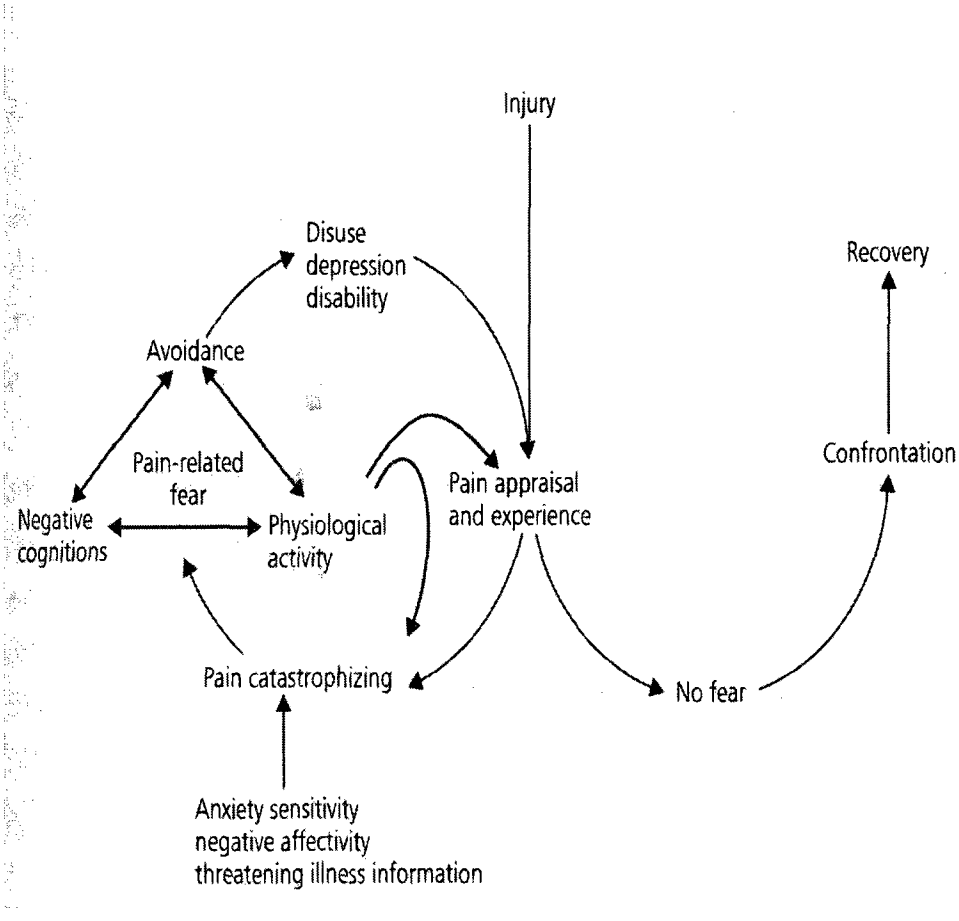

Figure 3. Amended model of chronic pain (Norton & Asmundson, 2003)

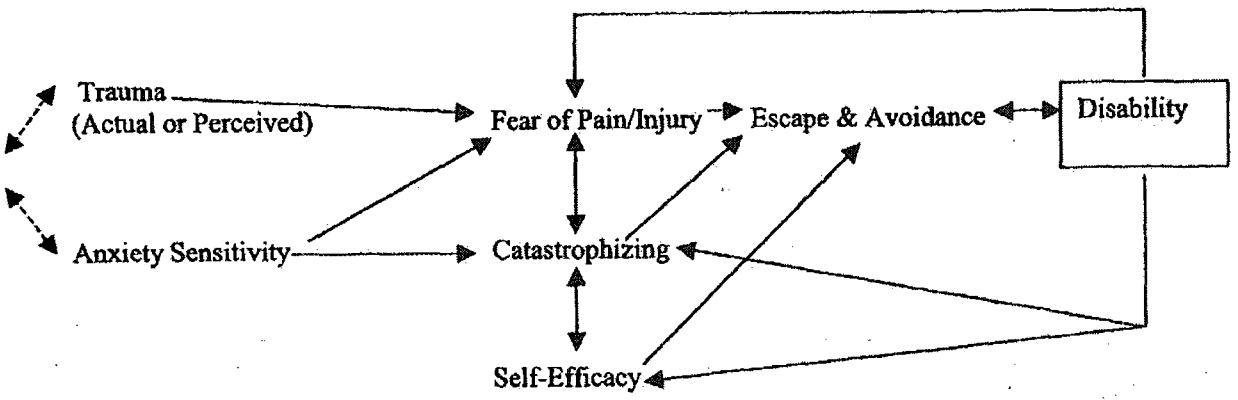

Figure 4. Diathesis-stress model of chronic pain and disability following trauma (Turk, 2002).

anxiety sensitivity, catastrophizing, and fear of pain are presented as factors that are interrelated and contribute to behaviours associated with fear, avoidance, and disability.

To summarize, pain is an aversive experience that often causes anxiety, triggering a number of fears related to it. How individuals respond cognitively in these circumstances influences whether they will avoid or confront their pain. Recent models have emphasized the importance of specific psychological constructs such as fear of pain, catastrophizing, and anxiety sensitivity-- the key constructs that will be examined in the present research-- in the development and maintenance of chronic non-malignant pain syndromes. Moreover, these models have provided researchers with a basis for understanding the inter-relationship between specific psychological variables and how these may contribute to avoidance, regardless of the level of physical impairment or biological source of pain.

Measuring Fear of Pain, Catastrophizing and Anxiety Sensitivity

Measures of Fear of Pain. Several instruments have been developed to quantify pain-related fear in patients suffering from chronic pain. These measures typically differ in the number of domains believed to reflect pain-related fear. These domains include fear of pain or pain-related anxiety, beliefs about work and related activities, and kinesiophobia, or the fear that movement may cause (re)injury and increased pain. The most widely used measures are the Pain Anxiety Symptoms Scale (PASS; McCracken, Zayfert, & Gross, 1992), the Tampa Scale of Kinesiophobia (TSK; Kori, Miller, & Todd, 1990) the Fear and Avoidance Behaviour Questionnaire (FABQ; Waddell, Newton, Henderson, Somerville, & Main, 1993), and the Fear of Pain Questionnaire-III (FPQ-III; McNeil & Rainwater, 1998).

The Pain Anxiety Symptoms Scale (PASS: McCracken, Zayfert, & Gross, 1992) as well as its shorter version, the PASS-20 (McCracken & Dhingra, 2002), was developed specifically to assess fear of pain in populations with diverse forms of chronic pain. McCracken et al. believed that physiological and behavioural responses to pain, in addition to cognitions, promote avoidance of activities and consequently exacerbate pain and increase disability. The PASS and PASS-20 include four sub-scales assessing cognitive anxiety, escape avoidance, fear of pain, and physiological symptoms associated with pain (McCracken & Dhingra, 2002; McCracken, Zayfert, & Gross, 1992, 1993).

The TSK (Kori, Miller, & Todd, 1990) and the FABQ (Waddell, Newton, Henderson, Somerville, & Main, 1993) were both developed to assess fears related to situations associated with experiences of pain in patients suffering from musculoskeletal conditions. In particular, the FABQ includes two sub-scales that assess beliefs about harm resulting from physical and work- related activities. The TSK was developed to assess fears of engaging in physical activity believed to cause (re)injury and includes 2 sub-scales, one assessing fears about somatic sensations and the other assessing fears about engaging in activities (Goubert et al. 2004).

The FPQ-III (McNeil & Rainwater, 1998) was developed to assess general fears associated with specific painful situations (e.g. falling down a flight of stairs, getting a paper cut on a finger). The FPQ-III assumes that fear of pain is a trait-like construct and that behavioural responses to a variety of pain-related situations will generalize to diverse circumstances. This measure includes 3 sub-scales assessing fear of severe pain, fear of minor pain, and fear of dental pain.

Other scales assessing fear and avoidance related to pain in patients suffering with chronic musculoskeletal pain include the Fear-Avoidance of Pain Scale (FAPS: Crowley & Kendall, 1999). Although this scale was developed to assess fear and avoidance in patients, few studies have used the measure.

Measures of Catastrophizing. To assess pain-related catastrophizing, some studies have used the catastrophizing sub-scale of other multidimensional measures while others have used scales developed specifically to assess pain-related catastrophizing. For example the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983) was developed to assess cognitive and behavioural coping strategies used by individuals to cope with pain. This measure assesses three domains: cognitive coping strategies, behavioural coping strategies, and effectiveness ratings. The cognitive coping strategies include six subscales, one of which assesses catastrophizing.

Other studies have used measures specifically developed to assess pain-related catastrophizing. For example, the Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995) builds on the catastrophizing subscale of the CSQ by including two additional dimensions. The PCS is widely used in clinical settings as well as in research. It is a well validated multidimensional measure (Osman, Barrios, Gutierrez, et al., 2000; Osman, Barrios, Kopper, et al., 1997; Sullivan, Bishop, & Pivik, 1995) and has been translated into several languages. The PCS includes three sub-scales assessing thoughts and feelings that individuals may experience related to pain including rumination, magnification, and helplessness.

Other measures that assess cognitive distortions but are used less frequently in studies of pain include, for example, the Cognitive Errors Questionnaire (CEQ; Lefebvre,

1981), the Inventory of Negative Thoughts in Response to Pain (INTRP; Gil, Williams, Keefe, & Beckham, 1990), the Pain Cognition List (PCL-e; Vlaeyen et al., 1990), and the Cognitive Coping Strategy Inventory (CCSI: Butler, Damarin, Beaulieu, Schwebel, & Thorn, 1989).

Measures of Anxiety Sensitivity. The Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986) is a well validated and widely used measure developed to assess fears of anxiety and anxiety-related sensations. Since its development, the ASI has been used in many studies on anxiety disorders and more recently, fear and avoidance in individuals with chronic pain (e.g., Asmundson & Norton, 1995; Asmundson & Taylor, 1996). It has also been translated and validated in several languages.

Although there are additional measures that assess anxiety sensitivity, these only measure single facets of the construct and were developed for individuals with anxiety disorders. For example, the Body Sensations Questionnaire (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984) focuses on fears related to physical sensations; the Agoraphobic Cognitions Questionnaire (ACQ; Chambless, Caputo, Bright, & Gallagher, 1984) measures cognitions associated with anxiety; the Anxiety Symptoms and Beliefs Scale (ASBS; Kenardy, Evans, & Oei, 1992) measures mainly the intensity of body sensations related to anxiety.

Empirical Findings Related to Fear of Pain, Catastrophizing, and Limitations in Function

A number of experimental studies have demonstrated support for the role of cognitive variables included in the fear and avoidance models of chronic pain. For example, studies of experimentally induced pain (e.g., physical activity, such as straight

leg raisings or trunk rotations), among people with chronic back pain, have found that individuals who fear pain are more likely to avoid movement (e.g. Burns, Mullen, Higdon, Wei, & Lansky, 2000; Vlaeyen, Kole-Snijders, Boeren, & Eek, 1995). Of particular relevance to the present study, however, are the clinical findings regarding the manner in which fear of pain, catastrophizing and anxiety sensitivity relate to each other and to disability.

Initial clinical studies in this area focused on patients suffering from musculoskeletal pain who were recruited from pain clinics or rehabilitation programs. The first generation of research used cross-sectional, correlational designs with varying sample sizes. More sophisticated studies have used structural equation modeling to examine causal relationships between fear and avoidance and selected cognitive and emotional variables. These studies have also employed a variety of measures to assess fear of pain and physical function.

Fear of Pain and Limitations in Function. Table 1 presents a summary of the correlations between different measures of fear of pain and limitations in function in patients suffering from chronic non-malignant pain. Six cross-sectional studies, using multiple regression analyses, have provided evidence that patients with non-malignant chronic pain who have high levels of pain-related fear are likely to avoid activities, reducing their level of physical function and, eventually, their ability to engage in activities. For example, McCracken, Zayfert, and Gross (1992) examined the relation between fear of pain and disability in a sample (N = 104) of patients suffering from various pain complaints. Separate regression analyses were run controlling for pain and

Table 1

Pearson Correlation Coefficients Between Fear of Pain and Limitations in Function

Authors	Pop	N	Measure	Cor	Sign
Crombez, Vlaeyen, Heuts, & Lysens (1999)	CLBP	35	TSK	0.56	***
McCracken & Dhingra (2002)	CP	282	PASS	0.44	***
McCracken, Gross, Aikens, & Carnrike (1996)	CLBP	45	PASS	0.61	***
McCracken, Zayfert, & Gross (1992)	CP	104	PASS	0.45	***
			FABQ	0.52	***
			FPQ-III	0.15	
Peters, Vlaeyen, & Weber (2005)	CLBP	100	PASS	0.40	***
van den Hout, Vlaeyen, Heuts, Sillen, & Willen (2001)	CLBP	122	TSK	0.34	***

Note. Pop = population. Cor = correlations. Sign = significance. CP = chronic pain. CLBP = chronic low back pain. FABQ = Fear and Avoidance Behaviour Questionnaire. FPQ-III = Fear of Pain Questionnaire – III. PASS = Pain Anxiety Symptoms Scale. TSK = Tampa Scale of Kinesiophobia. *p<.05. **p<.01. ***p<.001.

psychological distress. They found that fear of pain predicted disability even after controlling for anxiety, pain severity, or depression. In a later study, McCracken, Gross, Aikens, and Carnrike (1996) recruited a small sample of patients (N = 45) suffering from chronic non-malignant pain and compared different measures of fear and anxiety. Findings revealed that the escape/avoidance subscale of the PASS, the work subscale of the FABQ, and pain severity were significant predictors of physical limitations and accounted for 54% of the variance. In another study, Waddell, Newton, Henderson, Sommerville, and Main (1993) controlled for pain severity and other pain-related variables and found that patients suffering from low back pain (N = 184) with fear/avoidance beliefs about work and activity were impaired in their daily activities. Similarly, Crombez, Vlaeyen, Heuts, and Lysens, (1999) found in a sample of 35 patients suffering from chronic back pain that fears associated with work and kinesiophobia explained a portion of the variance in disability over and above age, gender, pain intensity, pain duration, and negative affect. Recently, Heuts et al. (2004) examined the association between dimensions of fear related to fear of movement/ (re)injury and disability in 227 patients with osteoarthritis. They found that different dimensions of fear associated with movement and (re)injury, were both related to levels of daily functioning after controlling for age, gender, pain intensity, and biological changes.

Additional evidence for the association between fear of pain and limitations has been provided by Asmundson, Norton, and Allerdings (1997). They classified patients' level of function using the Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985) which clusters patients into different empirically determined sub-types. Asmundson et al. found that patients classified as "globally dysfunctional" reported more

cognitive, physiological and avoidance behaviours as measured by the PASS compared to those classified as "interpersonally distressed" or as "adaptive copers."

Fear of Pain, Other Psychological Constructs, and Limitations in Function. In addition to the studies that have focused on fear of pain, four cross-sectional studies have examined the relation between fear of pain and other psychological constructs, including catastrophizing and anxiety sensitivity, with disability. van den Hout, Vlaeyen, Heuts, Sillen, and Willen (2001) examined the association between the fear of movement/re-injury, fear-avoidance beliefs, catastrophizing, and pain severity with limitations in function in 122 patients suffering from chronic back pain. They subsequently expanded the model by including daily stress and problem solving. Separate regressions were initially run for each variable under study controlling for age, and gender. Results showed that fear of pain, catastrophizing and pain severity predicted level of function when analyzed separately. When the independent variables were entered in a stepwise regression model, catastrophizing accounted for an additional 11% of the variance over and above fear of movement/re-injury and pain severity. The fear avoidance beliefs activity subscale of the FABQ (Waddell, Newton, Henderson, Somerville, & Main, 1993) accounted for an additional 2%. Recently, Peters, Vlaeyen, and Weber (2005) examined the role of physical pathology, pain-related fear, and catastrophizing in 100 patients with chronic low back pain using the PASS (McCracken, Zayfert, & Gross, 1992) and the Tampa Scale of Kinesiophobia (TSK: Kori, Miller, & Todd, 1990). Multiple regression analyses were run controlling for age, gender, education and pain duration. Separate analyses were run since multicollinearity between the PASS and PCS (Sullivan, Bishop, & Pivik, 1995) was suspected. Regression analyses revealed that fears associated with

movement/(re)injury predicted disability explaining an additional 4% of the variance in disability regardless of pain intensity. Both catastrophizng as measured by the PCS and fear of pain as measured by the PASS (McCracken, Zayfert, & Gross, 1992) were removed from the final model since these variables were not significant. The authors also found that level of function was not related to degree of physical pathology in this population. Thus it appears that level of pathology may not be an important determinant of functional limitations, at least in the case of chronic back pain. Moreover, it seems that for this group, fear of movement/(re) injury was a stronger predictor than catastrophizing or fear of pain as measured by the PASS.

Other studies have attempted to delineate the causal relationships between selected psychological variables, pain-related avoidance, and limitations in activity using structural equation modeling. For example, Asmundson and Taylor (1996) examined the inter-relationship between anxiety sensitivity, fear of pain, pain intensity, and pain-related escape avoidance in 254 patients suffering from chronic low back pain. Fear of pain was assessed using the pain-related anxiety, cognitive anxiety, and physiological anxiety subscales of the PASS (McCracken, Zayfert, & Gross, 1992); avoidance was assessed using the escape and avoidance sub-scale of the PASS, the presence or absence of analgesic medication, and impact on lifestyle. Analyses revealed that fear of pain mediated the relationship between anxiety sensitivity and pain-related escape and avoidance. In other words, when pain severity was controlled statistically, individuals with increased levels of anxiety sensitivity were likely to fear pain, avoid it, and subsequently avoid activities that might trigger it. This study confirmed the impact of fear of pain, anxiety sensitivity, and pain severity on fear and avoidance, and clarified how

these variables are inter-related. These findings were later confirmed in a population of headache sufferers (Norton & Asmundson, 2004). The replication of the central components of this model with a different population strongly suggests that the relation between anxiety sensitivity, pain severity, fear of pain, and pain-related escape and avoidance behaviours may generalize to other medically ill populations suffering from chronic pain.

To summarize, the findings presented above suggest that fear of pain impacts physical function in patients with chronic low back pain and perhaps in other populations as well. Furthermore, recent studies using structural equation modeling (SEM) have shown that when anxiety sensitivity and fear of pain are examined together, findings have revealed that anxiety sensitivity is an important determinant of pain-related fear, and that fear of pain appears to mediate the relation between anxiety sensitivity and physical limitations. Finally, when catastrophizing and fear of pain were compared, the role of these two variables in limitations in function was unclear. In particular, van den Hout, Vlaeyen, Heuts, Sillen, and Willen (2001) found that castrastrophizing was a stronger predictor of disability compared to pain-related fear, whereas Peters, Vlaeyen, and Weber (2005) did not.

Catastrophizing and Limitations in Function. Table 2 presents a summary of correlations between different measures of catastrophizing and disability in patients suffering from chronic non-malignant pain. Ten studies, two of which were longitudinal, have concluded that catastrophizing explains a portion of the variance in limitations in function in diverse groups of patients. For example, Sullivan, Stanish, Waite, Sullivan, and Tripp (1998) recruited a sample of 86 patients with soft-tissue injuries and found that

Table 2
Pearson Correlation Coefficients Between Catastrophizing and Limitations in Function

Authors	Pop	N	Measure	Cor	Sign
Peters, Vlaeyen, & Weber (2005)	CLBP	100	PCS	0.33	***
Severeijns, Vlaeyen, van den Hout, & Weber (2001)	CP	211	PCS	0.43	**
Sullivan, Stanish, Sullivan & Tripp (2002)	Whiplash	65	PCS	0.55	**
Sullivan, Stanish, Waite, Sullivan, & Tripp (1998)	Soft Tissue Injury	86	PCS	0.55	**
Turner, Jensen, & Romano (2000)	CP	169	CSQcat	0.36	***
Van den Hout, Vlaeyen, Heuts, Sillen & Willen (2001)	CLBP	122	PCS	0.51	***
Vienneau, Clark, Lynch, & Sullivan (1999)	CLBP	40	PCS	0.55	***

Note. Pop = population. Cor = correlations. Sign = significance. CP = chronic pain; CLBP = chronic low back pain. CSQcat = catastrophizing subscale of the Coping Strategies Questionnaire. PCS = Pain Catastrophizing Questionnaire. *p<.05. **p<.01. ***p<.001.

patients who reported ruminating about their pain were more debilitated regardless of age, pain duration and severity. Moreover, when the total score of the PCS (Sullivan, Bishop, & Pivik, 1995) was entered into the regression together with depression and anxiety as predictor variables, catastrophizing was the only significant predictor of disability. Severeijns, Vlaeyen, van den Hout, and Weber (2001) recruited 211 patients with various chronic pain complaints and found that catastrophizing accounted for a significant portion of the variance in disability even after controlling for level of physical impairment, duration of pain, age, and gender. Using a different population, Sullivan, Stanish, Sullivan, and Tripp (2002) recruited 65 patients with whiplash injuries and found that the sub-scales of the PCS, depression, and anxiety contributed to limitations in function after controlling for age, gender, pain severity and pain duration. Sullivan, Lynch, and Clark (2005) found that different dimensions of the PCS (Sullivan, Bishop, & Pivik, 1995) predicted disability after controlling for pain severity in patients with neuropathic pain.

Other investigators have focused on the relation between catastrophizing, various other coping strategies, and functional limitations in other populations. Turner, Jensen, Warms, and Cardenas (2002) recruited 174 patients suffering from chronic non-malignant pain following spinal cord injury. They found that catastrophizing was the only coping strategy that contributed to limitations in daily activities after controlling for age, gender, injury characteristics, and pain severity. Other strategies, such as diverting attention, reinterpreting pain, or ignoring pain, had no effect. Controlling for pain, disease severity, age and education, Martin et al. (1996) made similar conclusions in patients with primary fibromyalgia. Hill, Niven and Knussen (1995) concluded that

catasrophizing explained a larger portion of the variance in interference with activities than hoping or praying. Recently, Ullrich, Jensen, Loeser, and Cardenas (2007) examined the role of catastrophizing as a mediator between psychological distress, pain severity and level of function in a sample of 237 persons with spinal cord injury. They found that that people who experience pain and are distressed are likely to catastrophize, which impacts negatively on their level of function.

Two prospective studies have confirmed that catastrophic thoughts contribute to physical limitations in patients with chronic non-malignant pain. In the first study, Keefe, Brown, Wallston, and Caldwell (1989) conducted a longitudinal study focusing on 223 patients with rheumatoid arthritis. Findings revealed that catastrophizing at baseline predicted functional impairment 6 months later regardless of demographic (age, gender, socioeconomic status) and medical status variables. In the second study, Jensen et al. (2002) found that catastrophizing predicted changes in interference with daily activities 5 months later, over and above ratings of pain severity, in a group of 61 patients who had recently undergone limb amputation.

To summarize, the evidence presented above strongly supports catastrophizing as an important psychological construct that influences physical function in diverse groups of patients with chronic non-malignant pain, regardless of pain severity, pain duration, demographics and type of physical impairment. These studies also suggest a need to verify whether these findings generalize to other medically ill populations including those with chronic malignant pain, as opposed to non-malignant pain.

Determinants of Fear of Pain and Catastrophizing. Six cross-sectional studies have focused on identifying the variables that influence fear of pain. Vlaeyen, Kole-

Snijders, Boeren, and van Eek (1995) recruited 103 patients suffering from chronic low back pain and found that catastrophizing explained a larger portion of the variance in fear of movement and (re)injury than either depression or pain severity. Recently, using structural equation modeling Cook, Brawer, and Vowles (2006) concluded that fear of movement and (re) injury was an important mediating variable between catastrophizing and perceived disability, depression, and pain severity.

Although catastrophizing may be an important determinant of fear of pain, fear of pain may also be an important determinant of catastrophizing. For example, McCracken and Gross (1993) recruited 165 patients with diverse complaints of chronic non-malignant pain and found that specific dimensions of fear of pain as measured by the PASS (McCracken, Zayfert, & Gross, 1992), such as cognitive anxiety and physiological anxiety, predicted catastrophizing.

Anxiety sensitivity may also be an important predictor of fear of pain. Research findings have revealed that individuals with elevated ratings of anxiety sensitivity are more likely to develop pain-related fear. For example, Asmundson and Norton (1995) grouped 70 patients suffering from chronic back pain according to level of anxiety sensitivity and found that patients with high levels of anxiety sensitivity were more distressed by their pain. In particular, patients with elevated ratings of anxiety sensitivity, when compared to those with intermediate or low ratings, experienced greater fear of pain and greater cognitive anxiety as measured by the sub-scales of the PASS (McCracken, Zayfert, & Gross, 1992). Findings revealed that regardless of pain severity, anxiety sensitivity was significantly related to all four of the PASS sub-scales, as well as to negative affect. In this study, anxiety sensitivity was not associated with pain severity

or interference with daily activities. In another study, Asmundson, Frombach, and Hadjistavropoulos (1998) recruited 271 patients with chronic muskuloskeletal pain and found that dimensions of the ASI predicted the cognitive and physiological sub-scale of the PASS. Similarly, Zvolensky, Goodie, McNeil, Sperry, and Sorrell (2001) also found that anxiety sensitivity predicted fear of pain.

To summarize, the findings presented suggest that anxiety sensitivity is an important determinant of pain related-anxiety. The relation between catastrophizing and fear of pain, however, remains unclear. Finally, there are no studies examining the association between anxiety sensitivity and catastrophizing in patients suffering from chronic non-malignant or malignant pain, suggesting a need to explore this relationship.

Empirical Findings Related to Cognitive/Emotional Variables and Pain Severity

The research interest in fear of pain, catastrophizing, and anxiety sensitivity in chronic non-malignant pain has largely been directed toward the prediction of functional limitations in an effort understand the factors that contribute to disability. However, some of this research has also examined the role of these factors in the experience of pain itself. Although catastrophizing has been the focus of most studies focusing on pain severity, investigators have also concluded that pain-related fear may be another important determinant.

Fear of Pain and Pain Severity. Although a number of studies suggest an association between different measures of fear of pain and pain severity in patients suffering from chronic non-malignant pain, as shown in Table 3, only a few investigators have used multiple regression models to examine the proportion of the variance related to pain severity explained by fear of pain. For example, McCracken, Gross, Aikens and

Table 3

Pearson Correlation Coefficients Between Fear of Pain and Pain Severity

Authors	Pop	N	Measure	Cor	Sign
Crombez, Vlaeyen, Heuts, & Lysens (1999)	CLBP	35	TSK	0.14	
Goubert, Combez, & Van Damme (2004)	CP	122	TSK	0.29	**
McCracken & Dhingra (2002)	CP	282	PASS-20	0.34	***
McCracken, Gross, Aikens, & Carnrike (1996)	CLBP	45	PASS FABQ FPQ-III	0.56 0.28 0.03	***
McCracken, Zayfert, & Gross (1992)	CLBP	104	PASS	0.32	***
Peters, Vlaeyen, & Weber (2005)	CLBP	100	PASS	0.30	***
van den Hout, Vlaeyen, Heuts, Sillen, & Willen (2001)	CLBP	122	TSK	0.32	***
Vlaeyen, Kole-Snijders, Boeren, & van Eek (1995)	CLBP	103	TSK	0.25	**
Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts (1995)	CLBP	129	TSK	0.21	**
Zvolensky, Goodie, McNeil, Sperry, & Sorrell (2001)	CP	68	PASS	0.42	**

Note. Pop = population. Cor = correlations. Sign = significance. CP = chronic pain; CLBP = chronic low back pain. FABQ = Fear and Avoidance Behaviour Questionnaire. FPQ-III = Fear of Pain Questionnaire – III. PASS = Pain Anxiety Symptoms Scale. TSK = Tampa Scale of Kinesiophobia *p<.05. **p<.01. ***p<.001.

Carnrike (1996) examined the contribution of anxiety and pain-related fear to pain and found that only specific dimensions of the PASS (McCracken, Zayfert, & Gross, 1992) and in particular the physiological subscale, accounted for portions of the variance in pain severity. There is a need for additional research in this area.

Catastrophizing and Pain Severity. On the other hand, the association between catastrophizing and pain severity is well recognized. Over the past 20 years, a number of studies using cross-sectional designs have demonstrated that catastrophizing influences pain in diverse populations of patients suffering from chronic non-malignant pain (e.g. Hill, Niven, & Knussen, 1995; Jensen et al., 2002; Peters, Vlaeyen, & Weber, 2005; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Sullivan, Stanish, Sullivan, & Tripp, 2002; Turner, Jensen, Warms, & Cardenas, 2002). Moreover, two prospective studies have also confirmed the relation between catastrophizing and pain severity. For example, Keefe, Brown, Wallston, and Caldwell (1989) conducted a longitudinal study examining 223 patients with rheumatoid arthritis. They found that catastrophizing at Time 1 predicted increased pain severity six months later after controlling for age, gender, socioeconomic status, duration of pain, and disability support status. Additional evidence for the association between catastrophizing and pain severity has been provided in a study examining patients suffering from post-herpetic neuralgia (PHN) (Haythornthwaite, Clark, Pappagallo, & Raja, 2003). Findings revealed that patients suffering from PHN who catastrophized at baseline were more likely to experience pain eight weeks later, after controlling for initial pain severity.

Fear of Pain, Catastrophizing and Pain Severity. Two studies have examined the inter-relationships between fear of pain, catastrophizing and pain severity. Peters, Vlaeyen, and Weber (2005) examined the role of fear of pain, and pain-related catastrophizing in pain intensity. Separate regressions were run for fear of pain and catastrophizing controlling for age, gender, education, pain duration, and physical pathology. Results of the analyses revealed that patients with chronic low back pain who feared and catastrophized about their pain experienced higher levels of pain severity. In particular, catastrophizing explained 6 % of the variance in pain intensity over and above control variables and fear of pain explained 10% of the variance.

The relation between fear of pain, catastrophizing, and pain severity has also been examined using structural equation modeling. Goubert et al. (2004) recruited 122 patients with non-specific or recurrent back pain. They found that individuals who are predisposed to high levels of neuroticism are more likely to catastrophize about their pain, thereby contributing to the development of pain-related fears and vigilance to pain, leading to heightened awareness of an intense pain experience.

Anxiety Sensitivity and Pain Severity. Although anxiety sensitivity has mainly been understood as a predisposing factor to anxiety and fear of pain, one study suggests that anxiety sensitivity may influence pain directly. Asmundson, Frombach, and Hadjistavropoulos (1998) found that specific dimensions of the ASI (Reiss, Peterson, Gursky, & McNally, 1986) -- namely fear of somatic sensations – explained a portion of the variance in pain in a sample of 271 patients with chronic non-malignant pain.

To summarize, a number of studies using different statistical models, different measures and varying sample sizes have demonstrated that pain-related catastrophizing is

an important predictor of pain severity in diverse populations suffering from chronic non-malignant pain. To date, the studies that have examined the relationships between fear of pain, anxiety sensitivity, and pain intensity, although few in number, also point to these variables playing an important role in the experience of pain. Such findings strongly suggest that catastrophizing, anxiety sensitivity and fear of pain may be associated with pain severity in other medically ill populations.

General Summary

The studies reviewed generally demonstrate consistent support for the importance of cognitive/affective variables in the experience of chronic non-malignant pain. More specifically, the literature reviewed suggests that fear of pain influences pain severity and daily activities in various populations. Moreover, several studies have used cross-sectional designs to show that patients with non-malignant chronic pain who have high levels of pain-related fear are likely to avoid activities, thereby reducing their level of physical function and, eventually, their ability to engage in activities. Similar findings have been found in diverse groups of patients with chronic non-malignant pain who catastrophize. Other studies have attempted to delineate the causal relationships between selected psychological variables and pain-related avoidance. Still other studies have focused on identifying the variables that influence pain-related fear. The results point to reciprocal relationships between constructs, such that both catastrophizing and anxiety sensitivity independently determine fear of pain, but also that fear of pain may contribute to catastrophizing.

To conclude, there is a growing body of literature on people suffering from chronic non-malignant chronic pain emphasizing the role of fear of pain, catastrophizing,

and anxiety sensitivity, both in the experience of pain and in its ensuing functional limitations. However, few studies have examined whether these findings might generalize to with patients chronic cancer pain.

Cancer Pain

Epidemiology of Cancer

Although cancer death rates have declined by at least 10% since 1988, cancer remains the leading cause of "premature death in Canada, responsible for almost 32% of all potential years of life lost". It is estimated that in 2008, more than 166,400 individuals will be diagnosed with cancer for the first time. Current incidence rates suggest that 45% of women and 40% of men will develop cancer over the course of their life (Canadian Cancer Society, 2009).

Cancer is diagnosed more frequently in older individuals. More than two thirds of new cases of cancer occur in people who are 60 years of age or older. A recent study, however, suggested that an increasing number of young Canadians between the ages of 20 and 40 are being diagnosed with cancer (Canadian Cancer Society, 2009).

In Canada, it is estimated that in 2008 the most frequently diagnosed cancers will be prostate, lung and colorectal cancer in men, and breast, lung, and colorectal cancer in women (Canadian Cancer Society, 2009). In the United States, the most common cancers in men for the period between 1995 and 2003 were cancer of the prostate, lung, colorectal, and bladder. In women the most common cancers were breast, lung, colorectal, and gynecological cancer (The North American Association of Central Cancer Registries, 2009).

Etiology of Cancer

Cancer develops when the balance between cell division and cell loss in the body is disrupted. As the number of cells increase, tumors (masses of tissue) form and disrupt the normal cell activity of nearby tissue. Metastases develop when the cancer spreads

through the lymphatic system or the blood stream to other parts of the body and invades other organs (National Cancer Institute, 2009).

Cancer growths can be divided into carcinomas, sarcomas, leukemias, and lymphomas. Carcinomas are the most common type and originate from cells that grow in the tissue lining the inner and outer surfaces of our internal organs. Sarcomas originate in connective tissue found in bone, cartilage, and muscle. Leukemias originate in the blood, and lymphomas originate in the lymphatic system (National Cancer Institute, 2009).

Staging System

Clinicians use a staging system to aid in the development of treatment plans and also to determine the extent of disease progression. Staging systems may vary depending on the type of cancer. A stage ranging from 0 to IV is assigned depending on tumor size, extent of invasion in nearby tissue, spread to regional lymph nodes and spread to other regions of the body. Stage 0 refers to a cancer that is in its early stages and present only in the cells in which it began, whereas Stage IV refers to a cancer that has spread to distant organs. The higher the stage the more extensive and advanced the disease. Advanced cancer is typically Stage III and IV and refers to a tumor that has metastasized to other parts of the body (National Cancer Institute, 2009).

Prevalence of Physical Symptoms Associated With Cancer

Pain has been studied extensively in cancer. Recent systematic reviews have reported prevalence rates of pain in patients with advanced cancer ranging from 64% (see van den Beuken-van Everdingen et al., 2007 for a review) to 71% (see Teunissen et al., 2007 for a review) and many patients experience more than one pain syndrome (Caraceni

& Portenoy, 1999; Mercadante, 1994; Teunissen et al., 2007; Twycross, Harcourt, & Bergl, 1996).

As demonstrated consistently in a number of large-scale studies, patients with advanced cancer live with a variety of additional physical symptoms that are distressing and debilitating. For example, Teunissen et al. (2007) reported prevalence rates of various symptoms, including fatigue (74%), lack of energy (69%), weakness (60%), appetite loss (53%) insomnia (36%), and nausea (31%). Indeed some studies have found that pain is the single most prevalent symptom, although other symptoms such as fatigue, weakness, anorexia, weight loss and lack of energy are common (Donnelly & Walsh, 1995; Grond, Zech, Diefenbach, & Bischoff, 1994). On the other hand, some investigators have found fatigue to be the most prevalent symptom, followed by pain (Curtis, Kretch, & Walsh, 1991; Portenoy et al., 1994; Teunissen et al., 2007). Recently, Rodin et al. (2007) reported lack of energy, drowsiness, and pain as the most common symptoms in a large sample of patients with advanced cancer attending an outpatient clinic. In all cases, pain has been found to be common in patients with cancer and it is often severe. Symptoms associated with fatigue, pain, nausea, weight loss, worry, as well as concerns about quality of life have been identified as important targets for treatment in advanced cancer (Cella et al., 2003).

Although pain and fatigue appear to be the most prevalent symptoms, differences between prevalence rates can be explained by differences in measures used to assess symptoms (e.g. patients were presented with a specific list of symptoms) and variability in sample characteristics. Prevalence of symptoms may also vary according to primary

cancer site and severity of pain, with patients who have severe pain experiencing more symptoms generally (Grond, Zech, Diefenbach, & Bischoff, 1994).

In summary, symptoms of lack of energy and nausea are prevalent in patients with advanced cancer and these may vary depending on the type of cancer but also according to severity of pain.

Prevalence of Psychological Symptoms Associated With Cancer

Cancer is also very distressing and brings about clinically significant symptoms related to depression (Massie, 2004; Wilson, Chochinov, de Faye, & Breitbart, 2000). In epidemiological studies, however, prevalence rates for clinical depressive disorders have varied widely. For example, some authors have reported prevalence rates for major depression of 3% to 5% (Lansky et al., 1985), while others have reported rates as high as 42% (Buckberg, Penman, & Holland, 1984). A number of authors have suggested that variability in prevalence rates can be explained by a lack of standardization of assessment methods and diagnostic criteria (e.g. Hotopf, Chidgey, Addington-Hall, & Lan Ly, 2002; Newport & Nemeroff, 1998; Wilson et al., 2000). There is also difficulty in differentiating between normal sadness or grief about one's circumstances and the application of a psychiatric label. In addition, depression can be difficult to recognize in medically ill populations because, as with chronic non-malignant pain, some of the somatic symptoms associated with depression, such as fatigue, loss of appetite, weight loss, are also symptoms that can be caused by cancer. Despite these difficulties, most investigators have found that the prevalence of depression is elevated beyond population base rates. Hotopf, Chidgey, Addington-Hall, and Lan Ly (2002) conducted a systematic

review of the literature of depression in advanced disease, and found that studies using the Hospital Anxiety and Depression Scale (HADS) (Zigmond. & Snaith, 1983) reported a median rate of "definite depression" of 29%, whereas studies using psychiatric interviews reported a median rate of 15% for major depression.

The risk for depression increases as the disease advances (Ciaramella & Poli, 2001) and pain becomes more severe (Breitbart, 1995; Spiegel, Sands, & Koopman, 1994). Although some investigators have suggested that the relation between depression and pain may be bi-directional, most studies point to pain severity as playing a causal role in the depression experienced by cancer patients (Brown & Paraskevas, 1982; Lancee et al., 1994; Spiegel, Sands & Koopman, 1994).

Etiology of Cancer Pain

Cancer pain increases as the disease progresses and it varies according to the primary site of tumor (Daut & Cleeland, 1982; Mercadante, 1994; Rustoen, Fossa, Skarstein, & Moum, 2003), and the presence of bone metastases (Brescia, Portenoy, Ryan, Krasnoff, & Gray, 1992; Mercadante, 1994). Some studies have also found that it varies with age, with younger patients reporting more pain than older patients (Caraceni & Portenoy, 1999; Brescia et al., 1992). Cancers that are considered more painful than others include cancer of the cervix, prostate, and colon (Brescia et al., 1992). Pain severity may also be related to time remaining until death. For example, Rustoen, Fossa, Skarstein, and Moum (2003) found that patients with less than 3 months to live experienced the most pain.

Acute vs. Chronic Pain

Similar to non-malignant pain, cancer pain can be acute or chronic. In the case of cancer, however, acute pain is typically related to diagnostic and therapeutic interventions. The onset of chronic cancer pain is subtle and is typically caused by direct tumor infiltration of pain-sensitive structures such as bone, nerve or soft tissue (Cherny & Portenoy, 1999a). The most common cause of chronic pain is from tumor growth but can also result from cancer therapies such as surgery, radiotherapy, or chemotherapy. Pain due to other ailments, such as arthritis, may also be present but they are observed less frequently (Twycross, Harcourt, & Bergl, 1996; Mercadante, 1994). For example, Caraceni and Portenoy (1999) conducted an international survey involving 1095 patients. They concluded that 92.5% of patients with advanced cancer experienced one or more pains as a result of direct tumor involvement, while 20.8% experienced one or more pains as a result of cancer treatment.

Impact of Pain on Physical Function.

A number of studies have shown that cancer pain can be debilitating. Studies have found that patients with advanced cancer who have severe pain are more affected in their daily activities compared to those with less pain (e.g. Ahles, Blanchard, & Ruckdeschel, 1983; Daut & Cleeland, 1982; Dorrepaal, Aaronson, & van Dam, 1988; Florio, Sist, Zevon, & Lema, 1999; Portenoy, Payne, & Jacobsen, 1999; Strang,1992; Strang & Qvarner,1990; Thomason et al.,1998; Turk et al., 1998; Twycross, Harcourt, & Bergl, 1996; Vallerand, Templin, Hasenau, & Riley-Doucet, 2007; Ward et al.,1993; Wells, 2000). Recently, Wells, Murphy, Wujcik, and Johnson (2003) found that pain-related distress interfered with daily activities to a greater extent that pain severity. Such findings

emphasize the importance of understanding factors, other than pain severity, that affect physical function in patients with advanced cancer. This issue has been recognized by the World Health Organization who argue that pain is a "major international problem" (Stjernsward, 1990) and that assessment models incorporating domains associated with physical well-being, psychological well-being, and social functioning are needed urgently (Padilla, Ferrell, Grant, & Rhiner, 1990).

Treatment of Cancer Pain

The main objective of pain management is to achieve a balance between optimal analgesia while minimizing side-effects associated with treatment (Cherny et al., 1995). Treatment may also vary depending on whether the goal is to prolong survival, optimize comfort or maximize function. The World Health Organization (WHO, 1986, 1990) developed an "analgesic ladder" to provide physicians with a practical guideline for treating cancer pain. This three-step approach guides clinicians in selecting drugs according to the intensity of the pain or level of relief experienced by the patient. Studies examining the effectiveness of this approach suggest that 70% to 90% of the patients achieve adequate relief. Although pain management guidelines provided by the WHO benefit many patients, under-treatment is still a problem (Cherny & Portenoy, 1999b; Meuser et al., 2001).

The WHO endorses a multimodal approach to pain management. Psychosocial interventions such as relaxation and distraction, imagery, and cognitive-behavioural techniques are important adjuncts to analgesic therapy. Treatment of cancer pain includes therapies directed at removing the source of the pain as with chemotherapy, radiotherapy,

and surgery, or providing pharmacological analgesia. Typically, cancer pain that is moderate to severe is treated with opioid analgesics (World Health Organization, 1990).

Patients with cancer are considered to have non-curative illness when their cancer is beyond control and they are no longer receiving treatment directed at eliminating the disease. At that time, the primary goal for treating these patients is palliative care involving symptom control and comfort for the patient and family.

Psychological Aspects of Cancer Pain

Empirical Findings Related to Fear of Pain, Catastrophizing, and Limitations in Function

Although it is well accepted that psychological factors influence our perception of pain, most of the research on cancer pain has focused on physiological factors related to the disease. Surprisingly, few studies have systematically addressed psychological factors associated with cancer pain, as has been researched in the literature on chronic non-malignant pain. Most of the studies conducted to date on psychological aspects of cancer pain have focused on global psychological characteristics, such as depression and anxiety, rather than on specific processes associated with cognitive responses to pain. Nevertheless, a small body of literature does suggest that cancer pain severity cannot be fully explained by sensory factors, which points to the possible role of psychosocial variables.

A review of the cancer literature on fear of pain revealed that, although several authors refer anecdotally to pain as one of the most feared consequences of cancer (Breitbart, 1994; Bond, 1985; Cohen, & Mount, 2000; Coyle, & Foley, 1985; Foley, 1985; Hassed, 1999; Hauck, 1986; Levin, Cleeland, & Reuven, 1985; Strang, 1998; van

den Beuken-van Everdingen et al., 2007), few empirical studies have been conducted in this area.

Fear of Pain and Limitations in Function. The studies conducted to date have used designs that are either correlational or group comparisons. Only two studies have examined the association between fear of pain and physical function in patients with chronic cancer pain. In the first, Dalton and Feuerstein (1989) investigated the role of fear and other psychological variables and their association with cancer pain and behaviour. Four groups of patients were recruited: out-patients with cancer pain (N = 27) (74% with advanced disease), patients with chronic non-cancer pain (N = 26), patients who were chronically ill (e.g. hypertension) without pain (N = 26), and healthy controls (N = 24). Participants completed a variety of measures including visual analogue scales measuring pain severity, fear of pain, and interference with daily activities. Although findings revealed a positive association between interference with daily activities with fear of pain in patients with cancer, when cancer patients were compared to patients with chronic non-malignant pain, they actually reported fewer pain-related fears. These findings suggest that level of activity is possibly influenced by pain-related fear in patients with cancer. The main weaknesses in this study was the use of a small sample and the use of single-item visual analogue scales to assess different dimensions of emotion, including fear of pain, which may not be psychometrically sound enough to operationalize the construct adequately.

In the second study, Turk et al. (1998) compared different groups of patients' adaptation to pain. Participants completed measures of pain, depression, limitations in function, fear of pain, psychosocial and behavioural responses to pain. Comparisons

between the groups revealed that patients with cancer pain were more debilitated than those with non-malignant pain. Moreover, cancer patients reported higher levels of fear of pain as measured by the PASS (McCracken, Zayfert, & Gross, 1992). These findings suggest that cancer patients fear and worry more about their pain than patients with chronic non-malignant pain. These findings stand in direct contrast to Dalton and Feuerstein who concluded that patients with cancer do not fear pain. This is possibly due to due to larger sample size in the Turk et al. study and a different operationalization of the fear of pain construct e.g., use of a multidimensional Likert scale to assess fear of pain rather than a unidimensional visual analog scale.

Catastrophizing and Limitations in Function. Contrary to the literature on chronic non-malignant pain, the research on pain and catastrophic thoughts in patients with cancer is limited. The relevant literature in this area includes studies that have focused on catastrophizing explicitly, as well as other studies that have focused on broader but related constructs such as worries and beliefs about pain.

Only three studies have examined catastrophic thoughts and related contructs and their association with physical function in patients with cancer. Daut and Cleeland (1982) recruited 667 cancer patients and found that patients who believed the pain was caused by their cancer experienced greater interference with activities, even after pain severity was controlled statistically. Recently, Bishop and Warr (2003) recruited 68 women with chronic pain from breast cancer. Participants completed measures assessing pain severity, anxiety, depression, limitations in daily activities, coping style including pain-related catastrophizing. Findings revealed that catastrophizing combined with other coping strategies accounted for 30% of the variance in functional limitations after controlling for

the effects of pain severity. However, catastrophizing alone accounted for only 1% of the variance in functional limitations, while active coping and passive coping strategies accounted for 4% and 16% respectively. Although catastrophizing was associated with limitations in function in this study, its effects may have been mediated by active and passive coping such as avoidance. A limitation to this study, however, is the considerable item overlap between measures assessing catastrophizing and passive coping strategies. Nevertheless, it is possible that catastrophizing is a less relevant concept for people with chronic cancer pain than those with chronic non-malignant pain.

Another study compared patients with cancer pain to patients with non-cancer pain. Lin (1998) compared coping strategies and interference with activities between 88 patients with chronic cancer pain and 85 patients with chronic non-malignant pain. Participants completed measures assessing pain intensity, interference with activities, and coping strategies, including catastrophizing. Findings revealed that patients with chronic non-malignant pain reported greater interference with daily activities and pain severity than did cancer patients. In particular, cancer patients were more likely to use active coping strategies such as increases in activity and were less likely to castastrophize compared to patients with chronic non-malignant pain. It appears, therefore, that cancer patients may respond differently to their pain when compared to patients with non-malignant pain. Still, findings seem to suggest that catastrophizing may play a role in cancer patients' level of function, and the correlational results have not been consistent across studies.

To summarize, although some studies in the cancer literature have examined specific cognitive, behavioural and affective variables and their association with pain and

behaviour, few have used validated measures to assess fear of pain and catastrophizing. Moreover, these studies have not specifically addressed the manner in which these constructs contribute to limitations in function.

Empirical Findings Related to Fear of Pain, Catastrophizing, and Pain Severity

Fear of Pain and Pain Severity. Contrary to the findings from the studies that have focused on patients with chronic non-malignant pain, there is no evidence that fear of pain influences pain severity in patients with cancer. One study, however, has examined this association but used a general measure of fear rather than a measure specifically assessing pain-related anxiety. In that study, Sela, Bruera, Conner-Spady, Cumming, and Walker (2002) found that fear, as measured by a visual analogue scale, was not related to pain severity in either male or female participants. As in the study by Dalton and Feuerstein (1989), this study also used a unidimensional measure to assess fear of pain and may not be adequately operationalized.

Catastrophizing and Pain Severity. The relation between catastrophizing and pain severity also remains unclear in patients with chronic cancer pain. The relevant literature in this area includes studies that have focused on catastrophizing explicitly, as well as other studies that have focused on broader but related constructs such as worries and beliefs about pain.

In the first study to investigate catastrophizing in patients with cancer, Wilkie and Keefe (1991) examined the use of pain coping strategies in 45 patients with chronic pain due to lung cancer. Measures assessing pain severity, anxiety, and pain coping strategies were completed. Findings revealed that patients with lung cancer who catastrophized experienced greater pain. These findings, however, were not supported in a later study

conducted by Bishop and Warr (2003) who concluded that catastrophizing was not a significant predictor of average or worst pain in women with breast cancer. In another study, Lin (1998) compared patients with chronic non-malignant pain to patients with cancer pain and found that patients with chronic non-malignant pain were more likely to castastrophize and also reported greater pain intensity compared to cancer patients.

In addition to the studies that have focused directly on pain and coping behaviours, a number of studies suggest that beliefs and ascribed meaning about pain may influence the pain experience in patients with cancer. For example, Daut and Cleeland (1982) found that patients who believed that pain was caused by their cancer experienced greater pain than those who believed their pain was not related to their cancer. Ahles, Blanchard and Ruckdeschel (1983) concluded that patients who believed that pain was a sign of disease progression experienced greater pain. Spiegel and Bloom (1983) recruited 86 women with metastatic breast cancer and found that they experienced more pain if they attributed their symptoms to worsening of the disease. Belief about the meaning of pain accounted for a significant proportion of the variance in pain even after controlling for mood and medication intake. Smith, Gracely, and Safer (1998) found that patients who believed their pain was due to cancer rated their pain as more intense. Finally, Strang (1997) recruited 78 cancer patients and concluded that fears related to future problems with pain were associated with pain duration.

To summarize, the small body of literature addressing catastrophizing in cancer pain has not clearly confirmed its importance, in contrast to studies of other chronic pain conditions. Although Wilkie and Keefe (1991) found a significant correlation between catastrophizing and pain severity, Bishop and Warr (2003) did not. On the other hand,

studies of beliefs about pain suggest that patients do worry about their pain, and its meaning with respect to health and disease progression. Although the relationship between catastrophizing and cancer pain remains unclear, the evidence suggests that, similar to patients with non-malignant pain, psychosocial variables influence pain in this population and further investigation is warranted.

General Summary

Pain is prevalent in patients with advanced cancer, and according to anecdotal evidence, it is perhaps the most feared symptom. Although some evidence suggests that cancer patients fear pain, surprisingly few empirical studies have focused on the issue of pain-related fear in patients with advanced disease, and these studies have resulted in contradictory evidence. This is surprising since there is an extensive literature on chronic non-malignant pain demonstrating the importance of psychological variables in general, but also focusing on fear of pain and its effects on the functional limitations and the experience of pain in people with various pain syndromes. These findings also provide a framework for conceptualizing future studies, particularly those addressed to other populations, such as cancer, where psychological processes may be important (Keefe, Rumble, Scipio, Giordano, & Perri, 2004).

Objectives

At its most general level, this study will explore the hypothesis that chronic pain has certain correlates and consequences, regardless of its underlying cause. If such is the case, then there is much to be learned from an increasing integration of the largely disparate literatures on chronic non-malignant and chronic cancer pain. Therefore, the primary purpose of this study will be to investigate, among patients with chronic pain due

to advanced cancer, the relationships between fear of pain, catastrophizing, and anxiety sensitivity, with functional limitations and pain severity. This study will also compare the relationships observed in cancer patients to those observed in patients experiencing chronic non-malignant pain.

Research Hypotheses

Hypothesis 1. The literature suggests that cognitive/emotional variables are associated with limitations in function and pain severity. (a) It is therefore hypothesized that fear of pain, catastrophizing, and anxiety sensitivity are correlated with limitations in function and pain severity, to a comparable degree in both groups. (b) Further, it is hypothesized that fear of pain and catastrophizing contribute unique variance to the prediction of limitations in function limitation and pain severity scores in both groups of patients after controlling for demographic variables and other physical/psychological symptoms.

Hypothesis 2. There is no evidence that the biological cause of pain either due to cancer or non-malignant causes influences the extent to which pain is feared or catastrophized about. It is hypothesized, therefore, that malignancy does not moderate the relationship between fear of pain and limitations in function, and pain severity. It is also hypothesized that malignancy does not moderate the relationship between catastrophizing and limitations in function, and pain severity.

Hypothesis 3. The literature on chronic non-malignant pain suggests that the relationship between anxiety sensitivity and avoidance may be mediated by fear of pain (e.g. Asmundson & Taylor, 1996) and that catastrophizing may also have similar effects (Turk, 2002). It is therefore hypothesized that fear of pain mediates the relationship

between anxiety sensitivity and limitations in function. Furthermore, it is also hypothesized that catastrophizing mediates the relationship between anxiety sensitivity and limitations in functions (see Figures 5a, 5b).

Exploratory Analyses. There is little evidence to suggest that patients with pain associated with advanced cancer differ from patients with chronic non-malignant pain on the variables under study. Exploratory analyses will be performed to examine differences between groups on measures of fear of pain, catastrophizing, and anxiety sensitivity.

Finally, although the literature suggests that fear of pain and catastrophizing influence behaviour in patients with chronic pain, the inter-relationship between these two variables and how they influence pain severity is not clear (e.g. McCracken & Gross, 1993; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). Exploratory analyses will be performed to evaluate the mediating effects of fear of pain and catastrophizing on pain severity and their relationship with anxiety sensitivity (see Figures 6a, 6b).

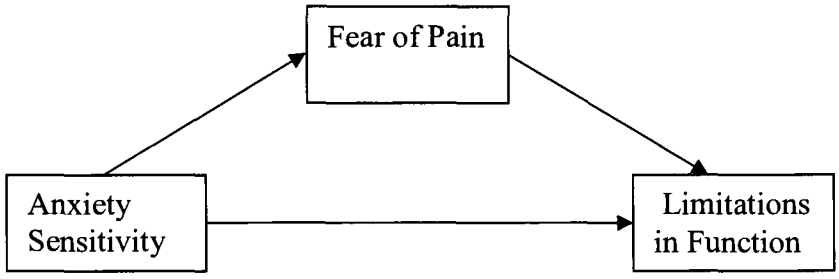

Figure 5a). Fear of Pain mediates the relationship between anxiety sensitivity and limitations in function.

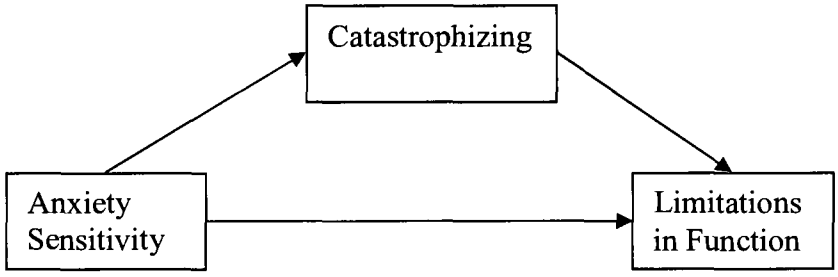

Figure 5b). Catastrophizing mediates the relationship between anxiety sensitivity and limitations in function.

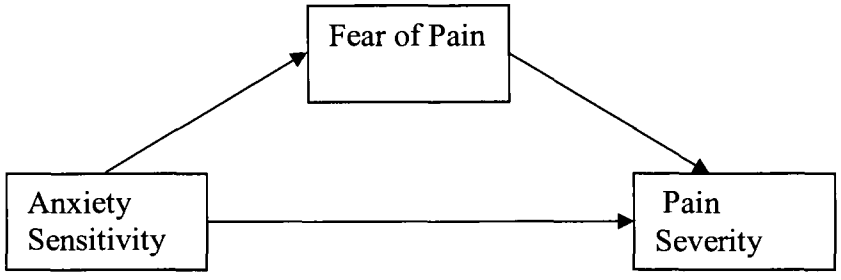

*Figure 6*a). Fear of pain mediates the relationship between anxiety sensitivity and pain severity.

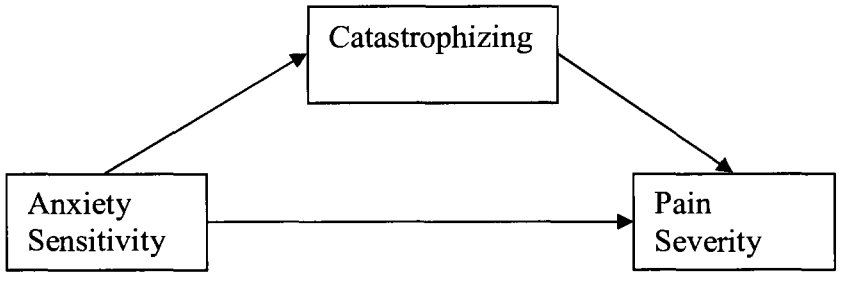

Figure 6b). Catastrophizing mediates the relationship between anxiety sensitivity and pain severity.

Method

Participants

Sample Size The required sample size was based on multivariate statistical requirements for hierarchical multiple regression, estimated number of predictors, power, and anticipated attrition from the study. The potentially most complex statistical design, multiple regression, was used to estimate the sample size assuming that at most 8 independent variables would be included in the analyses. According to Tabachnick and Fidell (2001), a sample of 114 participants for each group was initially calculated using N >= 50+8*m* (*m* represents the number of independent variables) yielding sufficient power (.80) with an alpha = .05 to detect a medium effect. A final sample size of 120 participants for each group was consequently targeted.

Inclusion Criteria. Potential participants were informed of the study if they met the following inclusion criteria: men and women age 18 years or older, English or French speaking, not cognitively impaired according to clinician opinion, and experiencing pain for at least 3 months. An additional criterion for patients with cancer required that they experience pain due to advanced disease, treatment, or procedure.

Procedure

This study was approved by the research ethics board of The Ottawa Hospital (TOH), the Ottawa Hospital Rehabilitation Centre (OHRC), and the University of Ottawa Research Ethics Board. Permission to recruit participants from the pain and symptom management clinic of the Ottawa Hospital Regional Cancer Centre (OHRCC) and the pain management program of the OHRC was obtained from the directors of each clinic. Recruitment took place at the OHRCC over a period of 21 months between January 2006

and October 2007 and at the OHRC over a period of 18 months between January 2006 and July 2007.

Recruiting Patients with Cancer. The pain and symptom management clinic of the OHRCC is open 4 half-days a week. During the recruiting period, 1287 patients were scheduled for appointments. Of these, 1065 patients did not meet criteria for this study because they were returning patients, were cured of cancer, did not have pain, did not come to their appointment, were too ill or too distressed, did not speak English or French, or did not have advanced cancer. Two hundred and twenty two patients met criteria and were approached by the clinician; of these 73 were not interested in the study for various reasons. The final sample recruited from the OHRCC included 149 patients. Twenty nine patients consented to participate but withdrew before completing the questionnaires because their condition deteriorated, leaving 120 cases for data screening.

Patients meeting the inclusion criteria were given an information sheet by their nurse clinician or physician (see Appendix A, B) at the end of their appointment and informed of their eligibility to participate in a study on pain. The nurse clinician or physician completed a brief information sheet about the patient's illness (see Appendix C) and gave this form to Ms. LeMay or the research assistant. The patients interested in participating were introduced to Ms. LeMay or the research assistant, who explained the study in greater detail. Participants who agreed to participate signed an declaration of informed consent form (see Appendix D, E) and were informed they could either complete the survey in the examining room, in a private area, or at home (see Appendixes J to Q for the English survey and Appendixes R to Y for the French survey). Those who chose to complete the survey at home were asked if a follow-up call could be made

should they have questions about the survey. Fifty one percent of the patients chose to complete the survey at home and were given a pre-addressed stamped envelope to return by mail. Participants were given a parking voucher to compensate them for their time since approximately 30 minutes was required to complete the questionnaires.

Recruiting Patients with Non-Malignant Pain. The chronic pain clinic of the OHRC is open 2 mornings per week. During the recruiting period 237 patients were scheduled for consultations. One hundred and seventy one patients with a primary complaint of chronic non-malignant pain met criteria and were informed of the study. Of these, 49 patients were not interested because they did not have time, 85 patients, although scheduled for an appointment either did not have chronic pain, had cancelled their appointment or did not speak English or French. One hundred and twenty two patients agreed to participate and two participants withdrew before completing the questionnaire, leaving 120 cases for data screening.

Consecutively referred patients to the OHRC meeting the inclusion criteria were given an information sheet at the end of their appointment (See Appendix A, B) and informed by their physician of their eligibility to participate in a study on pain. The patients interested in participating were introduced to the research assistant who explained the study in greater detail (Appendix F, G). Participants who agreed to participate signed a declaration of informed consent form (see Appendix H, I). All patients except for 2, preferred to complete the survey on site in the examining room. Participants were given a parking voucher to compensate them for their time.

Measures

The measures selected for this study were chosen for their brevity and ease of administration because this sample is composed entirely of medical patients, some of whom were very ill.

Dependent Variables

The Pain Disability Index (PDI). The PDI (Pollard, 1984; see Appendix K, S) is a 7-item questionnaire specifically developed to measure the degree to which chronic pain interferes with 7 areas of role function. Patients rate each item on a scale ranging from 0 (no disability) to 10 (total disability). A total disability score can be obtained by summing the 7 items.

Initial studies examining the factor structure of the PDI revealed a two factor solution (Tait, Pollard, Margolis, Duckro, & Krause, 1987). However, later studies using larger samples supported a single factor solution (Chibnall & Tait, 1994; Tait, Chibnall, & Krause, 1990). The PDI is a reliable measure (Cronbach's alpha = .86; Tait, Chibnall, & Krause) and it correlates with other measures of physical function (Tait, Pollard, Margolis, Duckro, & Krause, 1987; Tait, Chibnall, & Krause, 1990). A French Canadian version of the PDI was validated recently (Gauthier, Thibault, Adams, & Sullivan, 2008).

The PDI has been used extensively in various populations with chronic pain such as chronic low back pain (e.g., McCracken, Gross, Aikens, & Carnrike, 1996), soft tissue injury (e.g., Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998), whiplash (e.g., Sullivan, Stanish, Sullivan, & Tripp, 2002), and cancer (Bishop & Warr, 2003; Turk et al., 1998).

The Brief Pain Inventory (BPI). Pain severity was assessed using the four pain scales of the BPI (Daut, Cleeland, & Flanery, 1983; Cleeland, 2009; see Appendix J, R).

The BPI is a well validated measure and one of the most widely used instruments used for pain assessment. It requires that patients rate their average, worst, least, and current pain experienced during the last week. These 4 items are rated on a numerical scale ranging from 0 (no pain) to 10 (pain as bad as you can imagine) (Cleeland, 2009). An arithmetic mean of the 4 pain scores was calculated to provide a more accurate estimate of pain severity (Shacham, Dar & Cleeland, 1984; Jensen, Turner, Romano & Fisher, 1999).

A number of studies have demonstrated that the BPI pain intensity items load onto a single factor (e.g. Cleeland & Ryan, 1994). Although the BPI was primarily designed to assess pain in patients with cancer (Cleeland, 2009), it has also has been validated in patients with chronic non-malignant pain (e.g., Daut, Cleeland, & Flanery, 1983; Keller et al., 2004). The BPI has also been translated and validated in several languages including French Canadian (Poundja, Fikretoglu, Gay, & Brunet, 2007).

Independent Variables

The Pain Anxiety Symptoms Scale-20 (PASS-20). The PASS (McCracken, Zayfert, & Gross, 1992; see Appendix L, T) was developed specifically to assess fear of pain in populations with diverse forms of chronic pain. A short version of the PASS, the PASS-20 (McCracken & Dhingra, 2002) was later developed. This 20-item self-report includes four sub-scales, each comprising 5 items, assessing cognitive anxiety, escape/avoidance, fear of pain, and physiological symptoms associated with pain. The frequency of occurrence of each symptom described is rated on a 6 point scale ranging from 0 (never) to 5 (always).

Although factor analytic studies have confirmed a four-factor structure, the total summary score has often been used as a global measure of pain-related anxiety (e.g., McCracken & Dhingra, 2002; McCracken, Zayfert, & Gross, 1992; Peters, Vlaeyen, & Weber, 2005). The total score of the PASS-20 has excellent internal consistency (alpha = .91). The correlations between the sub-scales and total score of the shortened version with the original measure are high ranging from .75 to .86 for the sub-scales and .97 for the total score (McCracken & Dhingra, 2002). Recent studies have confirmed its factor structure and psychometric properties (Coons, Hadjistavropoulos, & Asmundson, 2004; Roelofs et al., 2004).

The Pain Catastrophizing Scale (PCS). The PCS (Sullivan, Bishop, & Pivik, 1995; see Appendix M, U) is a 13-item questionnaire developed to measure pain-related catastrophizing in individuals suffering from chronic pain. Each item is rated on a 5 point frequency-of-occurence scale ranging from 0 (not at all) to 4 (all the time). A total score is calculated by summing the items. A score ranging between 20 and 30 indicates a moderate risk for developing chronicity (Sullivan, 1995).

Factor analysis has revealed that the PCS (Sullivan, Bishop, & Pivik, 1995) includes three sub-scales related to rumination, magnification, and helplessness (Osman, Barrios, Gutierrez et al., 2000; Osman, Barrios, Kopper, et al., 1997; Sullivan, Bishop, & Pivik, 1995). Although the PCS is a multidimensional measure some studies have used the total score as a global measure of pain-related catastrophizing (e.g., Peters, Vlaeyen, & Weber, 2005; Severeijns, Vlaeyen, van den Hout, & Weber, 2001).

The PCS (Sullivan, Bishop, & Pivik, 1995) has been shown to possess high internal consistency with alphas ranging from .87 (Sullivan et al.) to .93 (Osman et al.,

1997) for the total score. The PCS was selected because it is short and easy to administer. It was also validated in the French-Canadian language (French et al., 2005).

The Anxiety Sensitivity Index (ASI). The ASI (Reiss, Peterson, Gursky, & McNally, 1986; see Appendix N, V) is a 16-item self-report developed to assess fear of anxiety itself and of anxiety-related sensations. The frequency of each symptom is rated on a 5 point scale ranging from 0 (very little) to 4 (very much). The ASI can be completed in approximately 5 minutes and a total score is obtained by summing the ratings. According to Peterson and Plehn (1999), a score 25 or more signifies that a person may have problems with anxiety sensitivity.

The ASI (Reiss, Peterson, Gursky, & McNally, 1986) is a well-validated measure with internal consistency alpha estimates ranging from .82 (Telch, Shermis, & Lucas, 1989) to .91 (Taylor, Koch, & Crockett, 1991). Test-retest reliability is satisfactory, with correlations ranging from .71 (Maller & Reiss, 1992) to .75 (Reiss, Peterson, Gursky, & McNally, 1986). Although there has been some debate in the literature about the dimensionality of the ASI, the evidence suggests that it comprises three domains assessing physical, mental, and social concerns, all of which factor onto a single scale (Zinbarg, Barlow, & Brown, 1997). This measure has been used extensively and translated into several languages. A French Canadian version has recently been validated (Verreault, Labrecque, Marchand, & Marchand, 2007).

The Patient Health Questionnaire-9 (PHQ-9): The Patient Health Questionnaire (PHQ; Spitzer et al., 1994) was developed to diagnose and assess the severity of depression and other mental disorders. Recently, the depression scale of the PHQ, the PHQ-9 (Kroenke, Spitzer, & Williams, 2001; see Appendix P, X), was retained as a

separate measure because of its brevity, ease of administration, and correspondence with the 9 criterion symptoms identified in the DSM-IV to diagnose depressive disorders. Patients rate the frequency of symptoms experienced during the past two weeks by choosing one of 4 response categories: 1 (not at all), 2 (several days), 3 (more than half the days), or 4 (nearly every day). A total score reflecting severity of depression is obtained by summing the responses across items. A score ranging from 0 to 4 represents no depression, 5 to 9 mild, 10 to 14 moderate, 15 to 19 moderately severe, 20 to 27 severe depression (Kroenke & Spitzer, 2002).

The PHQ-9 demonstrates excellent internal reliability with Cronbach's alpha ranging from .86 to .89, and it has also shown excellent test-retest reliability (Kroenke, Spitzer, & Williams, 2001). Its sensitivity to detect changes over time was demonstrated in medical outpatients (Lowe, Kroenke, Herzog, & Grafe, 2004). Although this measure includes symptoms that may be associated with underlying illness such as those impacting appetite, concentration, and sleep, the literature suggests that omitting physical symptoms is not necessarily superior to other diagnostic schemes (e.g. Geisser, Roth, & Robinson, 1997; Koenig, George, Peterson, & Pieper, 1997; Wilson, Chochinov, de Faye, & Breitbart, 2000). The PHQ-9 has been used with various medical populations, including patients with cancer (Ell et al., 2005; Jefford et al., 2004) and was recently validated in French (Dumont et al., 2005). The PHQ-9 was included in this study to control for the possible confounding effects of depression on measures of function and pain severity.

The Anderson Symptom Assessment Scale (ASAS): The ASAS (Palmer, Sweeney, & Fisch, 2002; see Appendix O, W) was adapted from the Edmonton Symptom

Assessment Scale (ESAS; Bruera, Kuehn, Miller, Selmser, & Macmillan, 1991). The ESAS is a 9-item self-report developed to assess specific symptoms (e.g., pain, nausea, fatigue etc.) experienced by patients with cancer. Each item is rated on a visual analogue scale (VAS) and patients are asked to cross the line at the point that best describes their symptom. The ESAS is a valid and reliable instrument and internal consistency alpha was .79 in a population of patients with cancer (Chang, Hwang, & Feuerman, 2000). Test-retest correlation coefficients were .86 ($p < .001$) when re-administered after 2 days and .45 ($p < .05$) after 1 week.

The ASAS adaptation of the ESAS replaces the VAS with a numerical rating scale ranging from 0 to 10, which is easier to use. In addition to replacing the VAS scale, an item reflecting level of activity was removed and two new items were added reflecting level of sleep and general well being. A total score is obtained by summing the physical items (pain, fatigue, nausea, drowsiness, shortness of breath, appetite, sleep), and a high score indicates a high level of symptomatology. A recent factor analysis of the ASAS revealed a two factor solution where the psychological symptoms are associated with one, and the physical symptoms are associated with the other (Palmer, Sweeney, & Fisch, 2002). For the purposes of this study, the psychological items and the pain item were removed because these were measured using other scales.

The ASAS, was selected because it is easier to use than the ESAS, and like the ESAS it assesses some of the most prevalent symptoms in patients with advanced cancer. Although this measure was not developed for people with chronic non-malignant pain conditions, it should be noted that many of the symptoms listed are commonly found in this population of patients (Wilson, Mikail, D'Eon, & Minns, 2001). The ASAS was

included in this study to control for the possible confounding effects of non-pain symptoms on measures of function and pain severity (McClement, Woodgate, & Degner, 1997).

Data Analytic Strategy

Descriptive Statistics. Descriptive statistics were run to calculate frequencies, means, and standard deviations for the demographic and medical information.

Pearson Correlations. Bivariate relationships among the independent variables (age, gender, education, physical symptoms, depression, fear of pain, anxiety sensitivity, catastrophizing) and the dependent variables (limitations in function and pain severity) were calculated for each group. Correlations between demographic variables commonly found to be associated with pain and disability were examined for statistical significance to determine if these should be included in subsequent analyses.

Fisher's z_r transformations (Ferguson, 1976) were used to test the significance of the difference between two correlation coefficients for independent samples to compare the correlations between limitations in function and fear of pain, catastrophizing, and anxiety sensitivity for each group. Similar analyses were conducted for the correlations between pain severity and fear of pain, catastrophizing, and anxiety sensitivity (Hypothesis 1a).

Multivariate Analysis of Variance. MANOVA was used to estimate the differences between groups on a linear combination of pain severity, limitations in function, depression, physical symptoms, fear of pain, catastrophizing and anxiety sensitivity. This model was chosen because it is designed to compare means when there are several dependent variables while controlling for Type I error.

Regression Analyses. Hierarchical multiple regression (HMR) analyses were run within each group to assess the independent contributions of each block of variables at a particular point of entry for each dependent variable (Hypothesis 1b). Two sets of regressions were run separately with a different set of control variables for fear of pain and catastrophizing. The first set comprised variables commonly controlled for in studies in this area such as age, gender, education, and pain severity. These variables were included with the aim of replicating the findings of studies on non-malignant pain and to examine their impact in patients with advanced cancer. In the second set of control variables, depression and physical symptoms were added since these variables have been shown to be associated with level of function and pain severity (e.g., DSM-IV; Gatchel, Bo Peng, Peters, Fuchs, & Turk, 2007; Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Lewinsohn, Munoz, Youngren, & Zeiss, 1986).

To test for the moderating or interacting effects of malignancy (Hypothesis 2) standard multiple regressions were performed based on the procedures outlined by Aiken and West (1991). The data were initially centered to eliminate non-essential multicollinearity between the variables. The variables were then entered as a block in the regression model that included malignancy, the independent variable, and the interaction term (malignancy x independent variable). For example, the diagnoses of cancer versus chronic non-malignant pain (malignancy) was assigned a dummy code and entered as an independent variable along with fear of pain and the product of malignancy and fear of pain. If the interaction between malignancy and fear of pain was significant, then the moderator hypothesis was supported. Regressions were run to test that malignancy does not moderate the relationship between: 1) fear of pain and limitations in function, 2)

catastrophizing and limitations in function, 3) fear of pain and pain severity, 4) catastrophizing and pain severity.

To test for the mediating effects of fear of pain and catastrophizing (Hypothesis 3), regression analyses were run according to the models described by Baron and Kenny (1986) and Preacher and Hayes (2004). Briefly, according to these procedures, three regression equations were tested as follows: one equation regressing, for example, fear of pain on anxiety sensitivity, a second equation regressing limitations in function on anxiety sensitivity after controlling for the mediator, and a third equation regressing limitations in function on both anxiety sensitivity and fear of pain. Mediation was established if four conditions were met: 1) the predictor was significantly associated with the mediator, 2) the predictor was significantly associated with the dependent variable, 3) the mediator was significantly associated with the dependent variable, 4) the impact of the predictor on the dependent variable was significantly less after controlling for the mediator (Holmbeck, 1997). Sobel's test was used to determine the indirect effect of the independent variable on the dependent variable (Preacher & Hayes, 2004).

Level of Significance

All tests were evaluated using a nominal alpha of .05 unless stated otherwise.

Results

Data Screening

Statistical analyses were conducted using SPSS version 10.1 statistical software. Two hundred and forty cases were screened for missing data, outliers, normality, and linearity according to the procedures outlined by Tabachnick and Fidell (2001). SPSS frequencies were run to identify the percentage of missing values per case per questionnaire, and per survey question. On a per case basis, 75% of the participants completed all the items, 17% were missing only one value and 8% were missing 2 or more values across the different surveys. When frequencies were run for each measure only question 5 of the Pain Disability Index (PDI; Pollard, 1984), which assesses the impact of pain on a person's sex life, was missing for 12.1% of the participants, exceeding the 5% criteria outlined by Tabachnick and Fidell. The decision was made to delete this item bringing the total of completed surveys to 85.3%. Mean replacement was used to estimate missing data on the cases that had no more than 1 or 2 unanswered questions (10.5% of the sample). Of the remaining 10 cases, 4 were deleted because the participants did not complete at least 50% of 2 surveys leaving 118 participants in each group. Expectation maximization (EM) (Tabachnick & Fidell, 2001) was used to impute total scores based on cases with completed data for 6 participants missing more than 50% of the items on only one survey.

Statistical assumptions were verified for all analyses. Frequency histograms were examined for normality and all variables appeared reasonably normally distributed for both groups. Absolute skewness and kurtosis were calculated and all variables fell within a range of 0 to +/-1, except for pain duration which was substantially positively skewed.

This variable was transformed using logarithmic transformation to correct the observed non-normality. Bivariate scatter plots revealed linear relationships among variables. No univariate outliers were identified using a criteria of $z = 3.29$, $p < .001$ (Tabachnick & Fidell, 2001). One multivariate outlier was identified and deleted using Mahalanobis distance critical value of $\chi^2 (8) = 26.13$, $P < .001$. Consequently, 117 cases in the group with chronic cancer pain and 118 cases in the group with chronic non-malignant pain remained for analysis.

Standard regression analyses were performed for each group to determine if multicollinearity was a concern for this study. Analyses revealed, for the group with cancer, a condition index of 15.33 with corresponding proportions of .81 and .80 and a variance inflation factor (VIF) of 3.0 and 2.70 for the PCS (Sullivan, Bishop, & Pivik, 1995) and PASS-20 (McCracken & Dhingra, 2002) respectively. Statistics for the group with non-malignant pain were as follows: a condition index of 16.40 with corresponding proportions of .42 and .51 and a VIF of 2.32 and 2.42 for the PCS (Sullivan, Bishop, & Pivik, 1995) and PASS-20 (McCracken & Dhingra, 2002) respectively. Additionally, bivariate correlations between the PASS-20 and the PCS were high with a correlation of .79 for the group with cancer and .73 for the group with non-malignant pain. Taken together these statistics suggest the presence of some degree of multicollinearity, putting into question the stability of the regression coefficients (Allison, 1999; O'Brien, 2007). To avoid misleading conclusions about the variables under study and given the objectives of this study, the only reasonable option was to run the variables separately. Consequently, similar to previous studies (e.g. Peters, Vlaeyen, & Weber, 2005), the PASS-20 and PCS were initially entered into separate regressions. The variables were

also subsequently entered in the same regression model to assess the impact of the multicollinarity on the regression coefficients.

Demographic Characteristics

Participant demographics are presented in Table 4 and medical characteristics in Table 5. One hundred and thirteen patients with pain associated with advanced cancer completed the English version of the survey and 4 completed the French version. Sixty nine were women and 48 were men, with participants' ages ranging from 31 to 90 years of age. Most were married (70%) and well educated, with 82% having some education beyond high school. The main cancer types were breast, digestive system, and prostate cancer. Ninety-four percent of the patients were treated for pain caused directly by cancer and 87% had been prescribed opioids to treat their pain. The mean duration of pain for these patients was 20 months.

One hundred and fifteen individuals with non-malignant pain completed the English version of the survey and 3 completed the French version. Seventy six were women and 42 were men, and participants' ages ranged from 19 to 84 years of age. Over half the sample was married (53%) and well educated, with 91% having some education beyond high school. Twenty-six percent were prescribed opioids to treat their pain. The mean duration of pain for these patients was 91 months.

Descriptive Statistics

Differences between groups on demographic variables and medical characteristics were examined using independent-samples *t* tests to evaluate differences in age and pain duration; χ^2 analyses were performed to evaluate differences in gender, education, marital status, race, and use of pain medication. Analyses revealed significant differences

Table 4

Demographic Information for the Participants

Variable	Cancer - % (N = 117)	Non-Cancer - % (N = 118)	Statistics
Age - Mean (SD)	58.7 (12.0)	46.2 (11.9)	$t(233) = 7.98,\ p < .001$
Gender			$\chi^2(1, N = 235) = .73, p > .05$
Male	41.0	35.6	
Female	59.0	64.4	
Race			$\chi^2(1, N = 235) = 3.42, p > .05$
Caucasian	92.3	87.3	
Other	5.1	11.9	
Missing	2.6	0.8	
Marital Status			$\chi^2(2, N = 232) = 10.86, p < .01$
Single	7.8	22.0	
Married	69.8	52.5	
Widowed, Separated, or Divorced	22.4	23.7	
Education			$\chi^2(3, N = 235) = 6.46, p > .05$
Primary or High School	17.9	9.3	
Some College or University	47.9	42.4	
College or University Graduate	27.4	38.1	
Post Grad. University	6.8	10.2	

Note. SD = standard deviation

Table 5

Medical Characteristics of the Participants

Variable	Cancer - % (N = 117)	Non-Cancer - % (N = 118)	Statistics
Pain Duration (months) - M(SD)	20.1 (22.2)	91.2 (104.3)	$t(232) = -10.78 < .001$
Primary tumour site			
Breast	29.0		
Lung	13.0		
Digestive System	26.0		
Prostate	5.0		
Unknown	14.0		
Other	13.0		
Pain treated due to:			
Cancer	94.0		
Treatment	12.0		
Procedure	1.7		
Other	2.6		
Pain Medications:			
Opioids	87.2	26.3	$\chi^2(1, 232) = 88.72, p < .001$
Nsaids	15.4	36.4	$\chi^2(1, 235) = 13.55, p < .001$
Antidepressants	30.8	28.0	

Note. SD = standard deviation. M = Mean. NSAIDs = Non-steroidal anti-inflammatory drugs

in age, $t(233) = 7.98$, $p < .001$, with cancer patients being significantly older. There were also differences in marital status $\chi^2(2, N = 232) = 10.86$, $p < .01$, with the proportion of patients who were married being greater for patients with cancer (69.8%) compared to patients with non-malignant pain (53.4%). There were no significant differences observed between the groups on level of education, race, and gender.

Significant differences were also observed when the groups were compared on medical characteristics. Differences were found for duration of pain, $t(232) = -10.78 <$ .001, with patients with chronic non-malignant pain experiencing pain for significantly more months when compared to patients with chronic cancer pain. Significant differences were also observed in use of pain medication with fewer patients with cancer having been prescribed NSAIDs, $\chi^2(1, N = 235) = 13.55$, $p < .001$, and a greater number of patients having been prescribed opioids, $\chi^2(1, N = 232) = 88.72$, $p < .001$. There were no significant differences in use of antidepressants between the groups.

The means and standard deviations for the questionnaires scores for each group are presented in Table 6. Multivariate analysis of variance (MANOVA) was used to examine the mean differences between groups on measures of pain severity, limitations in function, physical symptoms, depression, fear of pain, anxiety sensitivity, and catastrophizing. Overall, there was a significant multivariate effect, Wilk's $\Lambda = .75$, $F(7, 227) = 11.11$, $p < .001$, with a multivariate partial $\eta 2$ based on Wilk's Λ of 26% indicating significant differences between groups. Univariate analyses of variance (ANOVA) on each measure were conducted as follow-up tests. The ANOVA on pain severity, $F(1, 233) = 52.04$ $p < .001$, partial $\eta 2 = .18$, and depression scores,

Table 6

Means and Standard Deviations for Self-Report Inventories by Group

	Cancer(N = 117)		Non-Cancer (N = 118)			
	Mean	SD	Mean	SD	*F*	
Pain Disability Index (PDI)	34.20	13.50	35.06	10.93	0.29	
Brief Pain Inventory (BPI)	4.62	1.94	6.33	1.70	52.04	***
Fear of Pain (PASS-20)	50.88	22.21	52.44	20.16	0.32	
Catastrophizing (PCS)	25.97	12.67	28.88	11.79	3.33	
Anxiety Sensitivity (ASI)	24.85	12.74	27.77	13.98	2.79	
Depression (PHQ-9)	11.04	6.07	13.98	6.01	13.90	***
Physical symptoms (ASAS)	26.19	11.05	28.23	9.75	2.24	

Note. SD = standard deviation. Mean difference is significant (*** $p < .001$.)

$F(1, 233) = 13.90$, $p < .001$, partial $\eta 2 = .06$, was significant, with patients with non-malignant pain experiencing worse pain and more depressive symptoms. The ANOVAs on limitations in function, physical symptoms, fear of pain, catastrophizing, and anxiety sensitivity were not significant.

Pearson Correlations

Pearson's correlation coefficients (r) were calculated between the variables under study (see Table 7). For both groups, scores on the PDI (Pollard, 1984) were correlated with pain intensity, fear of pain, catastrophizing, anxiety sensitivity, physical symptoms, and depression. Similarly pain severity was correlated with fear of pain, catastrophizing, anxiety sensitivity, physical symptoms and depression for both groups. Gender was correlated with pain severity for patients with cancer, with women experiencing higher pain levels. Age was correlated with limitations in function for patients with non-malignant pain, with older patients experiencing fewer limitations. Education was correlated with pain severity in patients with non-malignant pain, with patients having greater educational attainment experiencing less pain.

Fisher's z_r transformation was used to test the significance of the difference between two correlation coefficients for independent samples (Ferguson, 1976). Fear of pain, catastrophizing, and anxiety sensitivity were correlated with limitations in function and pain severity to a comparable degree for both groups, $p > .05$. These tests are analogous to the interaction (moderation) tests used in a later section.

Table 7

Intercorrelations Among the Variables of Interest by Group

Variable		1	2	3	4	5	6	7	8	9	10
					Cancer (N = 117)						
1	BPI	--									
2	PDI	.42**	--								
3	PASS-20	.18*	.40**	--							
4	PCS	.25**	.35**	.79**	--						
5	ASI	.21*	.27**	.62**	.58**	--					
6	ASAS	.37**	.30**	.28**	.34**	.47**	--				
7	PHQ-9	.23*	.30**	.42**	.52**	.53**	.61**	--			
8	Gender[a]	.20*	-.13	.10	.09	.19*	.02	.08	--		
9	Age	-.14	-.03	-.10	-.10	-.05	-.17	-0.18	-.36**	--	
10	Education	-.12	-.13	-.25**	-.20*	-.15	-.09	-0.12	.01	-.08	--
					Non-Cancer (N = 118)						
1	BPI	--									
2	PDI	.57**	--								
3	PASS-20	.32**	.36**	--							
4	PCS	.26**	.37**	.73**	--						
5	ASI	.19*	.27**	.73**	.61**	--					
6	ASAS	.43**	.44**	.39**	.28**	.47**	--				
7	PHQ-9	.40**	.55**	.52**	.51**	.57**	.58**	--			
8	Gender[a]	.09	.09	-.04	.01	.06	-.10	.02	--		
9	Age	-.07	-.18*	-.25**	-.24**	-.15	-.15	-.35**	-.13	--	
10	Education	-.32**	-.08	-.00	-.06	-.00	.03	.01	-.11	-.02	--

Note. BPI = Brief Pain Inventory. PDI = Pain Disability Index. PASS-20 = Pain Anxiety Symptoms Scale - 20. PCS = Pain Catastrophizing Scale. ASI = Anxiety Sensitivity Index. ASAS = Anderson Symptoms Assessment Scale. PHQ-9 = Patient Health Questionaire-9. All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. [b] 1 = primary or high school. 2 = some college or university. 3 = university or college graduate. 4 = post graduate university. * $p < .05$. ** $p < .01$.

Hierarchical Multiple Regressions

Fear of Pain, Catastrophizing and Limitations in Function.

A series of hierarchical multiple regressions (HMR) were run to examine the unique contribution of fear of pain and catastrophizing to limitations in function. Tables 9 to 16 show the unstandardized coefficient (B), standard error (SE B), standardized beta coefficient (β), sr^2 (unique), R^2, ΔR^2 after entry of all independent variables for patients suffering from chronic cancer pain (see Table 9, 11, 13, 15) and chronic non-malignant pain (Table 10, 12, 14, 16).

First, HMR's were run using limitations in function as the dependent variable while controlling for variables similar to those used in clinical studies on chronic non-malignant pain. The regression equation was as follows: Block 1 included age, gender, education; Block 2 included pain severity; and Block 3 included fear of pain. This regression was subsequently re-run replacing fear of pain with catastrophizing. Another set of HMR's were run to include fear of pain and catastrophizing together in the third block keeping in mind the possibility of overlap between these two variables and their impact on the regression coefficients. However, when this regression was run the beta value signs reversed for catastrophizing in patients with cancer, in patients with non-malignant pain both fear of pain and catastrophizing were no longer significant (see Table 8). Similar patterns were observed when pain severity was the dependent variable. Consequently, since the presence of multicollinearity was suggested, the results from this regression were omitted from this section.

Table 8

Hierarchical Multiple Regression Analyses Predicting Limitations in Function

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model for Patients with Cancer Pain (N = 117)					
Age	-0.03	0.09	-.03		.00
Gender[a]	-7.16	2.29	-.26	**	.06
Education	0.09	0.73	.01		.00
Pain Severity	2.84	0.57	.41	***	.14
Fear of Pain	0.23	0.08	.37	**	.05
Catastrophizing	-0.03	0.14	-.02		.00
Note. R^2 = .04 for Block 1; ΔR^2 = .19 for Block 2 (p < .001); ΔR^2 = .11 for Step 3 (p < .001).					
		Basic Controls			
Final Model for Patients with Non-Malignant Pain (N = 118)					
Age	-0.08	0.07	-.09		0.01
Gender[a]	0.85	1.72	.04		0.00
Education	0.83	0.61	.11		0.01
Pain Severity	3.43	0.54	.53	***	0.22
Fear of Pain	0.01	0.06	.02		0.00
Catastrophizing	0.19	0.10	.20		0.02
Note. R^2 = .04 for Block 1; ΔR^2 = .31 for Block 2 (p < .001); ΔR^2 = .04 for Block 3 (p < .05). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * p < .05. ** p < .01. *** p < .001.					

Second, to extend the literature on chronic pain, another set of analyses were run with the addition of stricter controls to Block 2, namely depression and physical symptoms, since these variables have been shown to be associated with limitations in function in previous studies. The regression included: Block 1 age, gender, education; Block 2 pain severity, depression, physical symptoms; Block 3 fear of pain. The same regression was re-run replacing fear of pain with catastrophizing in Block 3.

Similar regressions were run for pain severity as the dependent variable for basic and stricter controlling variables.

Fear of Pain and Limitations in Function. In the first set of regressions, demographic variables were entered in Block 1 of the model (Tables 9 and 10) and did not contribute significantly to limitations in function for patients with cancer *F*-change (3,113) = 1.68, $p > .05$, or for patients with non-malignant pain, *F*-change (3,114) = 1.69, $p > .05$. After Block 2, pain severity explained a portion of the variance in limitations in function for patients with cancer pain, *F*-change (1, 112) = 27.86, $p < .001$, and for patients with non-malignant pain *F*-change (1, 113) = 53.97, $p < .001$. After Block 3, as hypothesized, fear of pain was also a significant contributor for patients with cancer, *F*-change (1,111) = 19.10, $p < .001$, and for patients with non-malignant pain, *F*-change (1,112) = 4.04, $p < .05$. The overall model was significant for patients with cancer *F* (5,111) = 11.74, $p < .001$, and for patients with non-malignant pain, *F* (5,112) = 13.42, $p < .001$.

Table 9

Hierarchical Multiple Regression Analyses Predicting Limitations in Function in Patients with Cancer (N=117)

Variables	B	SE B	β	sr^2(unique)
		Basic Controls		
Final Model Predicting Limitations in Function				
Age	-0.03	0.09	-.03	0.00
Gender[a]	-7.16	2.28	-.26**	0.06
Education	0.09	0.73	.01	0.00
Pain Severity	2.82	0.56	.41***	0.15
Fear of Pain	0.22	0.05	.35***	0.11

Note. R^2= .04 for Block 1; ΔR^2= .19 for Block 2 (p < .001); ΔR^2 = .11 for Block 3 (p < .001).

		Stricter Controls		
Final Model Predicting Limitations in Function				
Age	-0.02	0.10	-.02	0.00
Gender[a]	-7.00	2.31	-.26**	0.05
Education	0.10	0.73	.01	0.00
Pain Severity	2.68	0.59	.39***	0.12
Depression	0.19	0.23	.09	0.00
Physical Symptoms	0.03	0.13	.02	0.00
Fear of Pain	0.19	0.05	.32***	0.08

Note. R^2= .04 for Block 1; ΔR^2= .23 for Block 2 (p < .001); ΔR^2 = .08 for Block 3 (p < .001). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * p < .05. ** p < .01. *** p < .001.

Table 10

Hierarchical Multiple Regression Analyses Predicting Limitations in Function in Patients with Non-Malignant Pain (N=118)

Variables	B	SE B	β	sr^2(unique)
		Basic Controls		
Final Model Predicting Limitations in Function				
Age	-0.09	0.07	-.10	0.01
Gender[a]	0.95	1.73	.04	0.00
Education	0.75	0.62	.10	0.01
Pain Severity	3.44	0.54	.53***	0.23
Fear of Pain	0.09	0.04	.17*	0.02

Note. R^2 = .04 for Block 1; ΔR^2 = .31 for Block 2 ($p < .001$); ΔR^2 = .02 for Block 3 ($p < .05$).

		Stricter Controls		
Final Model Predicting Limitations in Function				
Age	-0.01	0.07	-.02	0.00
Gender[a]	1.19	1.65	.05	0.00
Education	0.42	0.59	.05	0.00
Pain Severity	2.64	0.56	.41***	0.11
Depression	0.61	0.18	.34**	0.06
Physical Symptoms	0.06	0.10	.06	0.00
Fear of Pain	0.02	0.05	.03	0.00

Note. R^2 = .04 for Block 1; ΔR^2 = .41 for Block 2 ($p < .001$); ΔR^2 = .00 for Block 3 ($p > .05$). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

The regressions were re-run for both groups adding stricter controls, depression and physical symptoms, in Block 2. This block was significant for patients with cancer, *F*-change (3, 110) = 11.85, $p < .001$, and for patients with non-malignant pain *F*-change (3, 111) = 27.99, $p < .001$. After Block 3, however, fear of pain remained a significant contributor only for patients for patients with cancer, *F*-change (1,109) = 13.01, $p < .001$ with fear of pain explaining a significant portion of the variance in limitations in function; for patients with non-malignant pain, fear of pain was no longer significant, *F*-change (1,110) = .13, $p > .05$. The overall model was significant for patients with cancer $F(7, 109) = 8.52$, $p < .001$, and for patients with non-malignant pain, $F(7, 110) = 13.15$, $p < .001$.

These results support the hypothesis that fear of pain explains a portion of the variance in limitations in function in patients with chronic non-malignant pain and extend to patients with chronic advanced cancer pain. In particular, the final regression model showed that fear of pain explained 11% and 2% of the variance in limitations in function over and above demographic variables and pain severity in patients with cancer and in patients with non-malignant chronic pain, respectively. However, when additional controls such as depression and physical symptoms were included, the hypothesis was supported only in patients with cancer, with fear of pain explaining 8% of the variance and pain severity explaining 12% of the variance.

Catastrophizing and Limitations in Function. The multiple regressions were re-run replacing fear of pain with catastrophizing in Block 3 while controlling for demographic variables in Block 1 and pain severity in Block 2 (see Tables 11 and 12). After Block 3, as hypothesized, catastrophizing explained a significant portion of the variance in

Table 11

Hierarchical Multiple Regression Analyses Predicting Limitations in Function in Patients with Cancer Pain (N=117)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Predicting Limitations in Function					
Age	-0.05	0.10	-.04		0.00
Gender[a]	-6.92	2.37	-.25	**	0.05
Education	-0.26	0.75	-.03		0.00
Pain Severity	2.75	0.59	.39	***	0.14
Catastrophizing	0.28	0.09	.26	**	0.06
		Stricter Controls			
Final Model Predicting Limitations in Function					
Age	-0.03	0.10	-.02		0.00
Gender[a]	-6.74	2.39	-.25	**	0.05
Education	-0.24	0.75	-.03		0.00
Pain Severity	2.62	0.62	.38	***	0.11
Depression	0.23	0.25	.11		0.01
Physical Symptoms	0.03	0.13	.03		0.00
Catastrophizing	0.22	0.10	.20	*	0.03

Note. R^2 = .04 for Block 1; ΔR^2 = .19 for Block 2 ($p < .001$); ΔR^2 = .06 for Block 3 ($p < .01$).

Note. R^2 = .04 for Block 1; ΔR^2 = .23 for Block 2 ($p < .001$); ΔR^2 = .03 for Block 3 ($p < .05$). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 12

Hierarchical Multiple Regression Analyses Predicting Limitations in Function in Patients with Non -Malignant Pain (N=118)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Predicting Limitations in Function					
Age	-0.08	0.07	-.09		.01
Gender[a]	0.82	1.70	.04		.00
Education	0.84	0.61	.11		.01
Pain Severity	3.45	0.52	.54	***	.24
Catastrophizing	0.20	0.07	.21	**	.04
		Stricter Controls			
Final Model Predicting Limitations in Function					
Age	-0.10	0.07	-.01		0.00
Gender[a]	1.20	1.64	.05		0.00
Education	0.46	0.59	.06		0.00
Pain Severity	2.62	0.57	.41	***	0.11
Depression	0.55	0.18	.30	**	0.04
Physical Symptoms	0.07	0.10	.06		0.00
Catastrophizing	0.09	0.08	.09		0.01

Note. R^2 = .04 for Block 1; ΔR^2 = .31 for Block 2 ($p < .001$); ΔR^2 = .04 for Block 3 ($p < .01$).

Note. R^2 = .04 for Block 1; ΔR^2 = .41 for Block 2 ($p < .001$); ΔR^2 = .01 for Block 3 ($p > .05$). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

limitations in function for patients with cancer, *F*-change (1,111) = 9.69, p < .01, and for patients with non-malignant pain, *F*-change (1,112) = 7.48, p < .01. The overall model was significant for patients with cancer *F* (5,111) = 9.29, p < .001, and for patients with non-malignant pain, *F* (5,112) = 14.47, p < .001.

The regressions were re-run for both groups using stricter controls. After Block 3, however, catastrophizing remained a significant contributor for patients with cancer, *F*-change (1,109) = 4.56, p < .05, but not for patients with non-malignant pain, *F*-change (1,110) = 1.26, p > .05. The overall model was significant for patients with cancer *F* (7, 109) = 6.85, p < .001 and for patients with non-malignant pain, *F* (7, 110) = 13.45, p < .001.

Taken together, the final model showed that catastrophizing explained a significant portion of the variance in limitations in function in patients with cancer (6%) and patients with non-malignant pain (4%) but only when demographic variables and pain severity are entered as controls. When depression and physical symptoms were added, catastrophizing remained significant, but only in patients with cancer with 3% of the variance explained and pain severity explaining 11%.

Fear of Pain, Catastrophizing and Pain Severity

Similar regressions were run for pain severity as the dependent variable (see Tables 13 to 16).

Fear of Pain and Pain Severity. Controlling for age, gender, and education, when fear of pain was entered in Block 2 the overall model for patients with cancer (see Table 13) was not significant, *F* (4,112) = 2.43, p > .05. For the patients with non-malignant

Table 13

Hierarchical Multiple Regression Analyses Predicting Pain Severity in Patients with Cancer (N=117)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Predicting Pain Severity					
Age	-0.01	0.02	-.07		.00
Gender[a]	0.64	0.38	.16		.02
Education	-0.13	0.12	-.10		.01
Fear of Pain	0.01	0.01	.14		.02

Note. R^2 = .06 for Block 1; ΔR^2 = .02 for Block 2 (p > 05).

		Stricter Controls			
Final Model Predicting Pain Severity					
Age	-0.00	0.02	-.02		.00
Gender[a]	0.73	0.36	.19	*	.03
Education	-0.11	0.12	-.09		.01
Depression	-0.01	0.04	-.04		.00
Physical Symptoms	0.06	0.02	.37	**	.08
Fear of Pain	0.01	0.01	.06		.00

Note. R^2 = .06 for Block 1; ΔR^2 = .12 for Block 2 (p < .001); ΔR^2 = .00 for Block 3 (p > .05). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * p < .05. ** p < .01.*** p < .001.

pain (see Table 14), however, the demographic variables accounted for a significant portion of the variance in pain severity, F-change (3, 114) = 4.71, $p < .01$, and after Block 2, as hypothesized, fear of pain was a significant contributor, F-change (1, 113) = 13.88, $p < .001$. The overall model for this group was significant, F (4,113) = 7.40, $p < .001$.

The model was re-run adding stricter controls in the second block for the patients with non-malignant pain. When pain severity, depression, and physical symptoms were included, this block explained a significant portion of the variance, F-change (2, 112) = 19.45, $p < .001$. When Block 3 was entered into the model, however, fear of pain was not significant, F-change (1, 111) = 1.18, $p > .05$. The overall model for this group was significant, F (6,111) = 9.97, $p < .001$.

The final model showed that fear of pain impacts pain severity explaining 10% of the variance but only in patients with non-malignant pain and only after controlling for demographic variables. When depression and physical symptoms were included as controls fear of pain was no longer a significant contributor for this group. Only education and physical symptoms remained significant, explaining 10% and 6% of the variance in pain severity respectively.

Catastrophizing and Pain Severity. The multiple regressions were re-run with the basic controls replacing fear of pain with catastrophizing. After Block 2 was entered, as hypothesized, catastrophizing was a significant contributor to the variance in pain severity in patients with cancer (see Table 15), F-change (1,112) = 5.50, $p < .05$, and in patients with non-malignant pain (see Table 16), F-change (1,113) = 7.07, $p < .01$. The final model was significant for patients with cancer, F (4,112) = 3.35, $p < .05$, and for patients with non-malignant pain, F (4,113) = 5.49, $p < .001$.

Table 14

Hierarchical Multiple Regression Analyses Predicting Pain Severity in Patients with Non-Malignant Pain (N=118)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Predicting Pain Severity					
Age	0.00	0.01	.02		0.00
Gender[a]	0.26	0.30	.07		0.01
Education	-0.38	0.10	-.31	***	0.10
Fear of Pain	0.03	0.01	.32	***	0.10

Note. R^2 = .11 for Block 1; ΔR^2 = .10 for Block 2 ($p < .001$).

		Stricter Controls			
Final Model Predicting Pain Severity					
Age	0.00	0.01	.08		0.01
Gender[a]	0.35	0.28	.10		0.01
Education	-0.39	0.09	-.32	***	0.10
Depression	0.05	0.03	.19		0.02
Physical Symptoms	0.05	0.02	.30	**	0.06
Fear of Pain	0.01	0.01	.12		0.01

Note. R^2 = .11 for Block 1; ΔR^2 = .23 for Block 2 ($p < .001$); ΔR^2 = .01 for Block 3 ($p > .05$. All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 15

Hierarchical Multiple Regression Analyses Predicting Pain Severity in Patients with Cancer Pain (N=117)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Predicting Pain Severity					
Age	-0.01	0.02	-.07		0.00
Gender[a]	0.62	0.38	.16		0.02
Education	-0.11	0.12	-.09		0.01
Catastrophizing	0.03	0.01	.22	*	0.04

Note. R^2 = .06 for Block 1; ΔR^2 = .04 for Block 2 ($p < .05$). * $p < .05$. ** $p < .01$. *** $p < .001$.

		Stricter Controls			
Final Model Predicting Pain Severity					
Age	-0.00	0.02	-.02		0.00
Gender[a]	0.71	0.36	.18		0.03
Education	-0.10	0.11	-.08		0.01
Depression	-0.03	0.04	-.09		0.00
Physical Symptoms	0.06	0.02	.36	**	0.08
Catastrophizing	0.02	0.02	.14		0.01

Note. R^2 = .06 for Block 1; ΔR^2 = .12 for Block 2 ($p < .001$); ΔR^2 = .01 for Block 3 ($p > .05$). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 16

Hierarchical Multiple Regression Analyses Predicting Pain Severity in Patients with Non-Malignant Pain (N=118)

Variables	B	SE B	β		sr^2(unique)
		Basic Controls			
Final Model Pain Severity					
Age	0.00	0.01	-.01		0.00
Gender[a]	0.20	0.31	.06		0.00
Education	-0.36	0.11	-.30	**	0.09
Catastrophizing	0.03	0.01	.24	**	0.05

Note. R^2 = .11 for Block 1; ΔR^2 = .05 for Block ($p < .01$).

		Stricter Controls			
Final Model Pain Severity					
Age	0.01	0.01	.08		0.01
Gender[a]	0.33	0.28	.09		0.01
Education	-0.38	0.09	-.32	***	0.10
Depression	0.06	0.03	.22	*	0.02
Physical symptoms	0.06	0.02	.32	**	0.07
Catastrophizing	0.01	0.01	.06		0.00

Note. R^2 = .11 for Block 1; ΔR^2 = .23 for Block 2 ($p < .001$); ΔR^2 = .00 for Block 3 ($p > .05$). All variables were assessed on Likert-type scales with higher values representing higher levels of each variable. [a] 1 = male, 2 = female. * $p < .05$. ** $p < .01$. *** $p < .001$.

The hierarchical multiple regression analyses were re-run adding depression and physical symptoms in Block 2. This block explained a significant portion of the variance for patients with cancer, F-change (2, 111) = 8.20, $p < .001$, and for patients with non-malignant pain, F-change (2, 111) = 19.45, $p < .001$. After adding Block 3, however, catastrophizing was not significant for patients with cancer, F-change (1,110) = 1.98, $p > .05$, or for patients with non-malignant pain, F-change (1,111) = 40, $p > .05$. The overall model was significant for patients with cancer, F (6,110) = 4.53, $p < .05$, and for patients with non-malignant pain, F (6,111) = 9.61, $p < .001$.

Taken together these results suggest that catastrophizing appears to influence pain severity for both groups but only after controlling for demographic variables. Catastrophizing explained 4% and 5% of the variance in pain severity for patients with cancer and for patients with non-malignant pain, respectively. Education was also an important contributor but only in patients with non-malignant pain. When depression and physical symptoms were included as controls, catastrophizing was no longer significant for either group of patients. The variable assessing for physical symptoms was the only variable that remained significant for patients with cancer. In patients with non-malignant pain, only education, physical symptoms, and depression explained the variance in pain severity.

Moderation

Moderation was used to test, hypothesis 2, whether malignancy moderates the relationship between: 1) fear of pain and limitations in function, 2) catastrophizing and limitations in function, 3) fear of pain and pain severity, 4) catastrophizing and pain severity. Results showed similar patterns of association for both groups of patients. As

hypothesized, the moderator or interaction term was not a significant predictor of limitations in function or pain severity in all scenarios presented above, $p > .05$. We can therefore conclude from these results that malignancy does not appear to impact the relationship between fear of pain or catastrophizing with limitations in function or pain severity. These findings are also in line with the correlation comparisons calculated in an earlier section.

Mediation

Mediation was used to test hypothesis 3, that fear of pain mediates the relationship between anxiety sensitivity and limitations in function, and that catastrophizing mediates the relationship between anxiety sensitivity and limitations in function.

Fear of Pain Mediates the Relation Between Anxiety Sensitivity Limitations in Function. For patients with chronic cancer pain Sobel's test was significant, $z = 3.18$, $p < .01$, indicating mediation. To determine whether mediation was complete or partial, the direct effect of the independent variable on the dependent variable after controlling for the mediating variable was examined. The relationship between anxiety sensitivity and limitations in function after controlling for fear of pain was not significant, $t(114) = .36$, $p > .05$, suggesting complete mediation. These results suggest that fear of pain mediates the relationship between anxiety sensitivity and limitations in function in patients with cancer pain with 7.3 % of the variance in limitations accounted for by fear of pain as a mediator.

Similar analyses were run for patients with non-malignant pain. When fear of pain was included as the mediating variable for this group, Sobel's test was significant, $z = 2.54$, $p < .05$, again suggesting mediation. The relationship between anxiety sensitivity

and limitations in function after controlling for fear of pain was not significant, $t(115) = .26$, $p > .05$, indicating complete mediation. This suggests that fear of pain mediates the relationship between anxiety sensitivity and limitations in function in patients with non-malignant pain with 7.5 % of the variance in limitations in function accounted for by fear of pain.

Catastrophizing Mediates the Relation Between Anxiety Sensitivity Limitations in Function. The analyses were run using catastrophizing as the mediator for patients with cancer pain. Sobel's test was significant, $z = 2.50$, $p < .05$, indicating mediation. The relationship between anxiety sensitivity and limitations in function after controlling for catastrophizing was not significant, $t(114) = 1.01$, $p > .05$, which is consistent with complete mediation. These results fit well with the idea that catastrophizing mediates the relationship between anxiety sensitivity and limitations in function in patients with cancer with 6.7 % of the variance in limitations in function accounted for by catastrophizing as a mediator.

The same analysis was run again using catastrophizing as the mediator for the group with non-malignant pain. Sobel's test was significant, $z = 2.73$, $p < .05$, suggesting mediation. The relationship between anxiety sensitivity and limitations in function after controlling for catastrophizing was not significant, $t(115) = .73$, $p > .05$, indicating complete mediation. This suggests that catastrophizing mediates the relationship between anxiety sensitivity and limitations in function in patients with non-malignant pain with 7.1 % of the variance accounted for by catastrophizing as a mediator.

To summarize, similar patterns were observed for fear of pain and catastrophizing in both groups, supporting hypothesis 3. Taken together these results suggest that both

fear of pain and catastrophizing mediate the relationship between anxiety sensitivity and limitations in function for patients with cancer related pain and those with non-malignant pain.

Exploratory Analyses

Mediation

Fear of Pain as a Mediator of the Relation Between Anxiety Sensitivity and Pain Severity. The analyses were run replacing the dependent variable, limitations in function, with pain severity. When fear of pain was included as a potential mediator for patients with cancer Sobel's test was not significant, $z = .75$, $p > .05$, indicating that fear of pain does not mediate the relationship between anxiety sensitivity and pain severity. However, for patients with chronic non-malignant pain, Sobel's test was significant, $z = 2.79$, $p < .05$ indicating mediation. The relationship between anxiety sensitivity and pain severity after controlling for fear of pain was not significant, $t(115) = -.60$, $p > .05$, indicating complete mediation. This suggests that fear of pain mediates the relationship between anxiety sensitivity and pain severity only in patients with non-malignant pain with 3.5 % of the variance in pain severity accounted for by fear of pain as a mediator.

Catastrophizing as a Mediator of the Relations Between Anxiety Sensitivity and Pain Severity. The analysis was run using catastrophizing as the mediator for patients with cancer related chronic pain and for patients with non-malignant pain. For both groups Sobel's test was not significant for patients with cancer, $z = 1.76$, $p > .05$, and also for patients with chronic non-malignant pain, $z = 1.85$, $p > .05$, indicating that catastrophizing does not mediate the relationship between anxiety sensitivity and pain severity.

To summarize, contrary to limitations in function, different patterns were observed when pain severity was the dependent variable. Only fear of pain mediated the relationship between anxiety sensitivity and pain severity but only in patients with non-malignant pain. When catastrophizing was introduced as a potential mediator, mediation was not indicated.

Discussion

Although many health professionals and researchers have referred anecdotally to patients with advanced cancer fearing pain, few studies have investigated fear of pain in this population. There is, however, a growing body of literature in the area of chronic non-malignant pain emphasizing the influence of fear of pain on level of function and pain severity. Moreover, this research has also emphasized the importance of other constructs, such as catastrophizing and anxiety sensitivity, in the development and maintenance of chronic pain. The purpose of this study was to investigate how these cognitive and emotional variables might be relevant to patients with advanced cancer. Another objective was to replicate previous findings in a population of patients suffering from chronic non-malignant pain. In this section the main findings of the study will be discussed, followed by strengths and limitations, implications for clinical practice, and lastly, considerations for future research.

Main Research Findings

Similarities and Differences Between Groups

Participants were recruited from the Ottawa Hospital Regional Cancer Centre and the Ottawa Hospital Rehabilitation Centre. When groups were compared, patients with advanced cancer were significantly older and a greater number of patients were married. The groups were similar, however, in their racial backgrounds and educational attainment. In terms of medical characteristics, significant differences were observed in pain duration, with cancer patients experiencing pain for fewer months than the patients with chronic non-malignant pain. This difference is likely due to the nature of the disease with advanced cancer being a terminal illness which typically has a shorter course.

Differences were also observed in the use of pain medication. Eighty seven percent of patients with advanced cancer were prescribed opioids compared to 26% of patients with non-malignant pain; however, fewer cancer patients were prescribed non-steroidal anti-inflammatory medication (NSAIDs). When group differences were examined for the variables under study, interestingly, significant differences in self-reported depression and levels of pain were observed between groups, with cancer patients reporting fewer symptoms of depression and experiencing significantly less pain. These findings are consistent with previous studies that have reported differences in pain severity between groups of patients suffering from chronic malignant and non-malignant pain (Dalton & Feuerstein, 1989; Lin, 1998; Turk et al., 1998). This may be due to the nature of the referral base at the Rehabilitation Centre, which focuses on people with significant pain-related disability, who are often quite distressed. On the other hand, it is also possible that these differences are due to the effects of opioids, which can improve depression by relieving pain (Tenore, 2008). In this sample, most patients with cancer were medicated with opioids, which are commonly prescribed to treat cancer pain. On the other hand, patients with advanced cancer were similar to patients with non-malignant pain on level of function, the extent to which they catastrophize and fear pain, number of physical symptoms, and level of anxiety sensitivity. These results are at odds with Turk et al. (1998) who concluded that patients with cancer pain reported significantly higher levels of limitations in function, fear of pain, and somatic symptoms of depression when compared to patients with chronic non-cancer pain. Lin (1998) found that cancer patients' catastrophized less and reported less interference with activities than patients with chronic non-malignant pain. Dalton and Feuerstein found that patients with chronic

cancer pain reported fewer thoughts, behaviours, and physiological responses related to fear of pain when compared to patients with chronic non-cancer pain. The differences observed between studies may due to the use of diverse measures assessing the same construct, and to sample characteristics (e.g. not all patients having advanced cancer).

Although the patients in this study differed in terms of age, marital status, pain duration, pain severity, and symptoms of depression, they reported comparable levels of physical symptoms, fear of pain, catastrophizing, anxiety sensitivity, and disability. At a more general level, these results are comparable to those of Turk et al. (1998), and to those of Lin (1998), who concluded that patients with cancer are more similar than different in their experience of chronic pain when compared to patients suffering from chronic non-malignant pain.

Hypothesis 1a

Similarities between groups were also observed when relationships between the variables under study were examined. It was hypothesized that fear of pain, catastrophizing, and anxiety sensitivity would be correlated with disability and pain severity, to a comparable degree in both groups. When bivariate correlations between the groups were compared, fear of pain, catastrophizing and anxiety sensitivity were indeed correlated with disability and pain severity to a comparable degree in both groups, thereby supporting hypothesis 1a. These findings suggest that cognitive/emotional variables influence level of function and pain severity in patients with cancer as well as in those suffering from chronic non-malignant pain.

The magnitude of the correlations between the variables under study as measured by the total scores of the PASS-20 (McCracken & Dhingra, 2002), the total scores of the

PCS (Sullivan, Bishop, & Pivik, 1995) with the total scores of the PDI (Pollard, 1984) and pain severity were similar to those reported in the literature.

Fear of Pain, Catastrophizing, and Limitations in Function. The correlations in this study were in line with those reported in previous studies that have focused on disability as the outcome variable. In particular, studies in this area assessing for fear of pain have reported correlations for the total scores of the PASS (McCracken, Zayfert, & Gross, 1992) or PASS-20 (McCracken & Dhingra, 2002) ranging between .40 and .61 (McCracken & Dhingra, 2002; McCracken, Gross, Aikens, & Carnrike, 1996; McCracken, Zayfert, & Gross, 1992; Peter, Vlaeyen, & Weber, 2005). For catastrophizing as measured by the total scores of the PCS (Sullivan, Bishop, & Pivik, 1995), studies have reported correlations ranging from .33 to .55 (Peters, Vlaeyen, & Weber, 2005; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Sullivan, Stanish, Sullivan, & Tripp, 2002; Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998; Van de Hout, Vlaeyen, Heuts, Sillen, & Willen, 2001; Vienneau, Clark, Lynch, & Sullivan, 1999).

Fear of Pain, Catastrophizing, and Pain Severity. The correlations between fear of pain, catastrophizing and pain severity in this study are also in line with previous research, except for fear of pain in patients with cancer. For this group, the correlation was somewhat lower than that reported previously. For example, previous studies have reported correlations ranging between .30 and .56 for fear of pain (McCracken & Dhingra, 2002; McCracken, Gross, Aiken, & Carnrike, 1996; McCracken, Zayfert, Gross, 1992; Peters, Vlaeyen, & Weber, 2005; Zvolensky, Goodie, McNeil, Sperry, & Sorrell, 2001). Finally, correlations between catastrophizing and pain severity have ranged between .25 and .41 (Peters, Vlaeyen, & Weber, 2005; Severeijns, Vlaeyen, van den

Hout, & Weber, 2001; Sullivan, Stanish, Sullivan, & Tripp, 2002; van den Hout, Vlaeyen, Heuts, Sillen, & Willen, 2001).

Hypothesis 1b

It was hypothesized that fear of pain and catastrophizing contribute uniquely to the variance in disability in both groups of patients after controlling for demographic variables and other physical/psychological variables. Using the same control variables, it was also hypothesized that fear of pain and catastrophizing contribute uniquely to the variance in pain severity in both groups of patients. As discussed in a previous section, since there was potential for overlap between the measures assessing for fear of pain and catastrophizing, separate hierarchical multiple regressions were run for each construct. Two different sets of regressions were also run, the first controlling for basic controls, namely demographic variables and pain severity, the second, adding a stricter set of controls, namely depression and physical symptoms.

Fear of Pain and Limitations in Function. The results of this study support hypothesis 1b. The findings are consistent with previous clinical studies using similar statistical models focusing on the relationship between total scores of fear of pain as measured by the PASS (McCracken, Zayfert, & Gross, 1992) or PASS-20 (McCracken & Dhingra, 2002) and level of function in patients with chronic non-malignant pain (Crombez, Vlaeyen, Heuts, & Lysens, 1999; McCracken, Zayfert, & Gross, 1992; Peters, Vlaeyen, & Weber, 2005; van den Hout, Vlaeyen, Heuts, Sillen, & Willen, 2001) and extend to patients with chronic pain associated with advanced cancer. Fear of pain explained a significant unique portion of the variance in disability after controlling for age, gender, education, and pain severity in patients with chronic non-malignant pain and

also in patients experiencing chronic pain associated with advanced cancer. In the final regression model, pain severity and fear of pain emerged as the most important predictors for both groups. Gender was significant but only in patients with cancer; it explained 6% of the variance, with men being more disabled than women. Although previous studies have typically controlled for gender, the relationship between gender and disability is complex and findings tend to be inconsistent between studies (e.g. Crombez, Vlaeyen, Heuts, & Lysens, 1999; Keefe et al., 2000). However, similar to previous studies (Crombez et al.; McCracken, Zayfert, & Gross, 1992; Peters, Vlaeyen, & Weber, 2005; van den Hout, Vlaeyen, Heuts, Sillen, & Willen, 2001), pain severity explained the largest portion of the variance in disability in both groups accounting for 15% of the variance in patients with cancer, and 23% of the variance in patients with non-malignant pain. Fear of pain explained an additional 11% of the variance in limitations in function for patients with cancer, and 2% in patients with non-malignant pain.

When symptoms of depression and physical symptoms were included in the regression model, however, fear of pain remained a significant contributor in patients with advanced cancer but not in patients with chronic non-malignant pain. Gender, pain severity, and fear of pain continued to explain significant portions of the variance in limitations in function but only in patients with advanced cancer; fear of pain was no longer a significant contributor in patients with chronic non-malignant pain. Fear of pain accounted for 8% of the variance over and above pain severity, depression and physical symptoms for patients with cancer. In patients with non-malignant pain, the portion of variance explained by pain severity decreased to 11%; level of depression was also an important predictor explaining 6% of the variance.

Although the effects of depression on loss of activities previously enjoyed are well established (DSM-IV; Lewinsohn, Munoz, Youngren, & Zeiss, 1986), relatively few studies in this area have controlled for these effects or for the effects of other psychological variables on limitations in function in patients with problems with chronic pain. In this study, the findings are partly at odds with McCracken, Zayfert, and Gross (1992) who found that depression explained 3.5% of the variance in level of function. In their study, contrary to the present findings, fear of pain, as measured by the PASS (McCracken, Zayfert, & Gross, 1992), uniquely explained 6.8% of the variance in disability over and above depression.

To summarize, fear of pain explained significant portions of the variance in disability in patients with advanced cancer after controlling for the effects of demographics, pain severity, depression, and physical symptoms. In patients with non-malignant pain, fear of pain influenced engagement in activities but only after controlling for demographic variables and pain severity. The findings for patients with cancer are consistent with previous studies on chronic non-malignant pain and add to the growing body of literature in this area. These results also emphasize the influence of psychological and emotional variables in the experience of pain in a population with advanced cancer. In this study, fear of pain was more important for patients with advanced cancer and influenced their level of function to a greater extent than for patients suffering from chronic non-malignant pain, after partialling out the effects of demographic variables, pain severity, levels of depression and physical symptoms. In patients with non-malignant pain on the other hand, disability was mainly influenced by their depression and pain severity. One possible explanation for this discrepancy may be that for patients

with cancer, pain is perceived as more threatening than for patients with non-malignant pain because of the nature of their illness. Acknowledging that one has a life threatening illness may induce a person to associate pain with disease progression or to impending death. Some people with a life threatening disease may be more likely to have fearful thoughts about the meaning of their pain (Ahles, Blanchard, & Ruckdeschel, 1983; Ferrell & Dean, 1995) influencing their perception of pain (Arntz & Claassens, 2004; Daut & Cleeland, 1982; Spiegel & Bloom, 1983; Strang, 1997) rendering them more fearful of it and influencing their level of function.

Catastrophizing and Limitations in Function. The results of this study are also in line with Severeijns, Vlaeyen, van den Hout, and Weber (2001) and van den Hout, Vlaeyen, Heuts, Sillen, and Willen (2001) who examined the relationship between total scores of catastrophizing, as measured by the PCS, and level of function in patients with chronic non-malignant pain. The patterns of association observed between the groups when catastrophizing was included in the regression model were similar to those observed when fear of pain was included. However, the portion of unique variance explained by catastrophizing in patients with cancer was smaller than that explained by fear of pain; for the group with non-malignant pain, catastrophizing explained a larger portion of the variance. The results of this study suggest that for patients with cancer, catastrophizing appears to influence level of function to a greater extent than for patients with non-malignant pain, but to a lesser extent when compared to fear of pain.

Similar to fear of pain, catastrophizing explained a significant and unique portion of the variance in disability after controlling for age, gender, education, and pain severity in patients with chronic non-malignant pain and also in patients experiencing chronic

cancer pain. When basic controls were included, catastrophizing explained 6% of the variance for patients with cancer whereas for patients with non-malignant pain, catastrophizing explained 4% of the variance. Gender was also a significant factor in patients with cancer, with women experiencing fewer limitations in function than men. The percentage of variance explained by pain severity was similar to the percentage explained by fear of pain in both groups. When additional controls were included in the regression model, catastrophizing remained a significant predictor but only in patients with cancer. The addition of stricter controls in this group further reduced the portion of the variance explained by catastrophizing to 3%; catastrophizing was no longer significant in patients with non-malignant pain. Gender and pain severity remained significant explaining 5% and 11%, respectively, of the variance in patients with cancer. Depression and physical symptoms were not significant for this group. In patients with non-malignant pain, pain severity explained 11% of the variance and depression 4%.

Studies investigating the impact of catastrophizing on level of function in patients with chronic non-malignant pain have typically controlled for demographic variables and pain severity; only a few have also included additional controls such as physical impairment or other medical variables. The findings in this study for patients with cancer when stricter controls were included are consistent with the literature (Severeijns et al., 2001). On the other hand, the findings for patients with non-malignant pain are consistent with Peters, Vlaeyen, and Weber (2005) who found that catastrophizing when entered with fear of movement/(re) injury did not explain a significant portion of the variance in level of function when age, gender, education, pain duration, pain intensity, and physical impairment were entered as controls. In that study fear of movement/(re) injury was a

better predictor. Similar to the research on fear of pain, studies have typically not controlled for the effects of depression, although its impact on disability and pain severity in patients with chronic pain is well recognized. In this study, depression was less disabling and less severe for patients with cancer than for patients with non-malignant pain.

Several conclusions can be drawn from these results. First, fear of pain and catastrophizing influence level of function in patients with cancer and in patients with non-malignant chronic pain. Second, fear of pain was a stronger predictor of level of function in patients with cancer, whereas for patients with non-malignant pain catastrophizing was more important. Third, the patterns of association for these two constructs were similar when entered separately into the regression model, suggesting the potential for overlap between the measures. It is possible that the PASS-20 may be tapping into catastrophic thoughts to a greater extent than originally intended, bringing into question its operationalization and its relationship with catastrophizing as measured by the PCS. Researchers in this area have typically considered catastrophizing a separate construct from fear of pain (e.g., Norton & Asmundson, 2003; Turk, 2002; Hirsh, George, Riley, & Robinson, 2007; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995).

Fear of Pain and Pain Severity. The findings of this study suggest that fear of pain influences pain severity but only in patients with chronic non-malignant pain, and only when demographic variables are included as controls. In this group of patients, both fear of pain and education equally explained 10% of the variance. When depression and physical symptoms were introduced into the model, fear of pain was no longer significant; education and physical symptoms explained 10% and 6% of the variance

respectively. In patients with cancer, the only significant contributors were physical symptoms, explaining 8% of the variance, and gender explaining 3%, with women experiencing more pain than men. This difference is consistent with research findings suggesting that women are more sensitive to pain than men (e.g., Fillingim, 2003; Wiesenfeld, 2005). Gender only became significant when depression and physical symptoms were controlled. Similar to patients with non-malignant pain, fear of pain did not influence pain in patients with cancer with the addition of stricter controls.

To date, few clinical studies have examined the influence of fear of pain on pain severity in a population of patients suffering from chronic pain. These findings provide preliminary evidence that fear of pain influences pain in patients with non-malignant pain. At a general level, these findings are consistent with Peters, Vlaeyen, and Weber (2005) who found that fear of pain explained a significant portion of the variance in pain severity controlling for demographic variables, pain duration, and physical pathology. Moreover, similar to the findings of this study, fear of pain was a more important predictor than catastrophizing.

To conclude, fear of pain influenced pain severity only in patients with non-malignant pain and only after partialling out the effects of gender and education. It seems that for both groups, when stricter controls were included, that physical symptoms were more influential than fear of pain. One potential explanation for this finding is that in this study, the patients with cancer experienced significantly less pain than patients with chronic non-malignant pain. It is plausible that fear of pain is less likely to influence pain when pain is not as severe. The widespread use of opioids in this sample may have also affected the outcome on pain.

Catastrophizing and Pain Severity. The findings of this study showed that total scores of catastrophizing influenced pain severity in both groups. At a general level, these results are consistent with studies that have used similar measures and statistical models (Peters, Vlaeyen, & Weber, 2005; Severeijns, Vlaeyen, van den Hout, & Weber, 2001). Catastrophizing was a significant predictor for both groups of patients explaining 4% of the variance in patients with cancer, and 5% in patients with non-malignant pain. Education explained 9% of the variance but only in patients with non-malignant pain, with the highly educated individuals experiencing less pain. When stricter controls were introduced in the model, catastrophizing no longer explained a unique portion of the variance in pain severity for either group of patients. In patients with cancer, only physical symptoms remained significant explaining 8% of the variance. In patients with non-malignant pain, education was the strongest predictor explaining 10% of the variance followed by physical symptoms (7%), and depression (2%).

To summarize, studies to date have controlled for a number of variables including demographic variables, physical impairment, physical pathology, pain duration. In this study, catastrophizing influenced pain severity in both groups but only when demographics were controlled. When stricter controls were added, physical symptoms had a greater impact on pain severity than catastrophizing, in patients with advanced cancer. It seems that for patients with non-malignant pain, level of education possibly allows for patients to seek out different options to help them cope with pain or have more resources available to them given greater earning potential.

Hypothesis 2

It was hypothesized, that malignancy does not moderate the relationship between fear of pain and limitations in function, or in pain severity. It was also hypothesized that malignancy would not moderate the relationship between catastrophizing and limitations in function, or in pain severity. The findings of this study are consistent with this hypothesis and with the results reported by Severeijns, Vlaeyen, van den Hout, and Weber (2001) who concluded that different pain ailments do not influence the association between catastrophizing and pain intensity and interference. The findings of this study suggest that fear of pain and catastrophizing and their relationship with disability and pain severity, is not influenced by the type of chronic pain, be it due to cancer or a musculoskeletal cause. It also suggests that patients with chronic cancer-related pain have similar experiences to patients with chronic non-malignant pain. These findings were also confirmed in an earlier section (see Hypothesis 1a) by the lack of significance when differences in correlations were calculated between groups.

Hypothesis 3

Given the potential for the overlap between fear of pain and catastrophizing, separate mediation models were proposed to test for the effects of these variables. It was therefore hypothesized that fear of pain mediated the relationship between anxiety sensitivity and limitations in function, and that catastrophizing also mediated the relationship between anxiety sensitivity and limitations in functions. This hypothesis was supported for both groups. Similar patterns of relationships were observed for both groups when catastrophizing was introduced as a potential mediator of anxiety sensitivity and limitations in function.

Fear of Pain. The findings for patients with chronic pain associated with advanced cancer provide preliminary support for the model proposed by Asmundson and Taylor (1996). In patients with cancer, fear of pain mediated the relationship between anxiety sensitivity and disability; similar effects were found for patients with non-malignant pain. In other words, a person suffering from cancer or non-malignant chronic pain with high levels of anxiety sensitivity is at risk of fearing pain, which will in turn influence the extent to which they engage in activities.

Catastrophizing. Findings for catastrophizing as a mediator were similar to those for fear of pain. These findings are consistent with the model proposed by Turk (2002) who introduced catastrophizing as a potential mediator. These findings provide preliminary evidence for catastrophizing as a mediating variable between anxiety sensitivity and disability in patients with non-malignant pain and in patients with advanced cancer. These results suggest that anxiety sensitivity exacerbates catastrophizing, in turn influencing level of activity in patients with diverse chronic pain problems.

Exploratory Analyses

Exploratory analyses were conducted to explore the potential effects of fear of pain and catastrophizing as mediating variables between anxiety sensitivity and pain severity. Interestingly, mediating effects were only found when fear of pain was the mediator, and only for patients with chronic non-malignant pain. Apparently, catastrophizing does not mediate the association between anxiety sensitivity and level of pain in either group. Although the influence of catastrophizing on pain severity is well established, the inter-relationship between catastrophizing and anxiety sensitivity, and

how they relate to pain severity, is not clear. Additional research is required in this area to further elucidate these relationships.

Strengths and Limitations of the Study

Strengths. Although there is an increasing amount of research focusing on cognitive/emotional variables and their influence on pain in diverse populations suffering from chronic non-malignant pain, few studies have examined these constructs in patients with chronic pain associated with cancer. This study is the first to explicitly focus on the role of fear of pain and catastrophizing and their influence on disability and pain severity, with an aim to replicate previous findings and extend them to patients suffering from chronic cancer-related pain. It is also one of the first studies examining these relationships using well validated measures such as the PASS-20 (McCracken & Dhingra, 2002) and PCS (Sullivan, Bishop, & Pivik, 1995) to assess fear of pain and catastrophizing respectively in patients with cancer. Moreover, this study explored the impact of additional controls (e.g., depression), that are known to influence level of function and pain severity. Another strength of this study is the inclusion of analyses to test for the influence of malignancy on these variables through interactions. Differences between chronic cancer pain and non-malignant pain are poorly understood. This is evidenced by the lack of research focusing on the psychological aspects of pain in patients with cancer. Moreover, there is an implicit understanding that cancer pain is different from non-cancer pain because of its source. Cancer pain has an identifiable cause whereas the source of non-malignant pain is often unknown and difficult to diagnose. The inclusion of such models provided additional evidence for the similarities between the groups. Testing for mediating effects also provided valuable information

about the mechanism through which disability and pain severity are influenced. To date, no studies have included such models in a sample of patients with cancer. Finally, this study adds to our current understanding of pain and provides evidence for the influence of cognitive and emotional variables on level of function and pain severity in patients with chronic pain associated with advanced cancer. These findings also show the effects of fear of pain and catastrophic thoughts on disability and pain severity and emphasize the necessity to address these variables in treatment.

Limitations. There are several methodological limitations to this study. First, the design of this study is cross-sectional and correlational; consequently we cannot determine the direction of causality between the variables. Second, self-reports were used to collect the data and therefore responses are based on the subjective experiences of the participants. There is, therefore, a possibility that the participants either under or over-reported their experiences, which could impact the validity of the measures. Also, method variance may have also influenced the results of this study. The use of surveys may produce spurious correlations among variables as a result of multiple contructs assessed within the same questionnaire. Third, the group of patients with cancer only represented patients with advanced cancer, which limits the generalizability of the results to other patients with cancer that is less advanced or to specific cancers such as, for example, breast or lung cancer. Fourth, the refusal rate for this study was high, at least among the patients with cancer. As a result, these results may not apply to patients who too physically or mentally compromised because of their illness. Fifth, similar to Peters, Vlaeyen, and Weber (2005), the unique contribution of both fear of pain and catastrophizing to the variance in limitations in function and pain could not be assessed

because of potential overlap between these two measures. This brings into question the operationalization of fear of pain as measured by the PASS (McCracken, Zayfert, & Gross, 1992) or the PASS-20 (McCracken & Dhingra, 2002) as a separate and distinct construct from catastrophizing as measured by the PCS (Sullivan, Bishop, & Pivik, 1995).

Clinical Implications

The findings of this study have important clinical implications. For one they emphasize the role and significance of cognitive and emotional variables in the experience of chronic pain in patients with advanced cancer. They demonstrate that patients with malignant disease do fear and catastrophize about their pain, and this has important consequences with respect to how they experience their pain and engage in activities. Consequently, addressing psychological factors such as fear of pain, catastrophizing, and anxiety sensitivity within a pain management context in patients with advanced cancer may prove beneficial for this population.

There are several psychological interventions that have been developed targeting fear-avoidance beliefs, catastrophizing, and anxiety sensitivity. In general, they have been examined among patients with chronic non-malignant pain rather than in cancer. In a recent review on outcome studies using Cognitive Behavioral Therapy (CBT), Lohnberg (1997) concluded that graded exposure in vivo was effective for decreasing fear and avoidance in people with chronic pain. Such an approach requires the development of a hierarchy of feared situations that cause pain to which the patient is gradually exposed to resulting in desensitization. Brief CBT has been shown effective for reducing anxiety sensitivity and fear of pain (Watt, Stewart, Lefaivre, & Uman, 2006). CBT is also

effective for influencing catastrophizing and subsequently levels of pain and interference (e.g., Smeets, Vlaeyen, Kester, & Knottnerus, 2006; Thorne, Boothby, & Sullivan, 2002; Turner, Holtzman, & Mancl, 2007; Turner, Mancl, & Aaron, 2006). McCracken and colleagues have developed a therapeutic approach aimed at decreasing distress and disability associated with chronic pain through an acceptance-based treatment (McCracken, 1998, 1999; McCracken & Eccleston, 2003; McCracken, Vowles, & Eccleston, 2004). There is evidence that this approach influences fear of pain in patients with non-malignant pain (McCracken, Vowles, & Eccleston, 2005). Acceptance therapy may also have beneficial effects for patients with cancer. Gauthier et al. (2008) found that acceptance was associated with decreases in pain, castastrophizing, activity interference, and depression in patients with advanced disease.

On a more general level, the benefits of cognitive behavioral strategies in the management of chronic pain are well recognized in patients with non-malignant pain (e.g., Morley, Eccleston, & Williams, 1999) and more recently in patients with cancer (see Abernethy, Keefe, McCrory, Scipio, & Matchar, 2006 for a review). How a person thinks, feels, and behaves when in pain has physiological implications influencing pain perception and level of function. Cognitive behavioral approaches help persons learn to change their attitude toward their pain, thereby reducing their anxiety about increasing their activity, helping to decrease pain (Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). Strategies such as cognitive restructuring are effective for managing catastrophic thoughts, thereby helping individuals change the way they think about their pain to regain a sense of control and self-efficacy. Other strategies such as psychoeducation about pain and relaxation are also included.

In the cancer literature, there are numerous treatment recommendations and guidelines for patients suffering from cancer-related pain, emphasizing the need to address psychosocial dimensions (e.g., Scottish Intercollegiate Guidelines Network, 2008). In Canada, the National Cancer Care Network (NCCN) recently developed guidelines emphasizing the need for psychosocial care in patients with cancer (Holland & Bultz, 2007). These guidelines highlight the powerful emotional consequences of cancer on patients and their families and emphasize the importance of assessing and treating emotional distress, a serious consequence of pain (Wells, Murphy, Wujcik, & Johnson, 2003).

Future Research

First, contrary to the literature on chronic non-malignant pain, there is a lack of research on the psychological aspects of pain and its impact on patients with malignant disease. To date, most of the studies in this area have focused on patients with problems associated with non-malignant pain. Such research would provide additional support for a psychosocial model of pain in patients with a terminal disease in an area where a medical model of pain is commonly applied. It would also clarify the role of psychological/emotional variables in pain and disability and establish their value as potential targets for intervention. Second, this study revealed that patients with advanced cancer fear pain to an extent that it impacts their level of activity. Research investigating the meaning of their fear would increase our understanding of pain and also allow for health care professionals to better target their interventions. The addition of a qualitative component to this research may prove useful to elucidate fear of pain in patients with malignant disease. Third, research evaluating other correlates, such as disease

progression and its impact on fear of pain in patients with cancer, may also be helpful for health professional to determine the timing of interventions. Finally, prospective studies evaluating how fear of pain evolves over time and its influence on level of function and pain severity may also prove useful.

Conclusion

Although anecdotal evidence suggests that patients with advanced cancer fear pain, few studies have actually studied it. The present study demonstrated the influence of fear of pain and other psychological constructs on limitations in function and pain severity in patients suffering from chronic cancer and non-cancer related pain. The findings of this study also emphasized the importance of psychological dimensions of pain in the treatment of chronic pain in cancer and also the similarities between the two groups of patients suffering from chronic pain. The integration within oncology pain management programs of treatment approaches such as CBT and acceptance based therapy, show promise and may benefit these patients.

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Appendix A

(Client Information Sheet - English)

The Ottawa Hospital | L'Hôpital d'Ottawa

The Rehabilitation Centre | Le Centre de réadaptation

A SUBSIDIARY CORPORATION OF THE OTTAWA HOSPITAL
UNE CORPORATION AFFILIÉE À L'HÔPITAL D'OTTAWA

The Impact of Chronic Pain
On People with
Diverse Pain Problems

We would like to inform you that a study on pain is being conducted at this clinic. This study will look at how chronic pain affects thoughts and feelings, and how thoughts and feelings affect pain severity and daily activities, in different groups of people with chronic pain problems. Although you may not personally benefit from your participation in the study, the information you provide may be helpful in planning future treatments for people with chronic pain.

Completing the forms will take about 30 minutes. If you are able to do them here today, you will be given a coupon that will pay for your parking at the hospital. However, you can also take the forms home to complete if you wish.

If you would consider taking part in this study, please print your name below and a researcher will speak to you and let you know more about it.

Name: _____

Appendix B

(Client Information Sheet – French)

The Ottawa Hospital | L'Hôpital d'Ottawa

The Rehabilitation Centre | Le Centre de réadaptation

A SUBSIDIARY CORPORATION OF THE OTTAWA HOSPITAL
UNE CORPORATION AFFILIÉE À L'HÔPITAL D'OTTAWA

Les effets de la douleur chronique chez les personnes qui souffrent de différents problèmes de douleur

Nous menons actuellement une étude sur la douleur à la clinique. L'objectif est d'examiner la façon dont la douleur chronique influence les pensées et les sentiments. Nous souhaitons également déterminer comment les pensées et les sentiments modifient l'intensité de la douleur ressentie et perturbent les activités quotidiennes chez différents groupes de personnes qui éprouvent des problèmes de douleur chronique. Il est possible que vous ne profitiez pas personnellement de votre participation à l'étude. Toutefois, les renseignements que vous divulguerez pourront se révéler utiles pour planifier le traitement futur des personnes qui souffrent de douleur chronique.

Il faut environ 30 minutes pour remplir les formulaires. Si vous avez le temps de les remplir aujourd'hui, ici même, nous vous remettrons un coupon et vous n'aurez pas à payer les frais de stationnement à l'Hôpital. Vous pouvez également emporter les formulaires pour les remplir à la maison si vous le souhaitez.

Vous envisagez la possibilité de participer à l'étude? Veuillez inscrire votre nom sur la ligne ci-dessous. Un chercheur communiquera avec vous pour vous donner de plus amples renseignements.

Nom : _____

Appendix C

(Clinician Information Sheet - English)

Patient Name: _____

Diagnosis:_____

Cancer Type:_____

Stage:_____

Primary Cancer Site:_____

Pain treated is due to:

( ) cancer ( ) treatment ( ) procedure ( ) other_____

Medication:

( ) anti-depressants ( ) Nsaids ( ) opioids ( ) benzodiazepines

Appendix D

(Declaration of Informed Consent and Information Sheet for the Ottawa Hospital - English)

Study Information Sheet and Consent Form

Project: The Impact of Chronic Pain on People with Diverse Pain Problems

Investigators: Dr. Keith G. Wilson, C. Psych., Staff Psychologist, The Rehabilitation Centre, Katerine LeMay, B.A.(Hons), University of Ottawa

Background – Some studies of people who have chronic pain show the importance of thoughts and emotions in pain. In particular, it has been shown that anxiety related to pain, worry, and fear influence pain severity and level of function. However, it is not clear if these relationships hold for different types of chronic pain.

Purpose – This study will investigate the psychological aspects of chronic pain in different groups of people with chronic pain problems. Specifically, this study will investigate how chronic pain affects thoughts and emotions, and how thoughts and emotions affect pain severity and daily activities. This study in being done in partial fulfillment of the requirements of Ms. LeMay's doctoral studies in clinical psychology.

Procedure – As a participant in this study you will be asked to complete several questionnaires about your pain and how it affects your thoughts, emotions, and daily activities. Specifically, there are questions that ask how your pain is preventing you from doing what you normally do. There are also questions about your pain history, the ways you respond and think about pain, the thoughts and feelings you experience when you are in pain, and other symptoms you experience in addition to your pain. It will take approximately 30 minutes to complete the questionnaires. We will also obtain medical information from your clinician. If you agree to take part in this study, you can complete the questionnaires in a private area at the clinic, or in your home.

Compensation – There is no payment for taking part in this study. However, if you choose to complete the questionnaires at the clinic, you will receive a parking voucher (day pass) to reimburse you for your parking expenses.

Risks and Benefits – There are no physical risks, but there may be some stress related to answering the questions. If you experience any distress during the course of the study, please let the interviewer know, and feel free to discuss the matter with him or her. You may not personally benefit from your participation in the study, but the information you provide may be helpful in planning future treatments for people with chronic pain.

Right To Withdraw from the Study – You do not have to participate in this study. You have the right to refuse to answer any specific question. You also have the right to withdraw your consent and terminate your participation at any time with no penalty, and your treatment at this hospital will not be affected in any way.

Confidentiality and Access to Records - Personal information collected as part of this study will be kept confidential and it will not be shared with anyone outside of the research team. No identifying information will appear on any reports or publications. The information collected is for research purposes only and will contain no identifying characteristics. The information collected from the questionnaires will be kept for a period of 15 years and then destroyed. Only Dr. K. Wilson and K. LeMay will have access to data collected.

Liability Statement – If you decide to participate you will be asked to sign a consent form. This form tells us that you understand the information given to you about the research. When you sign this form, you do not give up your legal rights, you are free to withdraw at any time.

If you have any questions about this study, please contact Katerine LeMay at The Rehabilitation Centre (737-7350, ext. 75608).

If you have any questions about your rights as a research participant, you may contact either the Chairperson of the Ottawa Hospital Research Ethics Board (798-5555, ext. 14902), or the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: (613) 562-5841, email: ethics@uottawa.ca

Informed Consent - I have read the Information Sheet and the purpose of the study has been explained to me. Any questions I have about the study have been answered.

I agree to participate in this study with the understanding that information will be collected and used for research purposes only and will be treated as confidential. I have been informed about the purpose of this study and realize that I am under no obligation to participate and may withdraw at any time. Choosing not to participate or withdrawing from the study will in no way affect my present and/or future treatment at the Ottawa Hospital Regional Cancer Center.

There are two copies of The Study Information Sheet and Consent Form, one of which I may keep.

Participant: _____
Date: _____

Investigator: _____ Date: _____

It is expected that the results of this study should be available by the fall of 2007. If you would like to be provided with the results of this study, please write your full name and address in the spaces provided:

Name: _____

Address : _____

Appendix E

(Declaration of Informed Consent and Information Sheet for the Ottawa Hospital – French)

Fiche de renseignements sur l'étude et déclaration de consentement éclairé

Projet : Les effets de la douleur chronique chez les personnes qui souffrent de différents problèmes de douleur

Chercheurs : D^r^ Keith G. Wilson, C. Psych., psychologue, Le Centre de réadaptation, Katerine LeMay, B.A. (spéc.), Université d'Ottawa

Contexte – Certaines études menées auprès de personnes qui souffrent de douleur chronique ont révélé l'importance des pensées et des émotions en ce qui concerne la douleur ressentie. Plus précisément, il a été démontré que l'anxiété causée par la douleur, l'inquiétude et la peur modifient l'intensité de la douleur ressentie et le degré de fonctionnement. Les résultats n'indiquent toutefois pas clairement que ces liens peuvent également être établis pour différents types de douleur chronique.

But – La présente étude porte sur les aspects psychologiques de la douleur chronique chez différents groupes de personnes. Plus particulièrement, l'étude vise à examiner la façon dont la douleur chronique influence les pensées et les émotions, ainsi que la façon dont les pensées et les émotions modifient l'intensité de la douleur ressentie et perturbent les activités quotidiennes. Cette étude se situe dans le cadre des exigences du programme de doctorat en psychologie clinique de Madame LeMay.

Procédure – En tant que participant à l'étude, vous devrez remplir plusieurs questionnaires pour nous aider à comprendre votre douleur et ses effets sur vos pensées, vos émotions et vos activités quotidiennes. Certaines questions portent sur la façon dont la douleur vous empêche de faire ce que vous faites en temps normal. D'autres questions sont axées sur vos antécédents en matière de douleur, la façon dont vous réagissez et pensez à la douleur, les pensées et les sentiments qui vous habitent lorsque vous éprouvez de la douleur et les autres symptômes que vous ressentez en plus de la douleur. Il faut compter environ 30 minutes pour remplir les questionnaires. Nous obtiendrons également des renseignements médicaux auprès de votre clinicien. Si vous décidez de participer, vous pouvez remplir les questionnaires à la clinique dans un endroit privé ou à la maison.

Compensation – Vous ne serez pas rémunéré pour participer à l'étude. Cependant, si vous décidez de remplir le questionnaire à la clinique, nous vous remettrons un coupon de stationnement (laissez-passer valide pendant une journée) pour vous rembourser vos frais de stationnement.

Risques et avantages – Il n'y a aucun risque physique, bien que vous puissiez ressentir un certain stress pendant que vous répondez aux questions. Si vous éprouvez de la détresse pendant la durée de l'étude, veuillez en informer l'interrogateur. N'hésitez surtout pas à en discuter avec lui. Il est possible que vous ne profitiez pas personnellement de votre participation à l'étude. Toutefois, les renseignements que vous divulguerez pourront se révéler utiles pour planifier le traitement futur des personnes qui souffrent de douleur chronique.

Droit de se retirer de l'étude – Vous n'êtes pas obligé de participer à l'étude. Vous avez le droit de refuser de répondre à certaines questions. Vous avez également le droit de retirer votre consentement et de mettre fin à votre participation en tout temps sans être pénalisé. Une telle décision n'aura aucune incidence sur votre traitement à l'Hôpital.

Confidentialité et accès aux dossiers – Les renseignements personnels recueillis dans le cadre de l'étude demeureront confidentiels. Seuls les membres de l'équipe de recherche y auront accès. Aucun renseignement permettant de vous identifier n'apparaîtra dans des rapports ou des publications. Les renseignements sont recueillis à des fins de recherche uniquement. Nous ne vous demanderons aucun renseignement sur votre identité. Les renseignements ainsi recueillis seront conservés pendant quinze ans avant d'être détruits. Seul le Dr. K. Wilson et K. LeMay auront accès aux données recueillis.

Avis de limitation de responsabilité – Si vous décidez de participer, nous vous demanderons de signer un formulaire de consentement. Ce formulaire confirme que vous comprenez les renseignements que nous vous donnons à propos de l'étude. Vous ne renoncez pas à vos droits légaux en signant ce formulaire et vous êtes libre de vous retirer en tout temps.Vous avez des questions au sujet de l'étude? N'hésitez pas à communiquer avec Katerine LeMay, au Centre de réadaptation, au 737-7350, poste 75608.

Si vous avez des questions au sujet de vos droit en tant que participant à une recherche veuillez alors communiquer soit avec le président du Conseil d'éthique en recherches de l'Hôpital d'Ottawa au 798-5555, poste 14902, soit avec le responsable de l'éthique en recherche, Université d'Ottawa, Pavillon Tabaret, 550 rue Cumberland, salle 159, Ottawa, ON K1N 6N5, tél.: (613) 562-5841, courriel : ethics@uottawa.ca.

Consentement éclairé - J'ai lu la fiche de renseignements et on m'a expliqué le but de l'étude. On a également répondu à toutes mes questions au sujet de l'étude.

Je consens à participer à l'étude dans la mesure où les renseignements recueillis seront utilisés à des fins de recherche uniquement et demeureront confidentiels. On m'a informé du but de l'étude. Je comprends que je ne suis pas dans l'obligation d'y participer et que je peux m'en retirer en tout temps. Ma décision de participer ou non n'aura aucune incidence sur mon traitement actuel ou à venir au Centre régional de cancérologie de L'Hôpital d'Ottawa.

Chaque formulaire de consentement est imprimé en deux copies et je peux en conserver une.

Participant : _____ Date : _____

Chercheur : _____ Date : _____

Les résultats de cette étude devraient être disponible à l'automne 2007. Si vous désirez recevoir les résultats de l'étude, veuillez inscrire votre nom complet ainsi que votre adresse dans l'espace prévu à cette fin ci-dessous.

Nom : _____

Adresse : _____

_____

Appendix F

(Study Information Sheet
for the Ottawa Rehabilitation Centre – English)

Study Information Sheet

Project: The Impact of Chronic Pain on People with Diverse Pain Problems

Investigators: Dr. Keith G. Wilson, C. Psych., Staff Psychologist, The Rehabilitation Centre Katerine LeMay, B.A. (Hons), University of Ottawa

Background – Some studies of people who have chronic pain show the importance of thoughts and emotions in pain. In particular, it has been shown that anxiety related to pain, worry, and fear influence pain severity and level of function. However, it is not clear if these relationships hold for different types of chronic pain.

Purpose – This study will investigate the psychological aspects of chronic pain in different groups of people with chronic pain problems. Specifically, this study will investigate how chronic pain affects thoughts and emotions, and how thoughts and emotions affect pain severity and daily activities.

Procedure – As a participant in this study you will be asked to complete several questionnaires about your pain and how it affects your thoughts, emotions, and daily activities. Specifically, there are questions that ask how your pain is preventing you from doing what you normally do. There are also questions about your pain history, the ways you respond and think about pain, the thoughts and feelings you experience when you are in pain, and other symptoms you experience in addition to your pain. It will take approximately 30 minutes to complete the questionnaires. We will also obtain medical information from your clinician. If you agree to take part in this study, you can complete the questionnaires in a private area at the clinic, or in your home.

Compensation – There is no payment for taking part in this study. However, if you choose to complete the questionnaires at the clinic, you will receive a parking voucher (day pass) to reimburse you for your parking expenses.

Risks and Benefits – There are no physical risks, but there may be some stress related to answering the questions. If you experience any distress during the course of the study, please let the interviewer know, and feel free to discuss the matter with him or her. You may not personally benefit from your participation in the study, but the information you provide may be helpful in planning future treatments for people with chronic pain.

Right To Withdraw from the Study – You do not have to participate in this study. You have the right to refuse to answer any specific question. You also have the right to withdraw your consent and terminate your participation at any time with no penalty, and your treatment at this hospital will not be affected in any way.

Confidentiality and Access to Records - Personal information collected as part of this study will be kept confidential and it will not be shared with anyone outside of the research team. No identifying information will appear on any reports or publications. The information collected is for research purposes only and will contain no identifying characteristics. The information collected from the questionnaires will be kept for a period of 10 years and then destroyed. Only Dr. K. Wilson and K. LeMay will have access to data collected.

Liability Statement – If you decide to participate you will be asked to sign a consent form. This form tells us that you understand the information given to you about the research. When you sign this form, you do not give up your legal rights, you are free to withdraw at anytime.

If you have any questions about this study, please contact Katerine LeMay at The Rehabilitation Centre (737-7350, ext. 75608).

If you have any ethical concerns about the study, please contact either Dr. David Jackson, Chairperson of the Research Ethics Board at The Rehabilitation Centre (737-7350, ext. 75577), or the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: (613) 562-5841, email: ethics@uottawa.ca

Appendix G

(Study Information Sheet
for the Ottawa Rehabilitation Centre – French)

Fiche de renseignements sur l'étude

Projet : Les effets de la douleur chronique chez les personnes qui souffrent de différents problèmes de douleur

Chercheurs : D^r^ Keith G. Wilson, C. Psych., psychologue, Le Centre de réadaptation Katerine LeMay, B.A. (spéc.), Université d'Ottawa

Contexte – Certaines études menées auprès de personnes qui souffrent de douleur chronique ont révélé l'importance des pensées et des émotions en ce qui concerne la douleur ressentie. Plus précisément, il a été démontré que l'anxiété causée par la douleur, l'inquiétude et la peur modifient l'intensité de la douleur ressentie et le degré de fonctionnement. Les résultats n'indiquent toutefois pas clairement que ces liens peuvent également être établis pour différents types de douleur chronique.

But – La présente étude porte sur les aspects psychologiques de la douleur chronique chez différents groupes de personnes. Plus particulièrement, l'étude vise à examiner la façon dont la douleur chronique influence les pensées et les émotions, ainsi que la façon dont les pensées et les émotions modifient l'intensité de la douleur ressentie et perturbent les activités quotidiennes.

Procédure – En tant que participant(e) à l'étude, vous devrez remplir plusieurs questionnaires pour nous aider à comprendre votre douleur et ses effets sur vos pensées, vos émotions et vos activités quotidiennes. Certaines questions portent sur la façon dont la douleur vous empêche de faire ce que vous faites en temps normal. D'autres questions sont axées sur vos antécédents en matière de douleur, la façon dont vous réagissez et pensez à la douleur, les pensées et les sentiments qui vous habitent lorsque vous éprouvez de la douleur et les autres symptômes que vous ressentez en plus de la douleur. Il faut compter environ 30 minutes pour remplir les questionnaires. Nous obtiendrons également des renseignements médicaux auprès de votre clinicien. Vous pouvez remplir les questionnaires à la clinique dans un endroit privé ou à la maison.

Compensation – Vous ne serez pas rémunéré pour participer à l'étude. Cependant, si vous décidez de remplir le questionnaire à la clinique, nous vous remettrons un coupon de stationnement (laissez-passer valide pendant une journée) pour vous rembourser vos frais de stationnement.

Risques et avantages – Il n'y a aucun risque physique, bien que vous puissiez ressentir un certain stress pendant que vous répondez aux questions. Si vous éprouvez de la détresse pendant la durée de l'étude, veuillez en informer l'interrogateur. N'hésitez surtout pas à en discuter avec lui. Il est possible que vous ne profitiez pas personnellement de votre participation à l'étude. Toutefois, les renseignements que vous divulguerez pourront se révéler utiles pour planifier le traitement futur des personnes qui souffrent de douleur chronique.

Droit de se retirer de l'étude – Vous n'êtes pas obligé de participer à l'étude. Vous avez le droit de refuser de répondre à certaines questions. Vous avez également le droit de retirer votre consentement et de mettre fin à votre participation en tout temps sans être pénalisé. Une telle décision n'aura aucun impact sur votre traitement à l'Hôpital.

Confidentialité et accès aux dossiers – Les renseignements personnels sont recueillis uniquement dans le cadre de l'étude demeureront confidentiels. Seuls les membres de l'équipe de recherche y auront accès. Aucun renseignement permettant de vous identifier n'apparaîtra dans des rapports ou des publications. Les renseignements sont recueillis à des fins de recherche uniquement. Nous ne vous demanderons aucun renseignement sur votre identité. Les renseignements ainsi recueillis seront conservés pendant dix ans avant d'être détruits. Seul le Dr. K. Wilson et K. LeMay auront accès aux données recueillis.

Avis de limitation de responsabilité – Si vous décidez de participer, nous vous demanderons de signer un formulaire de consentement. Ce formulaire confirme que vous comprenez les renseignements que nous vous donnons à propos de l'étude. Vous ne renoncez pas à vos droits légaux en signant ce formulaire et vous êtes libre de vous retirer en tout temps.

Vous avez des questions au sujet de l'étude? N'hésitez pas à communiquer avec Katerine LeMay, au Centre de réadaptation, au 737-7350, poste 75608.

Vous avez plutôt des questions de nature éthique à propos de l'étude? Veuillez alors communiquer soit avec Dr David Jackson, président du Conseil d'éthique en recherches du Centre de réadaptation, au 737-7350, poste 75577, soit avec le responsable de l'éthique en recherche, Université d'Ottawa, Pavillon Tabaret, 550 rue Cumberland, salle 159, Ottawa, ON K1N 6N5, tél.: (613) 562-5841, courriel : ethics@uottawa.ca.

Appendix H

(Declaration of Informed Consent
for the Ottawa Rehabilitation Centre – English)

DECLARATION OF INFORMED CONSENT

Project: The Impact of Chronic Pain on People with Diverse Pain Problems

Investigators: Dr. Keith G. Wilson, C. Psych., Staff Psychologist, The Rehabilitation Centre Katerine LeMay, B.A.(Hons), University of Ottawa

I have read the Information Sheet and the purpose of the study has been explained to me. Any questions I have about the study have been answered.

I understand that I will be completing several questionnaires about thoughts, feelings, and behaviours related to chronic pain and this will last approximately 30 minutes.

I understand that the questionnaires I complete will be kept for a period of ten years, and then will be destroyed. I understand that only Dr. K. Wilson and K. LeMay will have access to the data collected.

I understand that I am not under any obligation to participate in this study. I also understand I can withdraw my consent at any time and the assessment will be stopped without affecting my treatment at the hospital.

I agree to participate in this study with the understanding that information will be collected and used for research purposes only and will be treated as confidential. I have been informed about the purpose of this study and realize that I am not under any obligation to participate and may withdraw at any time. Refusal to participate or withdrawing from the study will in no way affect my present and/or future treatment at The Rehabilitation Centre/Ottawa Hospital Regional Cancer Center.

There are two copies of the consent form, one of which I may keep.

Participant:_____
Date:_____

Investigator: _____ Date: _____

If you have any questions about this study, please contact Katerine LeMay at The Rehabilitation Centre (737-7350, ext. 75608).

If you have any ethical concerns about the study, please contact either Dr. David Jackson, Chairperson of the Research Ethics Board at The Rehabilitation Centre (737-7350, ext. 75577), or the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5, tel.: (613) 562-5841, email: ethics@uottawa.ca

If you would like to be provided with the results of this study, please write your full name and address in the spaces provided:

Name: _____

Address: _____

_____

_____

Appendix I

(Declaration of Informed Consent
for the Ottawa Rehabilitation Centre – French)

DÉCLARATION DE CONSENTEMENT ÉCLAIRÉ

Projet :Les effets de la douleur chronique chez les personnes qui souffrent de différents problèmes de douleur

Chercheurs : D^r^ Keith G. Wilson, C. Psych., psychologue, Le Centre de réadaptation Katerine LeMay, B.A. (spéc.), Université d'Ottawa

J'ai lu la fiche de renseignements et on m'a expliqué le but de l'étude. On a également répondu à toutes mes questions au sujet de l'étude.

Je comprends que je vais remplir plusieurs questionnaires pour vous révéler mes pensées, mes sentiments et mes comportements à l'égard de la douleur chronique et que ce processus prendra environ 30 minutes.

J'ai conscience que ces questionnaires seront conservés pendant dix ans avant d'être détruits. J'ai conscience que seul le Dr. K. Wilson et K. LeMay auront accès aux données recueillis.

Je comprends également que je ne suis pas dans l'obligation de participer à l'étude et que je peux m'en retirer en tout temps. L'évaluation sera alors interrompue sans que cela n'ait aucune incidence sur le traitement que je reçois à l'Hôpital.

Je consens à participer à l'étude dans la mesure où les renseignements recueillis seront utilisés à des fins de recherche uniquement et demeureront confidentiels. On m'a informé du but de l'étude. Je comprends que je ne suis pas dans l'obligation d'y participer et que je peux m'en retirer en tout temps. Ma décision de participer ou non n'aura aucun impact sur mon traitement actuel ou à venir au Centre de réadaptation ou au Centre régional de cancérologie de L'Hôpital d'Ottawa.

Chaque formulaire de consentement est imprimé en deux copies et je peux en conserver une.

Participant : _____ Date : _____

Chercheur : _____ Date : _____

Vous avez des questions au sujet de l'étude? N'hésitez pas à communiquer avec Katerine LeMay, au Centre de réadaptation, au 737-7350, poste 75608.

Vous avez plutôt des questions de nature éthique à propos de l'étude? Veuillez alors communiquer soit avec Dr David Jackson, président du Conseil d'éthique en recherches du Centre de réadaptation, au 737-7350, poste 75577, soit avec le responsable de l'éthique en recherche, Université d'Ottawa, Pavillon Tabaret, 550 rue Cumberland, salle 159, Ottawa, ON K1N 6N5, tél.: (613) 562-5841, courriel : ethics@uottawa.ca.

Si vous désirez recevoir les résultats de l'étude, veuillez inscrire votre nom complet ainsi que votre adresse dans l'espace prévu à cette fin ci-dessous.

Nom : _____

Adresse : _____

_____

_____

Appendix J

(Pain History and Brief Pain Inventory – English)

PAIN HISTORY

1. What is your diagnosis? _____

2. a) Where do you experience the **most** pain? Please check (✓) only one.

[ ]Head, face, mouth
[ ]Neck (cervical) region
[ ]Shoulders
[ ]Arms, hands
[ ]Chest
[ ]Abdominal Region
[ ]Upper back
[ ]Lower back, lumbar spine
[ ]Legs, feet
[ ]Pelvic region
[ ]Genital region (private parts)
[ ]All over body
[ ]Joints
[ ]Other *(please specify):*
_____

b) If you have pain in other areas as well, please check (✓) all that apply.

[ ]Head, face, mouth
[ ]Neck (cervical) region
[ ]Shoulders
[ ]Arms, hands
[ ]Chest
[ ]Abdominal Region
[ ]Upper back
[ ]Lower back, lumbar spine
[ ]Legs, feet
[ ]Pelvic region
[ ]Genital region (private parts)
[ ]All over body
[ ]Joints
[ ]Other *(please specify):*
_____

c) Which statement best describes your pain experience?

[ ] Always present – Always the same intensity
[ ] Always present – Intensity varies
[ ] Often present – Have short periods without pain
[ ] Often present – Have pain-free periods lasting 1 to 6 hours
[ ] Often present – Have pain-free periods lasting more than 6 hours
[ ] Occasionally present – Have pain daily, lasting a few minutes to an hour
[ ] Occasionally present – Have pain daily, lasting a few seconds to a few minutes
[ ] Infrequently present – Have pain every few days or weeks

3. a) When did your current pain problem start? _____ *(Month/Year)*

b) How long have you had your current pain problem?_____ *(Months or Years)*

c) How did your current pain problem begin?

[ ]Motor vehicle accident
[ ]Accident at home
[ ]Accident at work
[ ]Other accident
[ ]Pain just began
[ ]After an illness
[ ]Other *(please specify)*: _____

4. What treatments or medications are you receiving for pain?

_____

_____

PAIN INTENSITY RATINGS

5. a) Please rate your pain by circling the one number that best describes your pain at its **worst in the last week.**

0 1 2 3 4 5 6 7 8 9 10
No Pain — Pain as bad as you can imagine

b) Please rate your pain by circling the one number that best describes your pain at its **least in the last week.**

0 1 2 3 4 5 6 7 8 9 10
No Pain — Pain as bad as you can imagine

c) Please rate your pain by circling the one number that best describes your pain on the **average**.

0 1 2 3 4 5 6 7 8 9 10
No Pain — Pain as bad as you can imagine

d) Please rate your pain by circling the one number that tells how much pain you have
right now.

0 1 2 3 4 5 6 7 8 9 10
No Pain Pain as bad as you can imagine

Appendix K

(Pain Disability Index - English)

PDI

The rating scales below are designed to measure the degree to which several aspects of your life are presently disrupted by chronic pain. In other words, we would like to know how much your pain is preventing you from doing what you would normally do, or from doing it as well as you normally would. Respond to each category by indicating the **overall impact of pain in your life, not just when the pain is at its worst.**

For each of the 7 categories of life activity listed, **please circle the number on the scale which describes the level of disability you typically experience.** A score of 0 means no disability at all, and a score of 10 signifies that all of the activities in which you would be normally involved have been totally disrupted or prevented by your pain.

1. Family / home responsibilities

This category refers to activities related to the home or family. It includes chores or duties performed around the house (e.g. yard work) and errands or favors for other family members (e.g. driving the children to school).

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

2. Recreation

This category includes hobbies, sports, and other similar leisure time activities

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

3. Social activity

This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social functions.

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

4. Occupation

This category refers to activities that are part of or directly related to one's job. This includes the non-paying jobs as well, such as that of a house wife or volunteer worker.

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

5. Sexual behavior

This category refers to the frequency and quality of one's sex life.

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

6. Self-care

This category includes activities which involve personal maintenance and independent daily living (e.g. taking a shower, driving getting dressed etc.)

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

7. Life-support activity

This category refers to basic life-supporting behaviors such as eating, sleeping, and breathing.

0	1	2	3	4	5	6	7	8	9	10
no disability										**total disability**

Appendix L

(Pain Anxiety Symptoms Scale – English)

PASS-20

Individuals who experience pain develop different ways to respond to that pain. We would like to know what you do and what you think about when in pain. Please use the rating scale below to indicate how often you engage in each of the following thoughts or activities. **Circle any number from 0 (NEVER) to 5 (ALWAYS) for each item.**

	Never					**Always**
1. I think that if my pain gets too severe, it will never decrease.....	0	1	2	3	4	5
2. When I feel pain, I am afraid that something terrible will happen.....	0	1	2	3	4	5
3. I go immediately to bed when I feel severe pain	0	1	2	3	4	5
4. I begin trembling when engaged in an activity that increases pain	0	1	2	3	4	5
5. I can't think straight when in pain.....	0	1	2	3	4	5
6. I will stop any activity as soon as I sense pain coming on.....	0	1	2	3	4	5
7. Pain seems to cause my heart to pound or race.....	0	1	2	3	4	5
8. As soon as pain comes on, I take medication to reduce it.....	0	1	2	3	4	5
9. When I feel pain I think that I might be seriously ill.....	0	1	2	3	4	5
10. During painful episodes it is difficult for me to think of anything besides the pain.....	0	1	2	3	4	5

	Never					Always
11. I avoid important activities when I hurt.	0	1	2	3	4	5
12. When I sense pain, I feel dizzy or faint.....	0	1	2	3	4	5
13. Pain sensations are terrifying.....	0	1	2	3	4	5
14. When I hurt, I think about the pain constantly.....	0	1	2	3	4	5
15. Pain makes me nauseous.....	0	1	2	3	4	5
16. When pain comes on strong, I think that I might become paralyzed or more disabled.....	0	1	2	3	4	5
17. I find it hard to concentrate when I hurt.....	0	1	2	3	4	5
18. I find it difficult to calm my body down after periods of pain	0	1	2	3	4	5
19. I worry when I am in pain.....	0	1	2	3	4	5
20. I try to avoid activities that cause pain.....	0	1	2	3	4	5

lmm0501

Appendix M

(Pain Catastrophizing Scale – English)

PCS

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.

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.**

0 – not at all **1** – to a slight degree **2** – to a moderate degree **3** – to a great degree **4** – all the time

---

When I'm in pain ...

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 out 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 N

(Anxiety Sensitivity Index - English)

ASI

Circle the one number that best represents the extent to which you agree with the item. If any of the items concern something that is not part of your experience (e.g., "It scares when I feel shaky" for someone who has never trembled or had the "shakes") answer on the basis of how you might feel ***if you had*** such an experience. Otherwise, answer all the items on the basis of your own experience:

		Very Little	**A Little**	**Moderate**	**Much**	**Very Much**
1	It is important to me not to appear nervous.....	0	1	2	3	4
2	When I cannot keep my mind on a task, I worry that I might be going crazy.....	0	1	2	3	4
3	It scares me when I fell "shaky" (trembling).....	0	1	2	3	4
4	It scares me when I feel faint...	0	1	2	3	4
5	It is important to me to stay in control of my emotions.....	0	1	2	3	4
6	It scares me when my heart beats rapidly.....	0	1	2	3	4
7	It embarrasses me when my stomach growls.....	0	1	2	3	4
8	It scares me when I am nauseous.	0	1	2	3	4

		Very Little	A Little	Moderate	Much	Very Much
9	When I notice my heart beating rapidly, I worry that I might have a heart attack.....	0	1	2	3	4
10	It scares me when I become short of breath.....	0	1	2	3	4
11	When my stomach is upset, I worry that I might be seriously ill.....	0	1	2	3	4
12	It scares me when I am unable to keep my mind on a task.....	0	1	2	3	4
13	Other people notice when I feel shaky.....	0	1	2	3	4
14	Unusual body sensations scare me.....	0	1	2	3	4
15	When I am nervous, I worry that I might be mentally ill.....	0	1	2	3	4
16	It scares me when I am nervous.....	0	1	2	3	4

Appendix O

(Anderson Symptoms Assessment Scale - English)

ASAS

Over the ***last 2 weeks***, how often have you been bothered by any of the following problems? **Please circle the number that best describes**:

0 1 2 3 4 5 6 7 8 9 10

No Fatigue **Worst Fatigue Imaginable**

0 1 2 3 4 5 6 7 8 9 10

No Nausea **Worst Nausea Imaginable**

0 1 2 3 4 5 6 7 8 9 10

No Drowsiness **Worst Drowsiness Imaginable**

0 1 2 3 4 5 6 7 8 9 10

No Shortness of Breath **Worst Shortness of Breath Imaginable**

0 1 2 3 4 5 6 7 8 9 10

Best Appetite **Worst Appetite Imaginable**

0 1 2 3 4 5 6 7 8 9 10

Best Sleep **Worst Sleep Imaginable**

Appendix P

(Patient Health Questionnaire – 9 - English)

PHQ-9

Over the ***last 2 weeks,*** how often have you been bothered by any of the following problems?

		Not at all	**Several Days**	**More than half the days**	**Nearly everyday**
1	Little interest or pleasure doing things	0	1	2	3
2	Feeling down, depressed, or hopeless	0	1	2	3
3	Trouble falling or staying asleep, or sleeping too much.....	0	1	2	3
4	Feeling tired or having little energy...	0	1	2	3
5	Poor appetite or overeating.....	0	1	2	3
6	Feeling bad about yourself - or that you are a failure or have let yourself or your family down.....	0	1	2	3
7	Trouble concentrating on things, such as reading the newspaper or watching television.....	0	1	2	3
8	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual.....	0	1	2	3
9	Thought that you would be better off dead or hurting yourself in some way	0	1	2	3

If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
( )	( )	( )	( )

Appendix Q

BACKGROUND INFORMATION

To help us understand your current situation, please complete the following as fully as possible.

1. Date: _____
   Day/Month/Year

2. Sex: [ ] Male [ ] Female

3. Age: _____ Date of Birth: _____
   In Years *Day/Month/Year*

4. Marital Status
   [ ] single [ ] widowed
   [ ] married [ ] separated/divorced

5. What is your educational background? Check (✓) the highest level achieved.
   [ ]Some primary school [ ]Some college/university
   [ ]Completed primary school [ ]College/university graduate
   [ ]Some high school [ ]Trade certification
   [ ]Completed high school [ ]Postgraduate university

6. We try to be sensitive to issues of ethnic diversity. In broad terms, how would you categorize your ethnic background:

   [ ]Caucasian origin [ ]First Nations origin
   [ ]Asian origin [ ]Other *(please specify):*
   [ ]African origin _____

8. What is your **current** employment status?

[ ]Working - Full-time
[ ]Working - Part-time
[ ]Sick leave
[ ]Student/retraining - Full-time
[ ]Student/retraining - Part-time
[ ]Homemaker/parenting
[ ]Unemployed-Because of pain
[ ]Unemployed - Not because of pain
[ ]Retired
[ ]Disability leave - Temporary
[ ]Disability leave - Permanent
[ ]Other *(please specify):*

_____

Thank you for taking the time to complete this survey. Your assistance in providing this information is very much appreciated. If there is anything else you would like to tell us about this survey, please do so in the space below.

Appendix R

(Pain History and Brief Pain Inventory – French)

ANTÉCÉDENTS DE LA DOULEUR

1. Quel est votre diagnostic? _____

2.a) A quelle région de votre corps avez-vous le **plus** mal? Cochez (□) une réponse.

[ ] tête, visage, bouche
[ ] région du cou (cervicale)
[ ] épaules
[ ] bras, main
[ ] poitrine
[ ] région abdominale
[ ] haut du dos
[ ] bas du dos, colonne lombaire
[ ] jambes, pieds
[ ] région pelvienne
[ ] région des organes génitaux
[ ] tout le corps
[ ] articulations
[ ] autre *(veuillez préciser):*

_____

b) Si vous avez de la douleur à d'autres parties du corps, veuillez indiquer (□) où :

[ ] tête, visage, bouche
[ ] région du cou (cervicale)
[ ] épaules
[ ] bras, main
[ ] poitrine
[ ] région abdominale
[ ] haut du dos
[ ] bas du dos, colonne lombaire
[ ] jambes, pieds
[ ] région pelvienne
[ ] région des organes génitaux
[ ] tout le corps
[ ] articulations
[ ] autre *(veuillez préciser):*

_____

c) Quel énoncé décrit le mieux votre douleur?

[ ] toujours présente – toujours la même intensité
[ ] toujours présente – l'intensité varie
[ ] souvent présente – j'ai de courtes périodes sans douleur
[ ] souvent présente - j'ai des périodes de 1 à 6 heures sans douleur
[ ] souvent présente - j'ai des périodes de plus de 6 heures sans douleur
[ ] présente à l'occasion – j'ai de la douleur quotidienne qui dure quelques minutes à une heure
[ ] présente à l'occasion – j'ai de la douleur quotidienne qui dure quelques secondes à quelques minutes
[ ] rarement présente – j'ai de la douleur à tous les quelques jours ou semaines

3. a) Quand est-ce que votre douleur a-t-elle commencé? _____ (mois/*année)*

b) Depuis combien de temps êtes-vous aux prises avec votre problème douleur actuel?

_____ *(mois ou année)*

c) Comment la douleur a-t-elle commencé?

[ ] accident d'automobile
[ ] accident à la maison
[ ] accident au travail
[ ] un autre accident
[ ] la douleur a simplement commencé
[ ] après une maladie
[ ] autre *(veuillez préciser):*

_____

4. Quels traitements ou médicaments recevez-vous pour votre douleur?

ÉVALUATION DE L'INTENSITÉ DE LA DOULEUR

5 a) Quelle est la **pire douleur** que vous avez éprouvée depuis **une semaine**

0	1	2	3	4	5	6	7	8	9	10
aucune douleur										douleur très intense

b) Quelle est la **douleur la moins intense** que vous avez éprouvée depuis **une semaine:**

0	1	2	3	4	5	6	7	8	9	10
aucune douleur										douleur très intense

c) Quelle est la **moyenne d'intensité** de votre douleur depuis **une semaine**:

0	1	2	3	4	5	6	7	8	9	10
aucune douleur										douleur très intense

d) SVP évaluer votre **douleur en ce moment** sur l'échelle qui suit :

0	1	2	3	4	5	6	7	8	9	10
aucune douleur										douleur très intense

Appendix S

(Pain Disability Index – French)

PDI

Les échelles d'évaluation ci-dessous sont conçues pour mesurer le degré auquel plusieurs aspects de votre vie sont actuellement perturbés par la douleur persistante. Autrement dit, nous voulons savoir à quel point votre douleur vous empêche de faire ce que vous feriez normalement, ou de le faire aussi bien qu'à l'habitude. Répondez à chaque catégorie en **indiquant l'impact général de la douleur dans votre vie, et non seulement l'impact lorsque votre douleur est très intense.**

Pour chacune des 7 catégories d'activités de vie inscrites, **encerclez un chiffre sur l'échelle qui décrit le niveau d'incapacité que vous éprouvez habituellement**. Un score de 0 signifie que vous n'avez aucune incapacité et un score de 10 signifie que toutes les activités dans lesquelles vous étiez normalement impliquées ont été totalement perturbées ou entravées par votre douleur.

(1) ***Famille / Responsabilités domestiques***
Cette catégorie fait allusion aux activités liées à la maison ou à la famille. Elle inclut les tâches ménagères ou les travaux exécutés autour de la maison (par exemple le jardinage) et des commissions ou les services effectués pour des membres de la famille (par exemple conduire les enfants à l'école).

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(2) ***Loisirs***
Cette catégorie inclut les passe-temps, le sport et les autres loisirs.

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(3) ***Activités sociales***
Cette catégorie fait allusion aux activités qui impliquent la participation des amis et des connaissances différents des membres da la famille. La catégorie inclut les fêtes, le théâtre, les concerts, dîner au restaurant ainsi que les autres fonctions sociales.

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(4) ***Profession***
Cette catégorie fait allusion aux activités qui font partis ou sont directement liées à son travail. Cela inclut aussi des activités non rémunérées comme celui d'un travailleur au foyer ou le bénévolat.

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(5) ***Activités sexuelles***
Cette catégorie fait allusion à la fréquence et à la qualité de sa vie sexuelle.

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(6) ***Autonomie***
Cette catégorie inclut les activités liées à sa capacité de répondre soi-même à ses besoins personnels et à ses soins quotidiens (par exemple se doucher, s'habiller, etc.)

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

(7) ***Activités de soutien vital***
Cette catégorie fait allusion aux besoins fondamentaux comme manger, dormir, et respirer.

0 1 2 3 4 5 6 7 8 9 10
aucune incapacité incapacité totale

Appendix T

(Pain Anxiety Symptoms Scale – French)

PASS-20

Les personnes qui éprouvent une douleur trouvent différentes façons d'y répondre. Nous aimerions savoir ce que vous faites et pensez lorsque vous ressentez une douleur. À l'aide de l'échelle d'évaluation suivante, veuillez indiquer la fréquence des idées ou des activités suivantes. **Encerclez l'un ou l'autre des chiffres allant de 0 (JAMAIS) à 5 (TOUJOURS) pour chaque énoncé.**

	Jamais					**Toujours**
1. Je pense que si ma douleur devient trop intense, elle ne diminuera jamais.....	0	1	2	3	4	5
2. Lorsque je ressens une douleur, j'ai peur qu'une chose terrible va arriver.....	0	1	2	3	4	5
3. Je vais immédiatement au lit lorsque je ressens une douleur intense	0	1	2	3	4	5
4. Je commence à trembler quand j'exécute une activité qui accroît la douleur.....	0	1	2	3	4	5
5. Je suis incapable de penser lorsque j'éprouve une douleur.....	0	1	2	3	4	5
6. J'interromps toute activité dès que je sens la douleur venir.....	0	1	2	3	4	5
7. La douleur accélère les battements de mon cœur.....	0	1	2	3	4	5
8. Dès que la douleur se manifeste, je prends un médicament pour la soulager.....	0	1	2	3	4	5
9. Quand je ressens une douleur, je pense que je suis gravement malade.....	0	1	2	3	4	5

	Jamais					**Toujours**
10. Quand j'ai mal, j'ai de la difficulté à penser à autre chose qu'à la douleur.....	0	1	2	3	4	5
11. J'évite toute activité importante quand j'ai mal.....	0	1	2	3	4	5
12. Quand je ressens une douleur, je me sens étourdi(e) ou je m'évanouis.....	0	1	2	3	4	5
13. Les sensations de douleur sont terrifiantes.....	0	1	2	3	4	5
14. Quand j'ai mal, je pense constamment à la douleur.....	0	1	2	3	4	5
15. La douleur me donne la nausée.....	0	1	2	3	4	5
16. Quand la douleur devient aiguë, je pense que je pourrais devenir paralysé(e) ou plus handicapé(e).....	0	1	2	3	4	5
17. J'ai de la difficulté à me concentrer quand j'ai mal.....	0	1	2	3	4	5
18. J'ai de la difficulté à calmer mon corps après les périodes de douleur.....	0	1	2	3	4	5
19. Je m'inquiète quand j'éprouve une douleur.....	0	1	2	3	4	5
20. J'essaie d'éviter les activités qui causent de la douleur.....	0	1	2	3	4	5

Appendix U

(Pain Catastrophizing Scale – French)

PCS

Chacun d'entre nous aura à subir des expériences douloureuses. Cela peut être la douleur associée aux maux de tête, à un mal de dent, ou encore la douleur musculaire ou aux articulations. Il nous arrive souvent d'avoir à subir des expériences douloureuses telles que la maladie, une blessure, un traitement dentaire ou une intervention chirurgicale.

Dans le présent questionnaire, nous vous demandons de décrire le genre de pensées et d'émotions que vous avez quand vous avez de la douleur. Vous trouverez ci-dessous treize énoncés décrivant différentes pensées et émotions qui peuvent être associées à la douleur. **Veuillez indiquer à quel point vous avez ces pensées et émotions, selon l'échelle ci-dessous, quand vous avez de la douleur.**

0 – pas du tout **1** – quelque peu **2** – de façon modéré **3** – beaucoup **4** – tout le temps

---

Quand j'ai de la douleur ...

1 ☐ j'ai peur qu'il n'y aura pas de fin à la douleur.

2 ☐ je sens que je ne peux pas continuer.

3 ☐ c'est terrible et je pense que ça ne s'améliorera jamais.

4 ☐ c'est affreux et je sens que c'est plus fort que moi.

5 je sens que je ne peux plus supporter la douleur.

6 ☐ j'ai peur que la douleur s'empire.

7 ☐ je ne fais que penser à d'autres expériences douloureuses.

8 ☐ avec inquiétude, je souhaite que la douleur disparaisse.

9 ☐ je ne peux m'empêcher d'y penser.

10 ☐ je ne fais que penser à quel point ça fait mal.

11 ☐ je ne fais que penser à quel point je veux que la douleur disparaisse.

12☐ il n'y a rien que je puisse faire pour réduire l'intensité de la douleur.

13☐ je me demande si quelque chose de grave va se produire.

Appendix V

(Anxiety Sensitivity Index – French)

ASI

Les énoncés suivants décrivent des conséquences négatives possibles suivant l'expérience de l'anxiété. Indiquez votre accord avec les énoncés en encerclant le chiffre correspondant à l'échelle suivante:

	Très peu	**Un peu**	**Parfois**	**Beaucoup**	**Énormément**
1- C'est important pour moi de ne pas paraître nerveux(se).....	0	1	2	3	4
2- Quand je ne peux pas garder mon esprit sur une tâche, j'ai peur de devenir fou (folle).....	0	1	2	3	4
3- J'ai peur quand j'ai des tremblements.....	0	1	2	3	4
4- J'ai peur quand je perds connaissance.....	0	1	2	3	4
5- C'est important pour moi de garder le contrôle de mes émotions..	0	1	2	3	4
6- J'ai peur quand mon cœur bat rapidement.....	0	1	2	3	4
7- Je suis embarrassé(e) quand mon estomac crie.....	0	1	2	3	4
8- J'ai peur quand j'ai la nausée.....	0	1	2	3	4
9- Quand je note que mon cœur bat rapidement, je m'inquiète d'avoir une attaque cardiaque.....	0	1	2	3	4
10 - J'ai peur quand j'ai le souffle coupé.....	0	1	2	3	4

	Très peu	Un peu	Parfois	Beaucoup	Énormément
11- Quand j'ai mal à l'estomac, je m'inquiète d'être sérieusement malade.....	0	1	2	3	4
12- J'ai peur quand je ne suis pas capable de garder mon esprit sur une tâche.....	0	1	2	3	4
13- Les autres personnes le voient quand je tremble.....	0	1	2	3	4
14- Les sensations inhabituelles de mon corps me font peur.....	0	1	2	3	4
15- Quand je suis nerveux, je m'inquiète d'être malade mentalement.....	0	1	2	3	4
16- J'ai peur quand je suis nerveux (se).....	0	1	2	3	4

Appendix W

ASAS

(Anderson Symptom Assessment Scale – French)

Veuillez répondre aux questions suivantes pour décrire votre expérience pendant les **14 dernières journées** en encerclant le chiffre qui correspond le mieux à votre situation

1	2	3	4	5	6	7	8	9	10
pas de fatigue									la pire fatigue possible
1	2	3	4	5	6	7	8	9	10
pas de nausée									la pire nausée possible
1	2	3	4	5	6	7	8	9	10
pas somnolent									extrêmement somnolent
1	2	3	4	5	6	7	8	9	10
pas essoufflé									extrêmement essoufflé
1	2	3	4	5	6	7	8	9	10
beaucoup d'appétit									pas d'appétit
1	2	3	4	5	6	7	8	9	10
bien dormi									n'ai pas bien dormi

Appendix X

(Patient Health Questionnaire – 9 – French)

PHQ-9

Au cours des ***2 dernières semaines***, à quelle fréquence avez-vous éprouvé les problèmes suivants?

		Pas du tout	Plusieurs jours	Plus d'un jour sur deux	Presque Tous les jours
1	Peu d'intérêt ou de plaisir à faire vos activités habituelles.....	0	1	2	3
2	Abattement, dépression ou désespoir.....	0	1	2	3
3	Difficulté à vous endormir ou à rester endormi(e), ou tendance à trop dormir.....	0	1	2	3
4	Sentiment de fatigue ou manque d'énergie.....	0	1	2	3
5	Manque d'appétit ou tendance à trop manger.....	0	1	2	3
6	Piètre opinion de vous-même - sentiment d'échec ou de ne pas être à la hauteur des attentes de votre famille.....	0	1	2	3
7	Difficulté à vous concentrer, par ex. pour lire le journal ou regarder la télévision.....	0	1	2	3
8	Bouger ou parler si lentement que votre entourage le remarque ou, au contraire, éprouver une agitation ou une nervosité telle qu'il vous est difficile de rester en place.....	0	1	2	3
9	Souhaiter être mort(e) ou penser à vous faire mal	0	1	2	3

Si vous avez éprouvé un ou plusieurs des troubles présentées dans ce questionnaire, dans quelle mesure cela a-t-il perturbé votre travail, vos activités quotidiennes ou vos relations interpersonnelles?

Aucunement	Un peu	Beaucoup	Énormément
( )	( )	( )	( )

Appendix Y

(Background Information - French)

Informations démographiques

Veuillez fournir les renseignements suivants aussi complètement que possible. Ceci nous aidera à comprendre votre situation actuelle.

1. Date: _____

jours/mois/année

2. Sexe: [ ]masculin [ ]féminin

3. Age: _____ Date de naissance: _____

en années *jour/mois/année*

4. État civil actuel

[ ] célibataire [ ] veuf/veuve

[ ] marié(e) ou conjoint de fait [ ] séparé(e)/divorcé(e)

5. Quel est votre niveau de scolarité? Veuillez cocher (□).

[ ] études primaires incomplètes [ ] études collégiales/universitaires incomplètes

[ ] études primaires complétées [ ] diplôme collégial/universitaire

[ ] études secondaires non complètes [ ] certification de métier

[ ] diplôme d'études secondaires [ ]études universitaires diplômées

6. Nous voulons être sensible à la diversité ethnique. En termes génériques, à quel groupe ethnique ou culturel appartenez-vous:

[ ] de race blanche [ ]d'origine autochtone

[ ] d'origine asiatique [ ] autres *(précisez):*_____

[ ] d'origine africaine

7. Parmi les énoncés suivants, lequel décrit le mieux votre statut d'emploi **actuellement**?

[ ] Travail – à temps plein
[ ] Travail – à temps partiel
[ ] En congé de maladie
[ ] Étudiant(e) à temps plein
[ ] Étudiant(e) à temps partiel
[ ] Entretien ménager/rôle parental
[ ] Sans emploi - à cause de la douleur
[ ] Sans emploi – non causé par la douleur
[ ] À la retraite
[ ] En congé d'invalidité à temps partiel
[ ] En congé d'invalidité à temps plein
[ ] Autres *(précisez):* _____

Nous vous remercions de bien vouloir participer à ce sondage. Votre collaboration nous est très précieuse. Veuillez utiliser l'espace ci-dessous si vous désirez passer tout autre commentaire relatif à ce sondage.