

Chronic Low Back Pain and the Impact on Relationship Satisfaction

by

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A thesis submitted to the Department of Psychology
in conformity with the requirements for
the degree of Master of Arts

Queen's University
Kingston, Ontario, Canada
September, 2006

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ISBN: 978-0-494-18843-9

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Abstract

Chronic low back pain (CLBP) is a very prevalent pain condition that is often associated with increased disability, diminished quality of life, and decreased relationship satisfaction. The biopsychosocial model suggests that biological, psychological, and social factors interact to perpetuate chronic pain (Gatchel, 1999). Chronic pain patients' quality of life is significantly affected by their satisfaction in relationships. However, little is known regarding the impact of the psychosocial environment in predicting relationship satisfaction. The primary focus of this research was to test the potential of various psychosocial variables to mediate the relationship between pain and relationship satisfaction. A sample of 58 patients with CLBP completed measures to assess depression, partner support, pain, relationship satisfaction, pain catastrophizing, pain-related fear, and sexual satisfaction. A series of regressions revealed that only negative responses by a partner and depression mediated the association between pain and relationship satisfaction. This was contrary to the hypothesis that all psychosocial variables would mediate this relationship. Negative responses emerged as the most important mediator as 53% of the total effect was accounted for by negative responses. Theoretical and practical implications for treatment are discussed.

Acknowledgments

There are several people that need to be acknowledged for their involvement and generous support during the past two years.

First, I must thank my supervisor, Dean Tripp, for his encouragement, enthusiasm, and belief in my abilities. Dean has offered me several opportunities to be involved in research and clinical work, which has helped to further develop my knowledge of pain. I must also thank him for being patient with my third defense mechanism - Fight, Flight, or Find!

I must also acknowledge the input of my committee members, Dr. Uzma Rehman, Dr. Kate Harkness, and Dr. Marjory Phillips. Their suggestions really helped to shape and improve my thesis. I really appreciate their timely and valuable feedback.

I owe my sanity to my peers in the clinical program. This process can be quite challenging and I feel so lucky to have found such amazing friends to offer endless support, empathy and laughs. Two degrees down, one more to go! To Ricardo, my stats mentor and new roommate, this process would have been unbelievably difficult without your love and support. Thank you for your patience when trying to explain to me how to bootstrap, and for always offering to help with any problem I encountered. I am so happy that you and I were the quotas!

Last, but certainly not least, I must thank my parents, Ieta and Gary Waxman. I feel incredibly lucky to have such caring and devoted parents. Thank you for your constant encouragement, patience, and unconditional love while I try to find direction in my life. You guys are the best!

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CHAPTER 1

Introduction

The International Association for the Study of Pain (IASP; 1986) defines the experience of pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (p. 11). This definition stresses that pain is a challenging sensation to understand because it is comprised of sensory and emotional components that are in constant interplay within the person. These competing negative sources of neurobiological input can create a stressful and often demoralizing situation that challenges the coping skills and environmental resources of an individual.

Pain is often described by its duration. Acute pain suggests that there is a recent onset often resulting from a specific medical issue. Acute pain usually presents with an identifiable etiology and thus specific treatment options that help alleviate it (Gatchel & Epker, 1999). The main focus of physicians working with patients suffering from acute pain is to identify the location, pattern, and description of pain as a means of diagnosing its underlying cause (Gatchel & Epker, 1999). Chronic pain describes pain that persists for a minimum of three months in duration, usually continuing long after the expected healing period has passed. Chronic pain may not arise from a medically distinct etiology but is suggested to develop from multiple interacting physical and psychological variables (Melzack & Wall, 1996).

Researchers suggest that chronic pain impacts several aspects of an individual's life including poorer psychological adjustment, decreased quality of life, increased disability, and greater interpersonal difficulties (Lamé, Peters, Vlaeyen, Kleef, & Patijn,

2005; Moulin, Clark, Speechley, & Morley-Foster, 2002; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Turk & Flor, 1999). In addition to the serious negative impact on an individual's life, chronic pain is associated with serious societal costs, such as lost productivity, increased health care utilization, increased disability benefits, and reduced income potential (Gatchel & Epker, 1999).

A great deal of research has investigated the impact of relationships and psychosocial variable on the pain experience (e.g., Cano, Weisberg, & Gallagher, 2000; Flor, Turk, & Scholz, 1987b; Kerns & Turk, 1984), yet there has been no examination of the effects of such variables on pain and relationship satisfaction. The purpose of this thesis was to determine which psychosocial variables mediated the relationship between pain and relationship satisfaction, as well as determine the degree to which each variable accounts for this relationship. Ultimately, the findings of the current study would contribute to pain management by helping to determine targets for treatment.

CHAPTER 2

Literature Review

Chronic pain is one of the leading health issues for Canadians. Moulin et al. (2002) found the prevalence of chronic pain to be approximately 29% among Canadian adults, with average pain duration of approximately 10.7 years. More recently, Tripp, VanDenKerkoff & McAlister (in press) showed that as many as 76% of 1049 community dwelling respondents in South-Eastern Ontario reported some pain in the past six months. It was found that among those participants reporting pain, 49% reported chronic pain (i.e., pain for at least 90 days over past 6 months) representing 37% of the total sample. In the United States, approximately 97 million Americans experience pain, resulting in billions of dollars lost in terms of work days and health care costs (Monga, Tan, Ostermann, Monga, & Grabois, 1998).

Although chronic pain is not limited to a particular region of the body, low back pain tends to be one of the most commonly experienced forms of chronic pain. Low back pain is frequently defined as “pain, muscle tension or stiffness, which is localized below the costal margin and above the inferior gluteal folds” (Manek & MacGregor, 2005, p. 134). Patients with low back pain tend to describe the pain as “deep, aching, and burning” (Melzack & Wall, 1996, p. 59), and often feel paralyzed by the pain for fear that movement will elicit a severe episode of pain.

Low back pain is a common medical diagnosis and in 90% of cases there is little available documentation of a concise physical pathology, etiology, and/or the maintaining factors, with many patients presenting with no anatomical abnormalities (Deyo & Weinstein, 2001; Manek & MacGregor, 2005; Melzack & Wall, 1996). Studies

examining neuroplasticity and pathological pain suggest that changes in the central nervous system may perpetuate the experience of pain in the absence of ongoing tissue damage (Deyo & Weinstein, 2001). In addition, the assessment of low back pain may not be very reliable, as both subjective indices (e.g. self-report measures) and objective indices (e.g. MRIs) are commonly influenced by a patient's motivation, effort, and psychological status at the time of assessment (Waddell & Turk, 2001).

The lifetime prevalence of back pain is high, recently exceeding 70% in most industrialized nations (Borenstein, Wiesel, & Boden, 2004). The National Health and Nutrition Survey II (NHANES II) found that lower back pain affects approximately 85% of people suffering from pain, with the highest prevalence rate in those 45 to 64 years of age (Borenstein et al., 2004). The National Center of Health Statistics collected data on Americans, which showed that 14% of new patient visits to physicians were for low back pain, and approximately 13 million visits to physicians were for chronic low back pain (Borenstein et al., 2004).

In Canada, a recent, large epidemiological survey was conducted on 118,533 Canadian residents, in the Canadian Community Health Survey (Currie & Wang, 2004). The survey utilized a multi-staged, stratified random sampling procedure, which targeted individuals 12 years of age and older who were living in the ten provinces and three territories. The survey included questions that assessed physical and mental health status, lifestyle behaviours, health care utilization, and socioeconomic status. Currie and Wang (2004) examined the prevalence of chronic back pain in this sample and found that 9% of the total sample (10,600 individuals) suffered from chronic back pain. When compared to

a pain-free group, the chronic back pain group tended to be older, less educated, female, single, Caucasian, and unemployed.

These epidemiological findings, although important, are primarily descriptive. They do, however, emphasize the need for examinations of the psychological and social variables associated with chronic low back pain (CLBP). The following section delineates both the theoretical and empirical basis for the hypotheses of the present study.

Theoretical Context: Pain

Several models have been proposed to explain the impact of chronic pain on an individual's physical and social well-being. Historically, pain models have primarily focused on physical pathology (i.e., the biomedical model). However, previous research has also shown that it is imperative to consider the differential impact that the psychosocial environment of a pain patient has on pain experience (e.g., Jensen, Ehde, Hoffman, Patterson, Czerniecki, & Robinson, 2002; Turk & Monarch, 2002). Therefore, utilizing a theoretical model that reflected the important contributions of both psychological and social variables was necessary to gain a more complete representation of the chronic pain experience.

Biopsychosocial (BPS) Model of Chronic Pain

The BPS model focuses on the biological, psychological, and social factors that interact to perpetuate chronic pain (Gatchel, 1999). To understand the interplay between these factors, one must recognize that:

Predispositional factors and current biological factors may initiate, maintain, and modulate physical perturbations; predispositional and current psychological variables influence evaluation and perception of internal

physiological signs; and social factors shape the behavioural responses of patients to the perceptions of their physical perturbations (Turk & Flor, 1999, p. 20).

Therefore, awareness of the complexity of chronic pain requires a comprehensive understanding of the three primary factors that affect a patient's perception of and responses to pain.

The previous trend in research was to utilize a biomedical model to explain chronic pain. This model proposes that chronic pain is the result of physical injury to the body, where the amount of pain is roughly equivalent to the amount of tissue damage. The biomedical model does not account for the impact that psychological and social factors may have on pain experience. Thus, this model does not address the significant effects that psychological distress has on pain and disability. Physical pathology only modestly predicts outcomes in chronic pain (Turk & Okifuji, 2002), whereas psychosocial variables account for as much as 59% of the variance in pain-related disability associated with chronic pain (Burton, Tillotson, Main, & Hollis, 1995). Current perspectives on pain suggest that a BPS model of chronic pain accounts for greater variability in predicting pain and behavioural outcomes than a restricted biomedical approach (Hanley, Jensen, Ehde, Hoffman, Patterson, & Robinson, 2004).

The BPS model of chronic pain emphasizes the importance of biological factors, but also considers the significant impact that psychosocial factors, specifically cognitions, coping, and social variables, may have on the development, expression, and maintenance of pain, regardless of etiology (Hanley et al., 2004; Jensen et al., 2002; Turk & Okifuji, 2002). Amongst the cognitive variables considered important in the BPS model of

chronic pain, catastrophizing is the most robust predictor of increased pain intensity and emotional distress (Sullivan, Thorn, Haythornthwaite, Keefe, Martin, Bradley, & Lefebvre, 2001; Turk & Flor, 1999). Catastrophizing is described as an “exaggerated negative ‘mental set’ brought to bear during actual or anticipated pain experience” (Sullivan et al., 2001, p. 53). Persons described as catastrophizers tend to magnify or exaggerate the threat value or seriousness of the pain sensations. Sullivan et al. (2001) note that there is a growing body of literature that suggests individuals who catastrophize during painful stimulation are more likely to experience intense pain and greater emotional suffering.

Catastrophizing has also been found to result in increased pain, disability, and psychological distress in individuals with chronic pain (Keefe, Brown, Wallston, & Caldwell, 1989; Cano, 2004; Severeijns et al., 2001; Sullivan et al., 2001). A recent study examining adjustment to lower limb amputation found that catastrophizing was one of the strongest predictors of changes in the intrusiveness of pain and depressive symptomology (Hanley et al., 2004). The authors suggest that the psychosocial factors may have a causal function in adjusting to amputations and phantom limb pain. In regard to CLBP patients, catastrophizing has been associated with depressive symptomology (Sullivan et al., 2001; Turner, Mancl, & Aaron, 2004), quality of life (Lamé et al., 2005), and low back disability (Main & Waddell, 1991). Therefore, catastrophizing is an important variable to consider when examining the impact of CLBP on patients’ wellbeing.

Depression is an additional cognitive variable that is important to consider as it is highly comorbid in chronic pain (e.g., Banks & Kerns, 1996; Cano, Gillis, Heinz, Geisser, & Foran, 2004; Cano et al., 2000; Currie & Wang, 2004; Turk, Flor, & Rudy,

1987). Depression is common in chronic headache (Gatchel & Epker, 1999), rheumatoid arthritis (Brown, 1990), and is associated with pain-related sexual dysfunction (Niles, Mori, Lambert, & Wolf, 2005). Depressive symptoms are also highly comorbid in CLBP (Garofalo & Polatin, 1999). Recently, major depression was rated the fourth most disabling medical disorder among adults in the world, with an estimated 121 million people suffering from depression (World Health Organization, 2001). Currie and Wang (2004) showed that the rate of major depression was much higher for chronic back pain groups (19.8%) as compared to non-pain groups (5.9%). Further, their data indicate that approximately 1.8% of the Canadian adult population reports both chronic back pain and major depression, and the risk of major depression increased linearly as pain severity escalated.

The pain literature is unclear of the temporal sequence of depression and chronic pain but proposes two hypotheses. First, chronic pain is the result of a primary, underlying depressive disorder. Second, chronic pain causes depressive symptoms (Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994). The authors conducted a study examining depression and pain data from two larger surveys of the United States during the 1970s and 1980s. They found that depressive symptoms predicted the development of chronic pain on follow-up, supporting the first hypothesis. This suggests that pain that develops as a result of depression is likely a “somatic manifestation of the psychological disorder” (Magni et al., 1994, p. 295). However, the authors also found that chronic pain predicted the development of depressive symptoms, which is consistent with the second hypothesis. This finding makes intuitive sense given the limitations that pain imposes on

an individual's life, the disruptions of interpersonal relationships, and the sense of helplessness that often accompanies chronic pain (Magni et al., 1994).

Bair, Robinson, Katon, and Kroenke (2003) recently reviewed the pain and depression literature to determine the prevalence of both conditions and how their comorbidity affects diagnoses and outcomes. They summarized literature that assessed whether participants presented with depression and then were subsequently assessed for pain, and whether patients with painful conditions were assessed for depression. An important finding was that the relationship between depression and pain becomes more robust as the severity of either condition increases. An additional finding was that the more pain complaints reported (i.e., multiple locations), the more likely that person would experience depression, such that patients with three or more pain complaints were eight times more likely to meet criteria for depression.

It has been strongly suggested that assessing patients with chronic pain without considering the potential effects of their social environment is essentially incomplete, as social interactions play an important role in the pain experience (Jacobs & Kerns, 2001). Amongst the social variables, social support from a spouse is considered one of the most influential, positive contributors to patients' functioning because it acts as a buffer in stressful situations. Several studies show the benefit of social support in chronic pain (Gil, Keefe, Crisson, & van Dalfsen, 1987; Flor, Kerns, & Turk, 1987a; Flor et al., 1987b; Feldman, Downey, & Schaffer-Neitz, 1999; Jensen et al., 2002; Hanley et al., 2004) and will often focus on the number of individuals who play a supportive role in a person's life, as well as the quality of support in terms of a person's satisfaction with it (Gil et al., 1987). Social support can be provided by any individual that is involved in a

person's life. For example, utilizing a daily diary to examine pain, negative mood, and perceived support among chronic pain patients, pain was shown to be less influential on negative mood and depression when patients reported greater support from family and friends (Feldman et al., 1999). In addition, greater pain behaviour in patients with CLBP was associated with lower social support (Gil et al., 1987).

It is important to note that not all styles of spousal support are adaptive. Solicitous responding refers to solicitous behaviours by a significant other, including showing concern and offering assistance, and is one type of support that can lead to decreases in patient functioning over time (Hanley et al., 2004). For example, greater partner solicitous responding is associated with increased patient disability (Flor et al., 1987a; Romano et al., 1995), pain intensity (Flor et al., 1987a; Flor et al., 1987b), and less marital satisfaction (Flor et al., 1987b). Solicitous responding by a partner plays an important role in the development of feelings of helplessness in the patient, and this sense of helplessness has been shown to be associated with greater psychological distress and depression in individuals with chronic pain (Hanley et al., 2004).

Punishing or negative responses may be exhibited by spouses of patients in chronic pain, and result in decreased functioning of the patient. For example, Schwartz, Slater, and Birchler (1996) reported that the more negative responses a spouse makes to the patient's pain behaviours, the greater the pain intensity, and overall functional and psychosocial impairment the patient will experience. Perceptions of partner's negative responses have also been associated with increased patient depression (Romano et al., 1995; Cano, 2004) and anxiety (Cano, 2004).

Two recent studies examined the relationship between pain catastrophizing and partner responses to pain, as well as partner-provided support (Boothby, Thorn, Overduin, & Ward, 2004; Cano, 2004). For example, Boothby et al. (2004) found that catastrophizing was significantly related to perceived negative partner responses, such that those pain patients who scored higher on a measure of catastrophizing believed that their partners were responding to their displays of pain with more irritation, frustration, and anger. However, Cano (2004) did not find that catastrophizing was related to perceived negative partner responses. Additionally, Boothby et al. (2004) were unable to find a significant relationship between level of catastrophizing and solicitous responses by the partner, while Cano (2004) found trends for solicitous and distracting responses to relate to pain catastrophizing. These discrepant findings emphasize the need for further research into the impact that various partner responses have on pain related distress variables.

The BPS model successfully argues the importance of including biological, psychological, and social factors when considering the development and maintenance of poor outcomes in chronic pain. The BPS model for chronic pain also allows for flexibility in considering other models that provide mechanistic explanations by which biological and psychosocial factors may interact.

Operant Model of Chronic Pain

Fordyce (1976) described a method by which pain behaviours may persist termed avoidance learning. He based his assumption on the earlier writings of behaviour theorists and proposed an *operant model of chronic pain* in which a person acts to avoid aversive or punishing outcomes in pain, which then reinforces those actions. Avoidance

learning is defined as frequent and persistent behaviours that enable a person to avoid or minimize aversive consequences. Once these behaviours have been established, the maintenance of avoidance learning will involve minimal reinforcement (Fordyce, 1976). This model emphasizes the influence that social responses have on patients' levels of disability, as was also proposed in the BPS model. The assumption in the operant model is that pain behaviours solicit attention from the social environment and can be reinforced or extinguished depending on the nature of the response from the environment. Therefore, spouses may inadvertently increase their partners' pain behaviours and pain intensity ratings by reinforcing overt expression of distress and suffering (Turk et al., 1987). In regards to pain and disability, a chronic pain patient may cease performing particular activities because he or she expects that doing such activities will increase pain and distress (Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). In the acute phase, avoidance behaviours, such as limping and resting, are suggested to be an adaptive way to reduce or avoid suffering caused by injury. However, as these behaviours persist, they no longer appear in response to pain, but in anticipation of it.

Pain-related fear is a specific form of avoidance often seen in chronic pain patients, where the patient believes that movement and physical activity will cause re-injury (Vlaeyen et al., 1995). It is proposed that patients in chronic pain develop erroneous beliefs regarding their ability to function, and as such, these beliefs inhibit behaviours that patients deem unnecessary to avoid further structural damage and anticipated resulting pain (Lethem, Slade, Troup, & Bentley, 1983). Therefore, pain-related fear must be considered a risk factor in the development and progression of

disability and interferes in the daily life of those suffering from chronic pain (Buer & Linton, 2002; Crombez, Vlaeyen, Heuts, & Lysens, 1999).

In addition, considerable overlap has been found between pain-related fear and catastrophizing (Vlaeyen et al., 1995). This suggests that catastrophizers tend to focus on the negative elements of situations, triggering an interpretation of their physical arousal as signs of impending pain. This interpretation creates a situation in which the individual is more hypervigilant of the interoceptive information that is related to movement, making it more likely that this information will be interpreted as dangerous or as an indication of (re)injury (Vlaeyen et al., 1995).

The pain models are very detailed with respect to the factors of importance and the mechanism with which pain can become chronic. However, one of the limitations of these models is that they are only capable of explaining an individual's experience with chronic pain, and do not provide a valid framework with which to examine the intimate relationships of patients with chronic pain. These models have failed to incorporate interpersonal relationship variables and therefore, may benefit from the inclusion of research from the area of marital therapy. Therefore, applying a general model of relationship satisfaction to CLBP may provide greater understanding of the association of physical and psychological functioning of patients suffering from chronic pain.

Theoretical Context: Relationship Satisfaction

Vulnerability-Stress-Adaptation (VSA) Model of Marriage

The Vulnerability-Stress-Adaptation (VSA) model of marriage (Karney & Bradbury, 1995, see Figure 1) was conceptualized from a review of 115 longitudinal studies examining marital quality. Four leading theoretical perspectives were examined

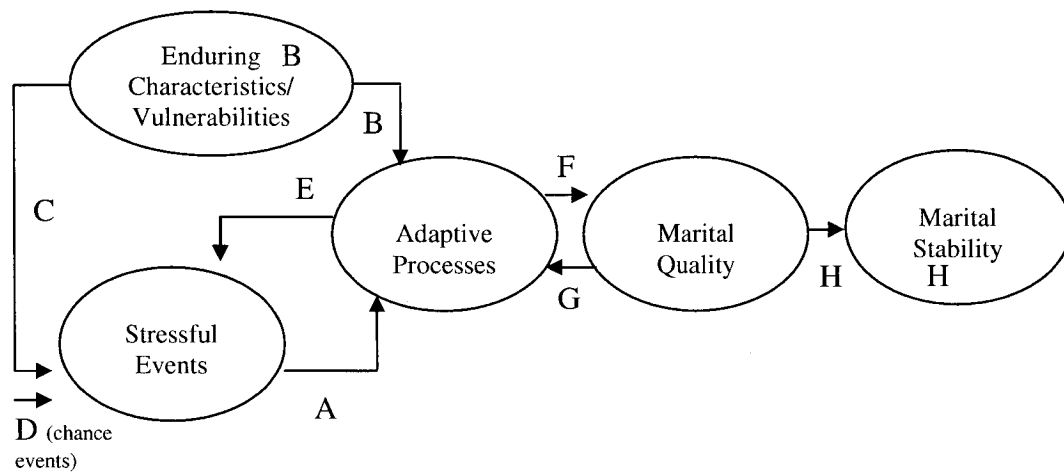


Figure 1. The vulnerability-stress-adaptation model of marriage (Karney & Bradbury, 1995).

(social exchange theory, attachment theory, crisis theory, behavioral theory) and found to focus on the prediction of marital or relationship outcomes. Unfortunately, none of these theories contribute to understanding the progression of marriages and intimate relationships over time and situations (Karney & Bradbury, 1995). The VSA model incorporates various key factors from these earlier theories as a means of establishing a more comprehensive model of marital outcomes that explains the interplay between various individual, contextual, and interpersonal factors that affect relationship functioning. Many of the factors do not directly effect marital satisfaction, but remain important because of their indirect influence on marital satisfaction and/or stability, which either improves or exacerbates the course of the relationship.

Karney and Bradbury (1995) identified three sets of variables that, when combined into a single framework, enhance our awareness of the processes by which marital satisfaction and stability evolve over time: *enduring vulnerabilities*, or “stable demographic, historical, personality, and experiential factors that individuals bring to marriage” (p. 22); *stressful events*, or “developmental transitions, situations, incidents, and chronic or acute circumstances that spouses and couples encounter” (p.22); and *adaptive processes*, or “ways individuals and couples contend with difference of opinion and individual or marital difficulties and transitions” (p. 22).

According to the VSA model, the manner in which couples manage life events contributes to their perceptions of their marital quality. Couples’ personal enduring vulnerabilities and the particular life stressors they encounter produce the adaptive processes that a couple utilizes in response to various situations. Once a couple experiences various challenging and stressful situations, perceptions of the quality of

their relationship are likely to be altered (Karney & Bradbury, 1995; Cohan & Bradbury, 1997). Alternatively, perceptions of the relationship quality are also likely to influence the manner in which challenging and stressful situations are encountered. For example, a satisfied couple is likely to engage in more constructive behaviours and communication styles, while engaging in constructive behaviours and communication styles is likely to increase the couple's perception of their marital quality. On the other hand, dysfunctional behaviours and communication styles may escalate the probability of relationship problems, eventually leading to a decline in marital satisfaction.

Most research examining adaptive processes has focused on interactions within intimate relationships (Karney & Bradbury, 1995), particularly the importance of social support. In particular, social support has commonly been viewed as one of the most important psychosocial mediators between a stressor (event or challenge) and stress (psychological response) (Gale et al., 2001). Therefore, the focus of research in the area of stressors and relationships has been directed at perceived social support and the extent to which social support buffers the effects of stress (Coyne & Downey, 1991). Cramer (2004) noted that social support may play a stronger role in determining satisfaction within a romantic relationship than other factors, such as conflict. In fact, a direct association was found between social support and relationship satisfaction that was not mediated by either conflict or depression (Cramer, 2004).

Gale et al. (2001) examined the impact of social support on women with breast cancer and found that it was not simply the presence of a partner but the level of satisfaction and support within the dyad that contributed to coping with the stressors associated with breast cancer. In particular, women in low quality relationships (i.e., a

score below the median cutpoint of 115 on the Dyadic Adjustment Scale) experienced significantly higher levels of stress, anxiety, and depression than women in high quality relationships (i.e., a score above the median cutpoint of 115 on the Dyadic Adjustment Scale). The discrepancy between actual and ideal support was much larger for women in low quality relationships as compared to women in high quality relationships. Similarly, economic pressures have been found to increase the risk of emotional distress, which ultimately increased the risk of conflict and distress within the dyad (Conger, Rueter, & Elder, 1999). Furthermore, increased levels of social support reduced the association between economic pressure and emotional distress.

The model proposed by Karney and Bradbury (1995) may be helpful in explaining the association between pain and relationship satisfaction, as pain can be perceived as a chronic stressor that leads to challenges and strains on relationships. Therefore, it is conceivable that patients dealing with chronic pain will experience strains on their relationships, and likely suffer declines in their level of relationship satisfaction.

Relationship Satisfaction and CLBP

Research shows that chronic pain has a negative impact on relationships (e.g. Cano et al., 2004; Flor, et al., 1987b; Kerns, Haythornthwaite, Southwick, & Giller, 1990; Maruta, Osborne, Swanson, & Halling, 1981; Monga et al., 1998; Romano, Turner, & Clancy, 1989; Rowat & Knafl, 1985; Schwartz, Slater, Birchler, & Atkinson, 1991; Turk et al., 1987). Specifically, research suggests that patients in pain and their partners present with greater emotional, marital, sexual, and physical disturbances compared to pain-free couples.

Flor et al. (1987b) examined the emotional and physical health of male patients in chronic pain and their female spouses and found significant pain-related modification in the patients' and spouses' marital and sexual satisfaction, with spouses experiencing considerably more marital dissatisfaction than patients (51% vs. 39%). Similar results were found by Kerns and Turk (1984), in that more than half of the 30 chronic pain patients and their spouses reported significant marital dissatisfaction. Previous research by Kerns and Turk (1984) also found a positive relationship between depressed mood and marital dissatisfaction, even when no significant correlation was found for self-reported pain intensity. More recently, marital satisfaction was found to be negatively correlated with depressive symptoms in chronic pain patients, with pain and marital variables in combination explaining psychological distress better than pain variables alone (Cano et al., 2004). Interestingly, the relationship between catastrophizing and relationship satisfaction has not been examined in a sample suffering from chronic pain.

Research suggests that as a pain problem develops and persists, the amount of support or reinforcement initially provided by a partner declines, and the importance of marital support increases for the patient. For example, the patient must now spend a great deal of time in the presence of the partner, as well as having an increased sense of dependence on the partner for various daily activities (Kern & Turk, 1984). Flor et al. (1987b) also examined the association between patients' and spouses' marital satisfaction. Patients' marital satisfaction was positively associated with perceptions of increased attention from the spouse (i.e. spousal solicitousness), spouses' marital satisfaction, and own levels of pain. However, it was found that the positive relationship between pain level and marital satisfaction was actually related to the significant positive

relationship between spousal solicitousness and patient's pain. When solicitousness was controlled for, the pain-marital satisfaction relationship was no longer significant.

Therefore, it appears that patients' marital satisfaction was most highly associated with the amount of perceived solicitous behaviours from their partners, and spouses' own marital satisfaction.

Additionally, chronic pain patients with lower marital satisfaction reported experiencing more depressed mood, less spousal support, changes in sexual interest, and lower frequency of sexual activity. In contrast, patients with lower sexual satisfaction reported higher levels of pain and greater spousal support (Flor et al., 1987b). The results of this study emphasize the significance of sexual functioning in committed relationships among patients with chronic pain, as those patients who reported lower marital satisfaction likewise reported decreased sexual activity.

Sexual Functioning and CLBP

The impact of pain on sexual functioning is also an issue in couple adjustment when at least one partner has chronic pain. Osborne & Maruta (1980) studied 66 patients with chronic, non-malignant pain showing that approximately two-thirds of patients reported a decrease in sexual adjustment, including a decline in the frequency and quality of sexual functioning. The most common sexual problems reported by women in the sample were difficulty achieving orgasm, loss of interest in engaging in sexual activity, and difficulty with arousal. Male pain patients reported similar problems, including difficulty obtaining and maintaining erections, as well as loss of interest in sexual activity. In addition, more than one-third of patients reported a decline in the quality of the marriage. Both male and female pain patients reported a diminished sexual activity

following the onset of the pain problem with men reporting a greater reduction in sexual activity. As well, Flor et al. (1987b) studied 58 male patients with chronic pain noting that declines in marital satisfaction and higher levels of pain were reported by those who also reported sexual dissatisfaction. Within the sample, 77% of the participants noticed a change in the regularity of their sexual activity as a result of pain, 67% were dissatisfied with the sexuality within the dyad, and 42% acknowledged that sexual activity completely ceased.

Osborne & Maruta (1980) suggested that in the case of low back pain, the physical demands of sexual intercourse may produce pain, and as such, a general loss of interest in sexual activity may ensue. Pain patients often avoid or decrease their involvement in physical activity, leading to deterioration in the condition of the low back. Once the patient decides to once again become physical, the unused muscles are pushed beyond their limit within the relatively short span of intense activity, creating an immense amount of pain and discomfort. The anticipation of pain following such concentrated activity often leads to a decrease in interest and sexual arousal. As noted by Osborne and Maruta (1980), patients with chronic back pain tend to worry that any form of physical activity will lead to further injury (i.e., pain-related fear), causing the patient to become distracted by their fear and anticipation of injury and pain during sexual activities. An additional problem that pain patients face involves the medications often consumed to help control or reduce the pain experienced. Opiates, antidepressants, and muscle relaxants frequently lead to problems with lubrication, arousal, and orgasm (Osborne & Maruta, 1980; Monga et al., 1998). Consequently even if the pain in the lower back is

reduced, the patient may not be able to become aroused and engage in sexual activity with their partner.

Maruta et al. (1981) examined marital and sexual adjustment in 50 married patients and their spouses who had been referred to their pain clinic. They found that before the onset of pain, the majority of the couples (both spouse and patient) were satisfied with their sexual adjustment in their marriage. However, after the pain had persisted for six months, the couples' rates of sexual adjustment had dropped, and half of these couples were dissatisfied with their own sexual adjustment, including a decrease in frequency and quality of their sexual activity. When asked to rate overall adjustment in marriage, the spouses and partners did not differ drastically before the onset of pain. However, after pain onset, 65% of spouses and 25% of patients reported negative changes in their marital satisfaction. In addition, 84% of spouses and 78% of patients reported substantial decreases in or elimination of sexual activity as a result of pain, with approximately 67% of patients reporting pain after engaging in sexual activity with their partners.

Beyond the physicality of chronic pain, researchers have found a large number of psychological factors that influence sexual functioning in chronic pain patients. In fact, psychological variables account for a large portion of the variance that can be attributed to sexual functioning, whereas pain related variables (e.g. pain duration, frequency, and severity) are suggested as non-significant in establishing sexual functioning (Monga et al., 1998). Monga et al. (1998) were the first to examine the relationship between sexual and psychological functioning by examining various aspects of sexual functioning and sexual adjustment in patients with chronic pain. Their sample consisted of 62 male and 8

female chronic pain patients, where depression was present among the majority of patients (87 and 71%, respectively). Depression was negatively correlated with several areas of sexuality, including sexual behaviour, drive, orgasm, and a composite score of sexual functioning. Furthermore, patients who frequently catastrophized also showed decreases in their sexual functioning. In an additional study to examine the coital positions and sexual functioning in a sample primarily composed of CLBP patients, Monga, Monga, Tan, & Grabois (1999) examined 40 male and 5 female chronic pain patients. The majority of patients in their sample reported a fear of failure to perform (76%), 56% reported a fear of aggravating their pain as a consequence to engaging in sexual activity, and 64% reported an increase in pain following sexual intercourse.

General Summary

The BPS model and the operant model of chronic pain were developed in reference to chronic pain and may be helpful in expanding the scope and awareness of patients' distress in chronic pain conditions, specifically CLBP. Integrating the VSA model into the CLBP literature may also prove to be beneficial as it provides a framework with which to examine relationship quality during a chronically stressful event, such as persistent pain. For example, catastrophizing, pain-related fear, perceived partner support, and sexual satisfaction may be integral variables in understanding the effect that CLBP has on relationship quality. Surprisingly, although much work has examined the effects of relationships and cognitive variables on pain outcomes (e.g. Cano et al., 2000; Flor et al., 1987b; Kerns & Turk, 1984), no study has examined the effects of such variables in mediating the effect that pain has on relationship satisfaction. This may be due to the lack of integration of relationship models (e.g., VSA model) or simply that

pain researchers have opted to see the biomedical variable of pain as a more primary outcome.

Research Objectives

There is robust empirical evidence showing that pain negatively impacts various aspects of a person's life (i.e., psychological adjustment, quality of life, interpersonal functioning). In fact, most of the literature has focused on predictors of individual functioning and outcome. An alternative course of chronic pain research has examined variables that influence the quality of intimate relationships among patient in chronic pain (e.g., Cano et al., 2004; Flor, et al., 1987b). Thus far, the literature is not entirely clear on which variables influence the relationship between pain and relationship distress, although pain catastrophizing, pain-related fear, depression, and spousal support have all been implicated as variables of importance in the experience of chronic pain.

Mediating relationships are important to examine as they help to identify potentially vital targets for treatment and future research. Researchers have investigated relationship satisfaction as both a mediator and a moderator between pain and a variety of psychosocial variables, such as depression, and anxiety (Kerns et al., 1990; Cano et al., 2000). However, there have been no studies looking at what variables mediate the association between pain and relationship satisfaction in patients with CLBP.

Investigating these mediational pathways may provide empirical support for potential sources of deterioration in relationships of patients with chronic pain. Primarily working under the theoretical context of the Vulnerability-Stress-Adaptation Model, and using associations suggested by the Biopsychosocial and Operant Model of Chronic Pain, the

current study examined the influence of various psychosocial variables on CLBP patients' relationship satisfaction.

Specifically, the first aim of the study was to examine the degree to which each of the psychosocial variables accounted for the association between pain and relationship satisfaction among CLBP patients both independently and simultaneously. Based on the pain and relationship literature reviewed, it was hypothesized that psychosocial variables (i.e., perceived partner support, depression, catastrophizing, pain-related fear, and sexual satisfaction) would independently mediate the relationship between pain and relationship satisfaction. Specifically, it is expected that:

a) CLBP would be associated with increased perceived negative, solicitous, or distracting responding by the partner (Gil et al., 1987; Feldman, et al., 1999), which would be associated with decreased relationship satisfaction (Flor et al., 1987b).

b) CLBP would be associated with increased catastrophizing (Keefe et al., 1989; Severeijns et al., 2001; Sullivan et al., 2001), which would be associated with decreased relationship satisfaction.

c) CLBP would be associated with increased pain-related fear (Lethem et al., 1983; Vlaeyen et al., 1995), which would be associated with decreased relationship satisfaction.

d) CLBP would be associated with decreased sexual satisfaction (Osborne & Maruta, 1980; Maruta et al., 1981; Flor et al., 1987b), which would be associated with decreased relationship satisfaction (Flor et al., 1987b; Maruta et al., 1981; Monga et al., 1998).

e) CLBP would be associated with increased depressive symptoms (Bair et al., 2003; Currie & Wang, 2004), which would be associated with decreased relationship satisfaction (Cano et al., 2004; Flor et al., 1987b).

For the multiple mediator model (see Figure 2), there were no predicted findings as this question was exploratory to some degree. There has been no prior research that has examined the influence of multiple mediators on the association between pain and relationship satisfaction. In fact, there is no pain literature that explores the impact of multiple mediators in predicting biological and psychosocial outcomes when a chronic pain condition is present.

The second aim of the study was to investigate differences between male and female participants with respect to psychosocial variables that mediate the association between pain and relationship satisfaction. Few studies have conducted separate analyses for men and women, concealing potentially significant differences that may exist. When these separate analyses have been conducted in previous research, similar results have been found for men and women (Cano et al., 2000; Flor, Turk, & Rudy, 1989). For example, Cano et al. (2000) found gender differences among the correlational analyses, such that negative and solicitous responses and marital satisfaction were significantly greater for females than males. In addition, male participants were found to have stronger relationships between negative responses to pain and depression, and distracting responses to pain and pain severity. However, when multiple regression analyses were utilized to examine mediational hypotheses, similar findings were found for both men and women. Therefore, it was expected that there would be no gender differences in the mediational analyses between male and female participants.

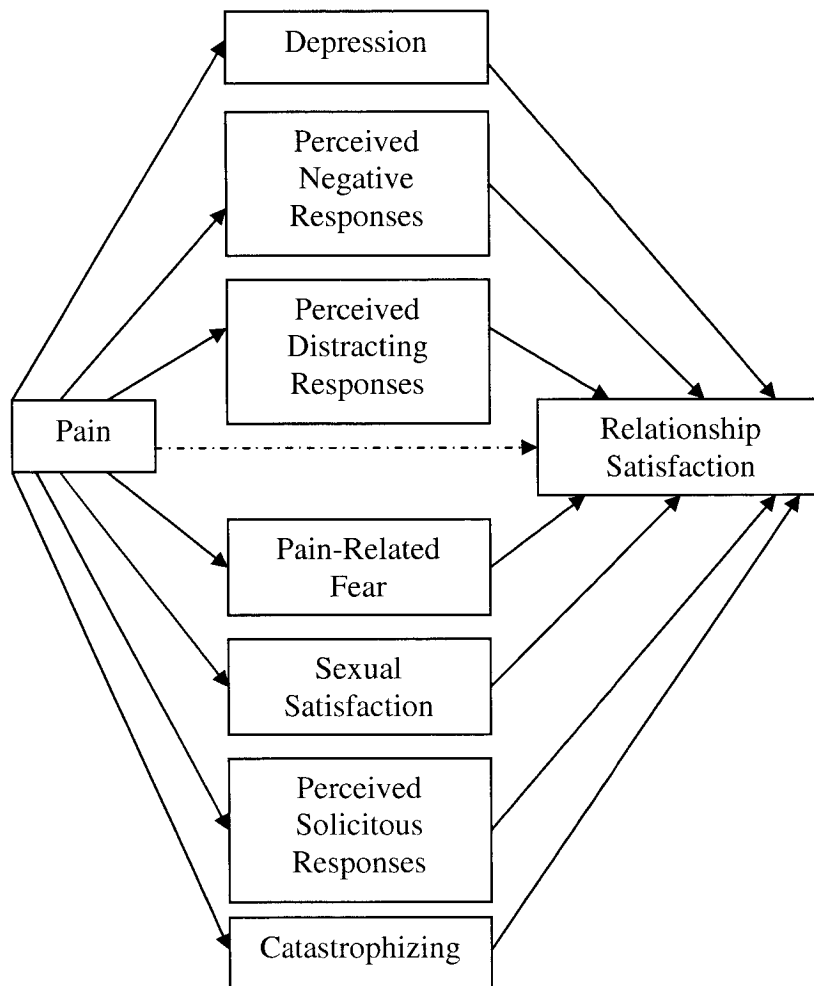


Figure 2. A multiple mediator model demonstrating psychosocial variables as mediators between pain and relationship satisfaction.

CHAPTER 3

Method

Participants

The current study assessed 58 CLBP patients (27 men and 31 women) from Northern (3 participants) and Southern Ontario (55 participants). CLBP patients who were either married or cohabitating were identified through a local community based chronic pain clinic at a Southeastern Ontario Hospital, family physician referrals or asked to participate through newspaper or medical office solicitation. The age of participants ranged from 27 to 75, with the average age being 50.62 ($SD = 11.07$). The average number of years in pain was 13.5 years ($SD = 10.39$), ranging from 1 year to 41 years of pain. The mean level of education reported by participants was 13.12 years ($SD = 2.03$), ranging from 8 years to 19 years. The majority of participants were either married (70.7%) or living with a significant other (22.4%) at the time of the evaluation, with 6.9% of participants having recently separated from their partners (within the last 6 months). Results from independent samples t -tests indicated that the three groups did not significantly differ with respect to the variables of interest (i.e., pain, catastrophizing, pain-related fear, sexual satisfaction, relationship satisfaction, depression, and perceived partner responses). The mean length of the relationship was 21.71 years ($SD = 14.78$), ranging from 1 year to 53 years. Participants presented with a wide range of pain sites, with 98.3% describing low back pain as their primary complaint.

Measures

Demographics

The demographic survey (see Appendix A) was used to ascertain specific demographic information. Variables included age, sex, ethnicity, education, marital status, and length of relationship.

Multidimensional Pain Inventory – Part II (MPI).

The MPI Part II (Kerns, Turk, & Rudy, 1985; see Appendix B) was designed to evaluate patients' perceptions of the range and frequency of responses by a significant other to displays of pain and suffering as patients' perceptions of a partners' reinforcement have been considered more important than the partners' perceptions of their actions in predicting pain and activity level (Flor et al., 1989). All of the items are answered on a 7 point Likert scale, ranging from 0 (low frequency of response) to 6 (high frequency of response). The scale scores are obtained by summing the individual items that relate to that specific scale. The MPI Part II consists of 14 items, composed of three scales: Negative (e.g., "expresses irritation at me"), Solicitous (e.g., "gives me pain medication"), and Distracting (e.g., "involves me in activities"). The three scales demonstrate high internal consistency, with Cronbach alpha values ranging from .74 to .84, as well as adequate internal stability, with *r* values ranging from .62 to .89 (Jacobs & Kerns, 2001). The current study demonstrated alpha values for that were consistent with previous studies: negative responses ($\alpha = .90$), solicitous responses ($\alpha = .85$), and distracting responses ($\alpha = .64$).

Short-Form McGill Pain Questionnaire (SF-MPQ)

The SF-MPQ (Melzack, 1987; see Appendix C) was developed to evaluate both sensory and affective qualities of pain, as well as provide an overall measure of pain intensity. The SF-MPQ consists of 15 words used to describe the pain experience. The items are arranged on a 4-point Likert scale, ranging from 0 (none) to 3 (severe). Eleven of these descriptors represent the sensory component of pain (e.g., throbbing, stabbing, gnawing) and four of the descriptors represent the affective component (e.g., tiring-exhausting, fearful). The reliability of the SF-MPQ has been well established, with intra-class correlations for the total scale (.96) being quite high (Grafton, Foster, & Wright, 2005), and is often used in clinical settings (Melzack, 1987). The total score alpha (.88) demonstrates excellent reliability.

Center for Epidemiological Studies Depression Scale (CES-D)

The CES-D (Radloff, 1977; see Appendix D) is a 20-item scale that assesses the frequency with which affective and somatic symptoms of depression occurred within the previous week. All items are rated on a 4 point Likert scale, ranging from 0 (rarely or none of the time) to 3 (most or all of the time). The CES-D is scored by summing the individual responses to yield a total score, with a possible range from 0-60. Scores at or above 16 are suggestive of clinical depression. The measure demonstrates high internal consistency, with Cronbach alpha values ranging from .84 for the general population to .90 for clinical samples. Within the current sample of CLBP patients, the Cronbach alpha value was .91. Test-retest reliability ranges from .48 to .67 (Radloff, 1977). The CES-D has been found to have better sensitivity in chronic pain patients than the Beck Depression Inventory (BDI) (81.8% vs. 68.2%) (Geisser, Roth, & Robinson, 1997).

Pain Catastrophizing Scale (PCS)

The PCS (Sullivan, Bishop, & Pivik, 1995; see Appendix E) is a 13-item self-report measure commonly used to assess pain catastrophizing. The measure provides a full scale score of pain catastrophizing, as well as three separate scores for the components of catastrophizing: Rumination (e.g., “I keep thinking about how much it hurts”), Magnification (e.g. “I wonder whether something serious may happen”), and Helplessness (e.g. “There is nothing I can do to reduce the intensity of the pain”). Participants rate on a 5 point Likert scale, 0 (not at all) to 4 (all the time) the extent to which they have an exaggerated negative view of their pain. A PCS is scored by totaling the individual items to yield to total score with a possible range of 0-52. The internal validity for the full scale score is good, with Cronbach alpha values ranging from .87 to .95. Similarly, the three components of catastrophizing demonstrate good internal validity, with Cronbach alpha values ranging from .87 to .95 for Rumination, .60 to .88 for the Magnification scale, and from .79 to .91 for Helplessness (Osman, Barrios, Gutierrez, Kopper, Merrifield, & Gritman, 2000; Sullivan et al., 1995). For the current study, only the PCS total was used, which demonstrated an inter-item reliability of .94.

Tampa Scale of Kinesiophobia (TSK)

The TSK (Kori, Miller, & Todd, 1990; see Appendix F) is a 17-item self-report measure that was used to assess pain-related fear. The TSK, designed for use in back pain populations, provides information regarding the extent to which this fear is associated with engaging in activities that may produce pain. The TSK is measured on a 4 point Likert scale, with values ranging from 1 (strongly disagree) to 4 (strongly agree). The TSK is scored by totaling the individual items to yield a score between 0 and 68. Internal

consistency for the TSK has been shown to be satisfactory, with a Cronbach alpha value of .80 (Crombez et al., 1999) and significant correlations were found with measures of pain intensity, catastrophizing, impact of pain on daily activities, and generalized fear (Vlaeyen & Linton, 2000). In the current study, the wording of questions 1, 4, 13, and 17 were altered to reflect sexual activity, as opposed to exercise, as a means of reflecting a facet of intimate relationships. Item-total correlations for these re-worded items were .30, .14, .46, and .07 for items 1, 4, 13, and 17, respectively. Despite these low correlations, the present Cronbach alpha value of .83 was consistent with previous findings.

Derogatis Sexual Functioning Inventory (DSFI)

The DSFI (Derogatis & Melisaratos, 1979; see Appendix G) is a 254-item self-report measure that was used to assess a person's self-perceived quality of current sexual functioning. The scale is arranged into 10 subscales reflective of the principal components of sexual behaviour. Subscales from the DSFI can be used in isolation to measure specific aspects of sexual behaviours (Derogatis & Melisaratos, 1979). The current study included two domains that measure sexual drive and sexual satisfaction (16 items). The ratings vary from domain to domain, however higher scores are indicative of greater sexual functioning. The DSFI has been found to be a reliable and valid measure with internal consistency coefficients ranging between .60 and .97, with adequate test re-test reliabilities of high .70s to low .90s over a 14-day period (Derogatis & Melisaratos, 1979). The current study demonstrated alpha values consistent with previous findings (sexual satisfaction = .74; sex drive = .58).

Dyadic Adjustment Scale (DAS)

The DAS (Spanier, 1976; see Appendix H) is a 32-item measure designed to assess the quality of the current relationship as perceived by married or cohabitating couples. The measure yields a total score, which indicates the couple's general satisfaction with the intimate relationship (Prouty, Markowski, & Barnes, 2000). The total score was obtained by summing individual subscale scores. This score was then converted to a t score with a mean of 50 and standard deviation of 10. Higher scores are indicative of greater dyadic adjustment, and t scores of 39 or less are indicative of significant relationship concerns. The DAS was normed on a sample of both married ($n = 218$) and divorced ($n = 94$) couples, and can be administered to couples who are married to cohabitating. The total score of DAS has been found to have excellent internal consistency, demonstrating a Cronbach alpha .69 to .96. For the current study, the inter-item reliability was excellent ($\alpha = .94$). The DAS has also demonstrated concurrent validity, as it has been shown to correlate ($r = .86$) with the Locke-Wallace Marital Adjustment Scale, and has been used to assess relationship adjustment in couples where one partner has chronic pain (Romano et al., 1995) as well as demonstrate the relationship between relationship adjustment and patient and partner functioning (Romano & Schmaling, 2001).

Procedure

Inclusion criteria for participation in the study were as follows. First, participants were required to read and write English at an eighth grade level. Second, participants had to be married or cohabiting for a minimum of six months or only recently left a marriage within the last six months. Third, participants had to report CLBP, as diagnosed by their

family physicians or other health care provider, for a minimum of three months. Fourth, the pain condition could not be related to neurological damage (e.g., stroke). Lastly, at the time of the study, the individual could not be involved in marital or relationship counseling in order to help control possible confounds of interventions designed to alter problematic communication styles that may arise from chronic pain.

CLBP patients were identified through a local community based chronic pain clinic, family physician referrals and/or asked to participate through newspaper, medical office or hospital solicitation (see Appendix I). Patients from outside of the pain clinic contacted the researcher to express their interest in participating in the study. At the outset of the study, all participants were asked to complete the battery of measures at the Pain Research Lab at Queen's University. Many of the original participants expressed concerns about their physical discomfort and fatigue in having to sit for the time needed to complete the package, in addition to the travel inconvenience. Therefore, it was decided that a mail-out study would ensue. A *t*-test was used to compare the seven participants who completed the package in the lab versus the 51 participants who received the package by mail. There were differences between the two groups on only two of the variables assessed: negative responses, $t(56) = 3.29, p < .05$ and solicitous responses, $t(56) = 3.51, p < .05$.

The battery of measures was piloted prior to the commencement of the present study to ensure that the questions were easily understood, and to determine an average length of time for completion. The pilot study was completed by six participants ranging in age from 24 years to 58 years of age. For the mail-out, a brief study description was provided at the time participants initially volunteered via telephone. All participants were

provided with a more thorough explanation of the study through a letter of information (see Appendix J) included in the battery of questionnaires. Participants were informed of their right to withdraw at any point during the study without repercussions. The participants were given the opportunity to ask questions throughout, and were provided with a list of phone numbers of local mental health resources should they be needed. Included in the package was a detailed letter of information, an instruction sheet (see Appendix K) for completing the questionnaires, a consent form (see Appendix L), mental health resources (see Appendix M), eight measures, and a debriefing sheet (see Appendix N). The measures were randomly ordered within each package to discourage order effects. The battery of questionnaires took approximately 45 minutes to complete. For their participation, participants were offered \$10 compensation and the opportunity to participate in a workshop on living with chronic low back pain held by the Pain Research Lab.

CHAPTER 4

Results

Descriptive Statistics

Total Sample Characteristics

All of the data was screened for accuracy and missing values prior to conducting the analyses. A prorated scale score was provided for participants with missing data, if there was no more than 10% missing data on that particular scale (Tabachnick & Fidell, 1996). One participant did not meet inclusion criteria and was excluded. This participant had been divorced for over ten years, although it was reported to have been a recent split on the telephone screen. The same participant had also experienced a psychotic break in which hospitalization was necessary for several weeks following completion of measures.

Means, standard deviations, and range for all measures by the total sample are shown in Table 1. For the DAS, the mean and standard deviation was similar to those reported by Flor et al. (1987b) and Cano et al. (2004). Similarly, the means and standard deviations for the subscales of the MPI-II were consistent with those found by Cano (2004), Cano et al. (2004), and Kerns et al. (1990). With regards to the cognitive variables, the means and standards deviations for pain catastrophizing and pain-related fear in the current study were higher than those found in Goubert, Crombez, Eccleston, and Devulder (2004) but comparable with those found in Crombez et al. (1999). The SF-MPQ demonstrated consistent values for mean and standard deviation as compared to studies by Flor et al. (1987a) and Melzack (1987). Lastly, the mean and standard deviation for the CES-D were at levels comparable to those found in Magni et al. (1994). In addition, the mean total score of the CES-D was above the recommended cutoff of 16,

Table 1

Means, Standard Deviations, and Range for All Measures in Total Sample

Measure	<i>N</i>	Range	<i>M</i>	<i>SD</i>
Dyadic Adjustment Scale (DAS)	58	20-64	48.38	11.49
Short Form McGill Pain Questionnaire (SF-MPQ)	55	5-40	22.53	9.60
Pain Catastrophizing Scale (PCS)	57	1-50	27.52	13.35
Pain-Related Fear (TSK)	56	26-62	43.54	9.31
Multidimensional Pain Inventory (MPI-II)				
Negative Responses	58	0-6	1.85	1.57
Solicitous Responses	58	.5-6	3.95	1.52
Distracting Responses	58	0-5.75	2.53	1.27
Derogatis Sexual Functioning Inventory (DSFI)				
General Sexual Satisfaction	53	0-7	3.02	2.45
Sexual Satisfaction	48	2-10	6.29	2.49
Sexual Drive	54	4-26	11.24	5.66
Centre for Epidemiological Studies-Depression (CES-D)	58	1-56	24.76	11.31
Age	58	27-75	50.62	11.07
Pain Duration	54	1-41	13.50	10.39
Education	56	8-19	13.11	2.03

suggesting high levels of depressive symptoms among the participants. Overall, these descriptive statistics are comparable to those reported previously in chronic pain samples.

Sample Characteristics by Gender

Male and female participants did not differ significantly in age, pain duration, number of years of education, length of relationship, total number of pain areas, and current working status. Differences between male and female participants for all measures are shown in Table 2. Female participants had significantly lower pain-related fear, $t(54) = 2.12, p < .05$, as compared to male participants, while the rest of the variables of interest did not differ by gender.

Correlations between Pain and Psychosocial Variables

Pearson product-moment correlations were obtained to examine the bivariate relationships between depression, perceived partner responses to pain, pain-related fear, pain, pain catastrophizing, relationship satisfaction, general sexual satisfaction, sexual satisfaction, and sexual drive. The intercorrelation matrix is shown in Table 3.

Relationship satisfaction was significantly related to a variety of measures. In the total sample, lower relationship satisfaction was associated with greater depression, greater negative responses from a partner, more pain, and increased pain catastrophizing. These relations are consistent with previous research and the hypotheses of the present study. Although all of these relations are considered above a moderate level, the strongest associations with relationship satisfaction were noted for negative responses from a partner, $r(58) = -.57, p < .001$, and depression, $r(58) = -.47, p < .001$. These relations indicate that satisfaction in the relationship is negatively influenced by pain, mood,

Table 2

Descriptive Statistics for All Measures by Gender

	Female (<i>N</i> = 31)		Male (<i>N</i> = 27)		<i>t</i>	Effect Size (Cohen's <i>d</i>)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Dyadic Adjustment Scale (DAS)	47.92	12.16	49.63	10.77	.77	.20
Short-Form McGill Pain Questionnaire (SF-MPQ)	22.74	10.22	22.29	9.10	-.17	-.05
Pain Catastrophizing Scale (PCS)	25.99	13.93	29.22	12.72	.91	.24
Pain-Related Fear (TSK)	41.07	8.89	46.19	9.18	2.12*	.56
Multidimensional Pain Inventory (MPI-II)						
Negative Responses	1.60	1.59	2.14	1.53	1.30	.35
Sollicitous Responses	3.93	1.55	3.98	1.53	.13	.03
Distracting Responses	2.43	1.39	2.64	1.13	.63	.16
Derogatis Sexual Functioning Inventory (DSFI)						
Sexual Satisfaction	6.43	2.75	6.16	2.25	-.38	.28
Sexual Drive	10.52	5.33	12.08	6.02	1.01	.04
Centre for Epidemiological Studies-Depression (CES-D)	24.94	10.55	24.56	12.32	-.12	-.03

Note. * $p < .05$, ** $p < .01$. Cohen's *d* values of .20, .50, and .80 correspond to small, medium, and large effect sizes, respectively (Cohen, 1992).

Table 3

Intercorrelations among All Measures in the Total Sample

Measure	1	2	3	4	5	6	7	8	9
1. DAS	–								
2. CES-D	-.47**	–							
3. NEG-R	.52**	.57**	–						
4. SOL-R	.21	.07	-.24	–					
5. DIS-R	.26*	.05	-.19	.56**	–				
6. FEAR	-.16	.53**	.45**	.22	.08	–			
7. CAT	-.29*	.64**	.52**	.19	-.05	.72**	–		
8. MPQ	-.34*	.62**	.37**	-.01	-.11	.52**	.66**	–	
9. SEXSAT	.36*	-.33*	-.45**	-.11	.06	-.47**	-.47**	-.61**	–

Note. * $p < .05$. ** $p < .01$. DAS = Dyadic Adjustment Scale; CES-D = Centre for Epidemiological Studies Depression; NEG-R = Negative Responses subscale of MPI; SOL-R = Solicitous Responses subscale of MPI; DIS-R = Distracting Responses subscale of MPI; FEAR = Tampa Scale of Kinesiophobia; CAT = Pain Catastrophizing Scale; MPQ = McGill Pain Questionnaire – Short form, SEXSAT = Derogatis Sexual Functioning Inventory – Sexual Satisfaction. Correlations of .10, .30, and .50 correspond to small, medium, and large effect sizes, respectively (Cohen, 1992).

internal cognitions about pain, and negative interactions with a partner. Variables that were positively related to relationship satisfaction included distracting responses, $r(58) = .26, p < .05$, and sexual satisfaction, $r(48) = .36, p < .05$. These relations suggest that pain coping assistance (in the form of distraction) and satisfying sex life are components of being more satisfied with your relationship.

Among the independent variables, several important relationships emerged. As was expected, greater pain was associated with more negative responses from a partner, greater participant depression, more pain-related fear, increased pain catastrophizing, and less sexual satisfaction. These findings are consistent with previous literature (Boothby et al., 2004; Flor et al., 1987a; Kerns & Turk, 1984; Monga et al., 1999; Schwartz et al., 1996; Williamson, Robinson, & Melamed, 1997). The current study found that the relationships between pain and depression, catastrophizing, and sexual satisfaction were considered very strong with correlations above .60. Greater depression was also associated with more negative responses from a partner, greater pain-related fear, and increased pain catastrophizing. As well, depression was negatively associated with sexual satisfaction. The strongest relationship noted was between depression and catastrophizing.

Greater negative responses from a partner were associated with increased pain-related fear, and increased pain catastrophizing. Negative responses were also negatively related to sexual satisfaction. Pain-related fear and pain catastrophizing were highly positively correlated, and both demonstrated significant negative associations with sexual satisfaction.

Additional correlations were obtained separately by gender, and can be seen in Table 4. For male participants, perceived negative responses were negatively associated with relationship satisfaction. Greater pain ratings were associated with increased depression, perceived negative responses, pain catastrophizing, pain-related fear, and less sexual satisfaction. Perceived negative responses were also associated with sexual satisfaction, decreased relationship satisfaction, greater pain catastrophizing, and higher levels of depression. In addition, depression was positively related to pain-related fear and pain catastrophizing.

As shown in Table 4, depression, perceived negative responses, pain-related fear, pain, and pain catastrophizing correlated significantly with increased relationship satisfaction in female participants; whereas more depressive symptoms, more frequent negative responses, increased pain-related fear and pain catastrophizing were associated with less relationship satisfaction. In addition, more sexual satisfaction was related to more relationship satisfaction. Pain was also significantly associated to depression, pain-related fear, pain catastrophizing, and sexual satisfaction. Perceived negative responses to pain were associated with pain-related fear, pain catastrophizing, and sexual satisfaction; whereas frequent negative responses were associated with increased pain-related fear, pain catastrophizing, and decreased sexual satisfaction. In addition, depression was positively correlated with pain-related fear and pain catastrophizing.

Table 4

Intercorrelations among All Measures by Gender

Measure	1	2	3	4	5	6	7	8	9
1. DAS	-----	-.36	-.42*	.15	.26	.02	-.17	-.19	.29
2. CES-D	-.58**	-----	.66**	.02	.21	.61**	.63**	.61**	-.38
3. NEG-R	-.74**	.51**	-----	-.25	-.04	.36	.49**	.43*	-.48*
4. SOL-R	.25	.11	-.24	-----	.55**	.29	.22	.10	-.21
5. DIS-R	.25	-.07	-.32	.63**	-----	.30	.12	.07	.02
6. FEAR	-.37*	.48**	.48**	.16	-.14	-----	.70**	.54**	-.33
7. CAT	-.40*	.66**	.53**	.18	-.19	.73**	-----	.63**	-.45*
8. MPQ	-.46*	.64**	.35	-.08	-.21	-.56**	.70**	-----	-.55**
9. SEXSAT	.43*	-.28	-.43*	-.03	.11	-.57**	-.48*	-.65**	-----

Note. * $p < .05$. ** $p < .01$. Correlations for men ($n = 27$) are above the diagonal; correlations for women ($n = 31$) are below the diagonal. DAS = Dyadic Adjustment Scale; CES-D = Centre for Epidemiological Studies Depression; NEG-R = Negative Responses subscale of MPI; SOL-R = Solicitous Responses subscale of MPI; DIS-R = Distracting Responses subscale of MPI; FEAR = Tampa Scale of Kinesiophobia; CAT = Pain Catastrophizing Scale; MPQ = McGill Pain Questionnaire – Short form, SEXSAT = Derogatis Sexual Functioning Inventory – Sexual Satisfaction. Correlations of .10, .30, and .50 correspond to small, medium, and large effect sizes, respectively (Cohen, 1992).

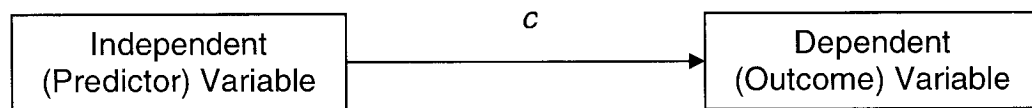
Analysis of Mediating Effects

Mediation analysis is generally conducted using the three steps criteria established by Baron and Kenny (1986). First, the total effect of the independent (or predictor) variable on the dependent variable must be significant (Path *c* of Figure 3). Second, the relationship between the mediator and the independent variable must be significant (Path *a* of Figure 3). Third, the mediator must be a significant predictor of the dependent variable in an equation controlling for the independent variable (Path *b* of Figure 3). If, for this third requirement, there is a significant decline in the direct association between the independent variable and outcome variable (Path *c'* of Figure 3), then the pattern of results is consistent with a mediation hypothesis. Once these conditions have been met, the significance of the indirect, or mediated, effect must be tested (Baron & Kenny, 1986). The indirect effect is the product of Paths *a* and *b*, which represents the mediated effect of the independent variable on the dependent variable through the mediator. This test is mathematically equivalent to a significance test of the drop in the direct effect when controlling for the mediator (Holmbeck, 2002).

Consideration of Assumptions

Before proceeding with the main analysis, the data were examined to ensure that they met the necessary assumptions for multiple regression. First, the normality of each variable was assessed using a Shapiro-Wilk's test of normality. The analyses indicated that four of the variables were not normally distributed (i.e., $p < .05$): depression, distracting responses, pain-related fear, and pain. Skewness and Kurtosis of each variable was also examined. Z-skewness and z-kurtosis values were calculated by dividing the skewness and kurtosis statistic by their respective standard error values.

The Direct Effect Model



The Mediation(Direct/Indirect Effect) Model

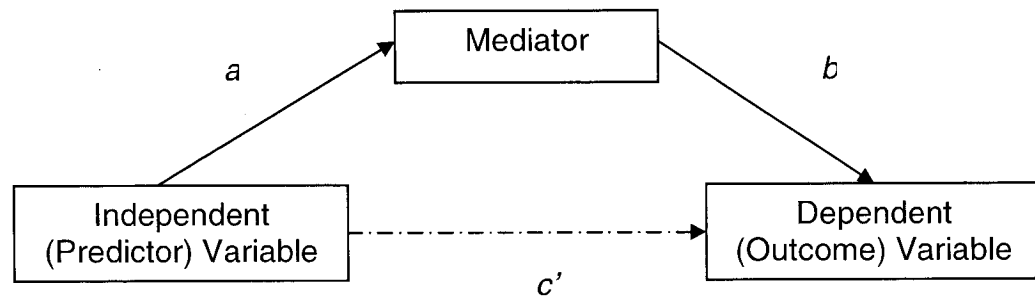


Figure 3. Criteria for Mediation and Mediation model proposed by Baron and Kenny (1986).

A distribution was considered non-normal if the z -value was greater than 3 or less than -3. In the current study, there were no z -*kurtosis* and z -*skewness* values outside of the ± 3 range. Therefore, it can be concluded that violations of normality were not due to skewness or kurtosis. Similarly, an examination of the q - q plots revealed only minor deviations from normality. These findings suggest that the violations of normality would not have a significant impact on the analyses. Second, there were no Cook's distances greater than 1.0, and the Mahalanobis' distances for all cases were below the critical value, $\chi^2_{(10)} = 23.21$, indicating that the data was free of multivariate outliers beyond what would be expected by chance. Third, there were no correlations greater than .80 among the variables, and the Variance Inflation Factor (VIF) did not exceed 10, confirming the absence of multicollinearity. Finally, to test for the assumptions of linearity and homoscedasticity, bivariate scatter plots were examined. These revealed the presence of heteroscedasticity among the study variables (i.e., variance of one variable was not constant at all levels of another variable).

As a result of failing to meet the distributional assumption of homoscedasticity, and because of the small sample size (Shrout & Bolger, 2002), a non-parametric bootstrapping approach was used to analyze the data. Traditional parametric tests assume that the sampling distribution of interest has particular known properties (e.g., normal distribution), whereas bootstrapping does not make the same demands on the data as the sampling distribution is derived empirically from the given sample. This highlights the main advantage of bootstrapping in that there are no assumptions made concerning the shape of the sampling distribution of the specific indirect effect because the sampling distribution of the indirect effect is estimated empirically (Hayes & Preacher, 2003).

The bootstrapping approach treats the sample as a population and then randomly draws a large number of samples of size N with replacement. For each “resample” the statistic of interest is calculated, and the frequency distribution of this statistic is used as an empirical estimate of its sampling distribution (Mooney & Duval, 1993). It is important to remember that each resample may have some of the original data represented in it more than once, and some not represented at all. Once completed, the bootstrapped sampling distribution can be used to make inferences about population parameters and generate confidence intervals for significance testing.

The current study utilized bootstrapping as a means of constructing confidence intervals around the regression coefficients in the series of regression equations that comprise mediation analysis (Baron & Kenny, 1986). Additionally, bootstrapping was used to test the significance of the indirect effects. MacKinnon, Lockwood, Hoffman, West, and Sheets (2002) demonstrated that traditional tests of the significance of indirect effects (e.g., Sobel’s test) tend to be overly conservative when the standard normal distribution is used to generate p -values. Therefore, an SPSS (SPSS, 1999) macro for bootstrapping (Hayes & Preacher, 2003), which produced empirical sampling distributions and confidence intervals for each indirect effect, was used. The confidence intervals were generated using bias correction and acceleration as this is a recommended procedure for generating accurate confidence intervals when the sample size is small (Hayes & Preacher, 2003). For all analyses, p -values were derived from bootstrapped confidence intervals and are reported in text. The bootstrapped confidence intervals can be found in Appendix O.

Mediation Analysis for Total Sample

A mediation analysis was conducted for each individual psychosocial variable to determine its univariate role as a mediator in the relationship between pain and relationship satisfaction (see Table 5). However, multiple mediation analysis is preferred to running separate simple mediation models for a couple of reasons. First, testing the total indirect effect of the independent variable on the dependent variable is equivalent to running a multiple regression analysis, when the goal is to determine whether an overall effect is present. If an effect is found, it can be concluded that the set of variables mediate the effect of the independent variable on the dependent variable (Preacher & Hayes, 2006). Second, by including multiple mediators in one model, it is possible to gain information regarding which mediators are the more successful predictors (Preacher & Hayes, 2006). Therefore, from the independent mediational analyses, two significant mediators emerged for the relationship between pain and relationship satisfaction: depression and negative responses by a partner. These mediators were put into the model together to examine their relative contributions to pain and relationship satisfaction.

Depression

Depression mediated the relationship between pain and relationship satisfaction. The total effect of pain on relationship satisfaction was significant, $\beta = -.34$, $p < .01$; as well as the association between pain and depression, $\beta = .62$, $p < .01$. The association between depression and relationship satisfaction, when controlling for pain, was also significant, $\beta = -.40$, $p < .05$. When depression was included in the equation, the direct effect between pain and relationship satisfaction became non-significant, $\beta = -.10$, n.s. The indirect effect of pain on relationship satisfaction through depression was significant,

Table 5

Standardized Regression (Path) Coefficients of Mediation Models with Psychosocial Variables as Mediators of Pain and Relationship Satisfaction for Total Sample

Mediator	Total Effect (Path <i>c</i>)	Direct effect, controlling for mediator (Path <i>c'</i>)	Effect on mediator (Path <i>a</i>)	Mediator effect on pain (Path <i>b</i>)	Indirect Effect (<i>ab</i>)
Depression	-.34**	-.10	.62**	-.40**	-.25*
Negative Responses	-.34**	-.14	.37**	-.54**	-.20**
Sollicitous Responses	-.34**	-.34**	-.01	.21	.00
Distracting Responses	-.34**	-.32*	-.11	.24	-.03
Pain-Related Fear	-.34**	-.34*	.52**	.00	.00
Catastrophizing	-.34**	-.23	-.66**	-.17	-.11
Sexual Satisfaction	-.28*	-.08	-.61**	.33	.20

Note. * $p < .05$. ** $p < .01$. Indirect effect is the product of pain effect on mediator (Path *a*) and mediator effect on relationship satisfaction (Path *b*). The significance of the indirect effect is equivalent to a test of the significance of the drop in the direct effect when controlling for the mediator. Path *c* varies according to the sample size used in the analyses. Significance levels based on 10,000 bootstrap samples. Paths *a*, *b*, *c*, and *c'* refer to those found in Figure 1.

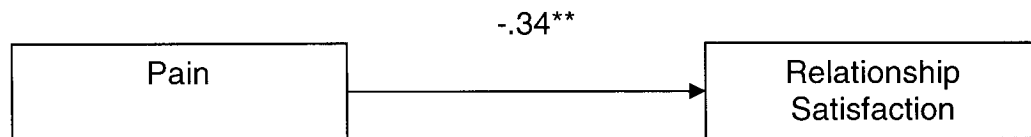
indirect effect = $-.25$, $p < .05$, indicating that the drop in the coefficient of the direct path was also significant (Holmbeck, 2002). Thus, depression is a significant mediator of pain and relationship satisfaction.

Negative Responses by a Partner

Negative responses by a partner mediated the relationship between pain and relationship satisfaction. The total effect of pain on relationship satisfaction was significant, $\beta = -.34$, $p < .01$; as well as the association between pain and negative responses, $\beta = .37$, $p < .01$. The association between negative responses and relationship satisfaction, when controlling for pain, was also significant, $\beta = -.54$, $p < .01$. When negative responses was included in the equation, the direct effect between pain and relationship satisfaction became non-significant, $\beta = -.14$, n.s. The indirect effect of pain on relationship satisfaction through negative responses was significant, *indirect effect* = $-.20$, $p < .01$. Thus, negative responses by a partner is also a significant mediator of pain and relationship satisfaction.

A multiple mediation analysis including depression and negative responses by a partner was conducted to examine the relative contributions of these mediators. As illustrated in Figure 4, only negative responses by a partner remained a significant mediator in the relationship between pain and relationship satisfaction. The total effect of pain on relationship satisfaction was significant, $\beta = -.34$, $p < .01$; as well as the association between pain and negative responses, $\beta = .37$, $p < .01$. The association between negative responses and relationship satisfaction, when controlling for pain, was also significant, $\beta = -.49$, $p < .01$.

The Direct Effect Model



The Mediation(Direct/Indirect Effect) Model

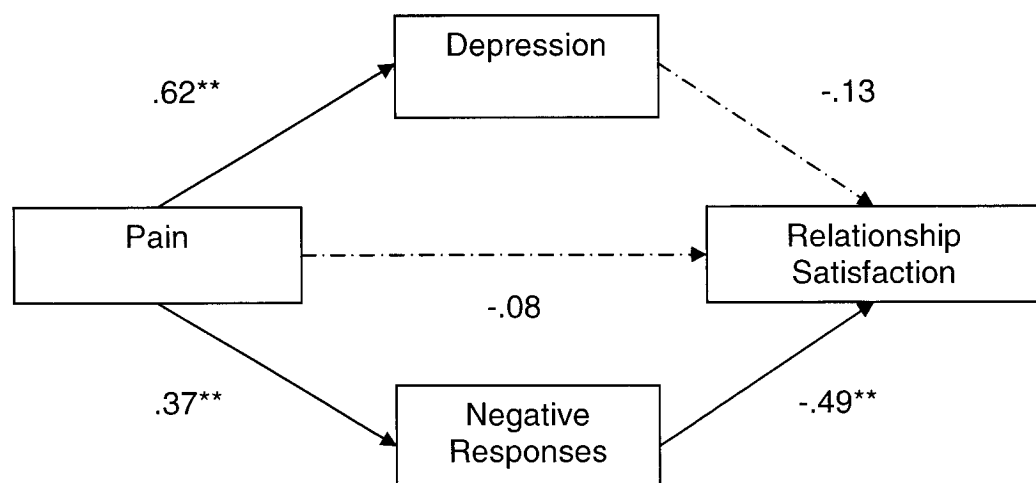


Figure 4. Path analysis for direct and mediational models of the relation between pain and relationship satisfaction. Path coefficients are standardized regression weights. Dashed lines indicate nonsignificant paths. ** $p < .01$.

When negative responses was included in the equation, the direct effect between pain and relationship satisfaction became non-significant, $\beta = -.08$, ns. The indirect effect of pain on relationship satisfaction through negative responses was significant, *indirect effect* = $-.18$, $p < .01$. The percentage of the total effect that is mediated can be used as an estimate of the relative strength of the mediation effect (MacKinnon & Dwyer, 1993). With a total direct effect of pain on relationship satisfaction of $-.34$, $p < .01$, 53% of the total effect was mediated by negative responses by a partner.

Depression was no longer found to be a significant mediator between pain and relationship satisfaction in the multiple mediation model. The total effect of pain on relationship satisfaction was significant, $\beta = -.34$, $p < .01$; as well as the association between pain and depression, $\beta = .62$, $p < .01$. The association between depression and relationship satisfaction, when controlling for pain, was non-significant, $\beta = -.13$, n.s. When depression was included in the equation, the direct effect between pain and relationship satisfaction became non-significant, $\beta = -.08$, n.s. The indirect effect of pain on relationship satisfaction through depression was non-significant, *indirect effect* = $-.08$, n.s. Therefore, the only significant mediator of pain and depression, when all significant independent mediators are included, is negative responses by a partner.

Mediation Analysis by Gender

To test the second hypothesis, mediation analyses were conducted separately by gender. Each psychosocial variable was again examined as a potential mediator between pain and relationship satisfaction for both male and female participants. As can be seen in Table 6, the results for female participants mirrored those from the total sample, such that both depression and negative responses by a partner were the only significant mediators

of pain and relationship satisfaction. Again, when both variables were included in a multiple mediator model, only negative responses remained a significant mediator. The total direct effect of pain on relationship satisfaction was $-.46, p < .01$, with 53% of the total effect being mediated by negative responses by a partner. The results for male participants were surprising as none of the psychosocial variables mediated the relationship between pain and relationship satisfaction. The total effect between pain and relationship satisfaction was found to be non-significant, $\beta = -.19, n.s.$ Therefore, the first criterion proposed by Baron and Kenny (1986) was not supported and no further mediational analyses were conducted.

Table 6

Standardized Regression (Path) Coefficients of Mediation Models with Psychosocial Variables as Mediators of Pain and Relationship Satisfaction for Females

Mediator	Total Effect (Path <i>c</i>)	Direct effect, controlling for mediator (Path <i>c'</i>)	Effect on mediator (Path <i>a</i>)	Mediator effect on pain (Path <i>b</i>)	Indirect Effect (<i>ab</i>)
Depression	-.46**	-.17	.64**	-.46*	.29**
Negative Responses	-.46**	-.20	.35*	-.73**	.26*
Sollicitous Responses	-.46**	-.44**	-.08	.23	-.02
Distracting Responses	-.46**	-.42*	-.21	.29	-.04
Pain-related Fear	-.46**	-.32	.56**	-.24	-.13
Catastrophizing	-.46**	-.25	.70**	-.31	-.21
Sexual Satisfaction	-.39*	-.14	-.65**	.38	.25

Note. * $p < .05$. ** $p < .01$. Indirect effect is the product of pain effect on mediator (Path *a*) and mediator effect on relationship satisfaction (Path *b*).

The significance of the indirect effect is equivalent to a test of the significance of the drop in the direct effect when controlling for the mediator.

Significance levels based on 10,000 bootstrap samples. Paths *a*, *b*, *c*, and *c'* refer to those found in Figure 1.

CHAPTER 5

Discussion

CLBP is an increasingly common condition that affects more than 70% of individuals living in industrialized communities (Borenstein et al., 2004). The impact of chronic pain has been well documented and shows that psychological and social wellbeing are greatly impaired (i.e., Cano et al., 2000; Cano, 2004; Currie & Wang, 2004; Kerns & Turk, 1984; Feldman et al., 1999; Flor et al, 1987b; Maruta et al., 1981, Monga et al., 1998). Previous research has also shown the influence of relationship satisfaction (acting as both moderator and mediator) on relationships between pain and various psychosocial variables and pain (Kerns et al., 1990; Cano et al., 2000). However, none of the CLBP research to date has included relationship satisfaction as an outcome variable while examining the impact that psychosocial variables have on pain and relationship satisfaction. Therefore, the purpose of the current study was to investigate the influence that various psychosocial variables have on pain patients and their relationship quality and extend previous research in the area of intimate relationships among patients with chronic pain.

Summary of Results

The current study addressed two main objectives concerning the association between pain and relationship satisfaction. The first objective was to determine which psychosocial variables mediated the relationship between pain and relationship satisfaction. It was hypothesized that depression, negative responses, solicitous responses, distracting responses, catastrophizing, pain-related fear, and sexual satisfaction would act independently as mediators, each resulting in lower marital satisfaction. From

the individual mediation analyses, depression and negative responses by a partner were the only psychosocial variables to emerge as significant mediators. This suggests that continuous CLBP can promote increased perceived negative responses by a partner, which in turn is associated with decreased relationship satisfaction. Likewise, CLBP may promote greater depressive symptoms, which in turn is associated with decreased relationship satisfaction. These results were consistent with two of the hypotheses, as well as previous studies involving chronic pain patients (Cano et al., 2004; Feldman, et al., 1999; Flor et al., 1987b; Kerns & Turk, 1984; Schwartz et al., 1996).

In addition, this study sought to determine the relative contribution of each significant mediator when examined simultaneously. In a multiple mediator model, only negative responses emerged as a significant mediator, accounting for 53% of the effect of pain on relationship satisfaction. It is surprising that depression was no longer a significant mediator in the model, given that depression has widely been implicated as a variable of importance in the pain and relationship literature (Cano et al. 2000; Cramer, 2004; Currie & Wang, 2004; Kerns & Turk, 1984). However, negative responses reflects the dynamics of a relationship (i.e., the way a partner responds to a patient's pain), while depression is more reflective of an individual's experience with pain. In a multiple mediator model, an individual indirect effect does not represent the overall ability of that particular mediator to mediate the relationship between the independent variable and the dependent variable. Instead, it represents the ability of that mediator to mediate the effect while controlling for all other mediators (Preacher & Hayes, 2006). The results of the present study suggest that negative responses is a more important mediator in this

relationship, accounting for unique variance over and above that contributed by depression.

Perhaps a more complicated relationship may exist for depression, negative responses, pain, and relationship satisfaction given that these four variables have been deemed significant and yet the temporal sequence of these variables is still unknown after more than twenty years of research. For example, Kerns and Turk (1984) proposed that chronic pain does not lead directly to depression, but rather to disruptions in spousal support and other social variables, which in turn are more likely to contribute to the development and maintenance of depression. Cano et al. (2000) proposed a different model, whereby marital satisfaction and pain severity mediated the relationship between negative responses and depression. Both of these studies highlight the importance of these four variables in the experience of chronic pain. Results of the current study are consistent with findings from Cano et al.'s (2000) work, showing that these four variables work together to form significant relationships, but in an alternative, plausible model.

A second major objective was to elucidate gender differences in variables associated with relationship satisfaction among CLBP patients. Pain-related fear was the only variable that differed significantly between males and females. This finding fits with the chronic pain literature such that, among male chronic pain patients, higher scores on a measure of pain-related anxiety have been associated with greater pain and more disability among male chronic pain patients (Edwards, Augustson, Fillingim, 2000; McCracken & Houle, 2000). In addition, the lack of a significant difference between male and female participants on the depression measure is somewhat surprising given that rates of depression are higher among women than men (Weissman, Bland, Joyce,

Newman, Wells, & Wittchen, 1993). Currie and Wang (2004) also found that individuals with both CLBP and major depression were more likely to be female. However, the fact that men and women appeared reasonably satisfied with their relationships may justify why there were no differences for depressive symptoms (Cano et al., 2000).

Many of the variables correlated for both males and females. However, relationship satisfaction showed markedly different correlations by gender, such that the magnitude of the association and the number of correlations were greatly varied. For example, among the female participants, relationship satisfaction correlated with depression, negative responses, pain-related fear, pain catastrophizing, pain, and sexual satisfaction. The effect sizes for all of these correlations were in the medium to high range. For male participants, relationship satisfaction only correlated with negative responses, with a medium effect size. Therefore, in the current study, more variables were found to associate with how women perceive their relationships as compared to men. The lack of significant correlations for male participants suggests that there is not a relationship between relationship satisfaction and the psychosocial variables in question in the present sample.

Gender differences emerged in the mediational models, such that depression and negative responses by a partner were both significant mediators of pain and relationship satisfaction among female, but not male, participants. In general, the results from the female participants mirrored those of the total sample. It is not surprising that depression was found to be a significant mediator for females, as the rates of depression are much higher for women than men (Weissman et al., 1993). That is, women are more likely to experience depression as a result of their pain. In regards to negative responses,

Schwarzer and Gutierrez-Dona (2005) proposed that, compared to men, women may be more sensitive to different kinds of social interaction as a result of socialization, such that men are raised to be more independent, while women are raised to seek support from others. They found that women did in fact report less spousal support than men, suggesting that perhaps male partners were not providing sufficient support. The results of the current study suggest that women's sensitivity to negative support from their partners may be increased by their pain, which in turn may lead to decreased satisfaction in their relationships.

Theoretical Implications

The results of this study are consistent with the biopsychosocial (BPS) model, such that the biological component (i.e., pain) is related to the social component (i.e., relationship satisfaction) through both a psychological variable (i.e., depression) and a psychosocial variable (i.e., perceived negative responses). Taken together, however, negative responses appear to have a greater impact on the relationship between pain and relationship satisfaction. The results of this study highlight the limitations of the biomedical model, which ignores the important contribution of depression and negative response to relationship satisfaction in CLBP patients, and demonstrate the importance of considering psychological and social variables in addition to biological variables when examining chronic pain conditions.

The results also fit within the context of operant models of pain, which suggest that patients' pain behaviours may draw attention from those in their social environment and may then be reinforced or extinguished depending on the quality of the environmental response (Turk et al., 1987). For example, patients in the current study

may display pain behaviours in the presence of their partners. Over time, the patients begin to perceive their partners as responding more negatively towards them with feelings such as anger and frustration over the pain. This may then lead to declines in relationship satisfaction. The same experience of pain may lead the patient to interpret the presence of pain to mean more disability. This view may lead to more depressive symptoms, which again may lead to lower levels of relationship satisfaction due to such factors as reduced intimacy.

The results also lend support to the VSA model proposed by Karney and Bradbury (1995). The VSA model suggests that the way a couple attempts to cope with life events will contribute to their opinion of their marital quality, while taking into account their personal characteristics. When stressful life events arise, changes in the perceptions of marital quality are likely to ensue. Given the mediation results from the current study, a more specific VSA model can be proposed for patients with CLBP by altering two of the original paths (see Figure 5). For example, stressful events, in the form of CLBP, may trigger an underlying vulnerability, such as that for depression (Path C of Figure 5). This may in turn affect marital quality, which in the current study was measured as relationship satisfaction (Path B in Figure 5). The dotted lines represent a path that may occur in the absence of negative responses, given the findings from the multiple mediator model. Additionally, stressful events are likely to alter the way the individual and the couple cope with these difficulties (e.g., partner support) (Path A in Figure 5), which will influence the quality or satisfaction with the relationship (Path F in Figure 5). This association appeared to have the strongest influence in the current study, a finding that is not surprising given that social support is one of the most influential

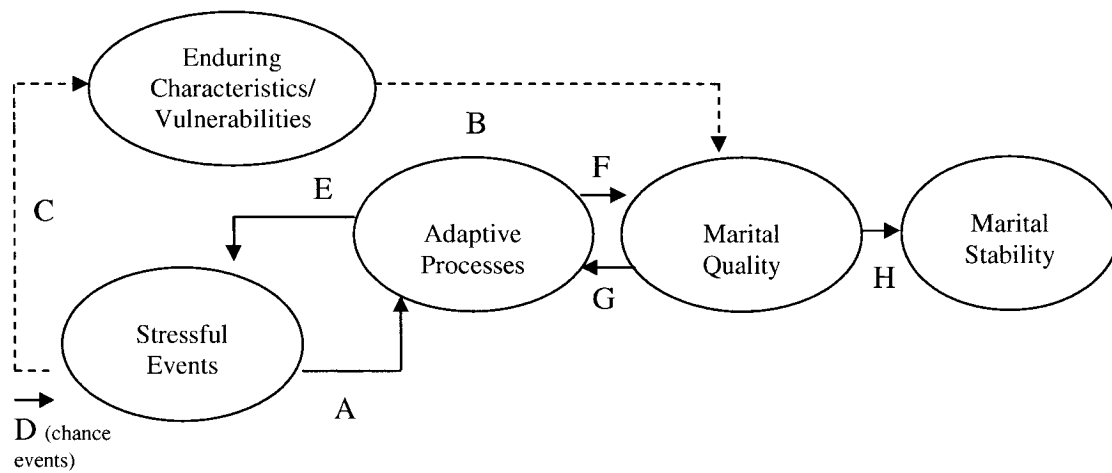


Figure 5. An adapted VSA model of marriage (Karney & Bradbury, 1995) for CLBP.

Dashed lines indicate changes to the model.

psychosocial mediators of stress (Gale et al., 2001). Additional research is needed to further examine the directions of relationships proposed in the original VSA model within chronic pain conditions, as the model provides a comprehensive analysis of the core components that affect relationship quality and stability.

Clinical Implications

The results of the current study have implications for CLBP treatment. It is clear from the present data that perceived negative responses from a partner and participant depression are associated with lower relationship satisfaction. This effect also seems to be prominent in the female participants of this sample only. These findings can be compared to previous research examining the impact of patients' chronic pain on partners' wellbeing (Flor et al., 1987b, Flor et al., 1989; Kerns & Turk, 1984). For example, Flor et al. (1987b) found that partners of patients with chronic pain experienced significantly less relationship satisfaction than the patients, and one quarter experienced symptoms of depression. Interestingly, spouses of patients with chronic pain presented with greater pain symptoms but not physical symptoms when compared to spouses of patients with other chronic, non-pain conditions (Flor et al., 1987b). In terms of gender differences, Flor et al. (1989) found significant differences between male and female partners with respect to marital satisfaction. More specifically, female partners' reported lower marital satisfaction than male partners. In addition, women reported more distress in regards to their husband's chronic conditions than men were about their wives' situations.

Social interactions between women suffering from painful rheumatoid arthritis and their husbands have also provided similar data (Manne & Zautra, 1990). In couples where the husbands made more critical remarks, the female patients reported greater pain and disability, while the husbands reported poorer psychological adjustment. Alternatively, when the husbands were regarded as supportive, the patients showed greater psychological adjustment. These findings indicate that negative social interactions are important in arthritis adjustment. Taken together, the findings of the current study and the research from other chronic pain conditions strongly emphasize the importance of including both the affected patient and the partner in psychosocial treatment. In particular, the current findings suggest that for women, psychosocial treatments should target depression and perceived negative responses from their partners in hopes of increasing relationship satisfaction and psychosocial adjustment.

Studies have examined psychosocial treatment programs for chronic pain that have included partners. For example, Saarijarvi (1991) was one of the first researchers to conduct a controlled study of couple's therapy for CLBP. He found that after five monthly sessions of marital therapy, marital communication had improved among the CLBP patients at one year follow up. At five years follow up, psychological distress had decreased significantly in the marital therapy group (Saarijarvi, Alanen, Rytokoski, & Hyypä, 1992). Pain management studies that used spousal assisted coping and included the partner in treatment for osteoarthritis have shown promising results (Keefe et al., 1996). The authors found that patients in the spouse-assisted coping skills training group showed reduced pain severity and behaviours, and psychological distress, with increases in marital satisfaction. These findings further support the impetus to establish treatment

programs for patients with CLBP that would include their partners. In particular, partner training in communication patterns and the avoidance of negative behavioural responses to a loved one in pain may be useful for partners in managing a variety of their own concerns (e.g., caregiver strain, personal adjustment). Indeed, instructing spouses how to respond to patients' attempts at coping with pain is important for psychological and interpersonal wellbeing. As well, communication training is one of the essential components of couples' therapy and the data reviewed suggests it could make a valuable addition in a CLBP treatment plan.

Limitations of the Current Study

There are limitations of the current research to be noted. First, the method of data collection must be acknowledged for its inherent weaknesses and strengths. The present data collection was reliant on self-report questionnaires completed by the patients only. Thus, it was not possible to objectively assess interaction patterns between the participants and their partner. Actual partner behaviour is unknown because no direct observations were made of couples interacting, and partners were not asked to provide opinions of their own behaviours or beliefs. Reliance on self-report measures increase the likelihood that factors such as social desirability will have an effect on participant responding (Schwartz et al., 1996), and limited the generalizability of the finding to the reporting sample. Additionally, most of the self-report measures were completed at participants' homes, and consequently, there is no guarantee that the measures were completed autonomously. Although self-report measures have their limitation, they are still useful and necessary tools for data collection. The "gold standard" of observed

behavioural data captured spontaneously in a natural environment is often impractical (e.g., Jensen & Karoly, 2001).

Second, the small sample size may have created problems in terms of the power for some of the statistical analyses. The data for a couple of potential mediators indicated trends in mediation that were close to significance. It is likely that the present sample size results in low power as there was a drop in c' for both sexual satisfaction and catastrophizing. It is suggested that a larger sample may have detected the effects of sexual satisfaction and catastrophizing in the mediational analyses. Alternatively, the significant relations shown for depression and perceived negative responses in mediating pain and relationship satisfaction within this low-moderately powered study suggest that these effects can be considered robust.

The present gender differences may also be explained by issues of low power. A cutoff recommendation for bootstrapping procedures in mediational models, to ensure a normal distribution, has been suggested at 30 participants (Mooney & Duval, 1993). In the current study, the sample size for the male participants' mediation model was below 30 participants. Bootstrapping procedures assumes that the empirical distribution constructed from the sample is an adequate estimator of the population distribution from which the sample was drawn. However, the smaller the sample size, the more likely it is that the important and necessary characteristics of a population will not be represented and may be particularly problematic when developing confidence intervals (Mooney & Duval, 1993). Therefore, readers are cautioned against generalizing the null findings of males in this sample to population males suffering from CLBP.

Lastly, although the mediation analysis used in this study suggests paths among the variables, one must be careful about making causal inferences when using a cross-sectional design. In the mediation models of the present study, assumptions were made regarding the various psychosocial variables, specifically that those variables temporally preceded relationship satisfaction when experiencing CLBP. However, alternative models have been proposed that include relationship satisfaction as a mediator in the relationship between pain and depression, and pain and negative partner responses (Cano et al., 2000). Both Cano et al's (2000) model and the current proposed model are plausible in their hypothesized association and relation of variables and both confirm the importance of these variables in the experience of chronic pain. However, additional research is needed to determine how these variables interact. Longitudinal studies can correctly determine the temporal order of variables, and allow for stronger causal conclusions to be made.

Future Research

Additional research is suggested to advance the understanding of CLBP. First, future research could look to expand the current sample or attempt to replicate the current findings. Obtaining larger samples would be a valuable course of action to ensure a more representative and normative sample for the present findings. A new, or expanded sample, could also consider data collection from other health care settings in the surrounding area or perhaps other areas of North America, to provide greater generalizability. A larger sample may also capture more participants with differences in SES groupings, ethnicities, and levels of education, which are all suggested to influence pain experience (e.g., Jensen & Karoly, 2001).

In addition, larger samples will allow for sufficient power to ensure that significant results are identified. For example, pain-related fear and pain catastrophizing were found to negatively correlate with sexual satisfaction. This suggests that patients likely held beliefs that engaging in sexual activity would lead to further injury of their backs. These findings are supported by the research of Osborne and Maruta (1980), which found that patients with chronic back pain tend to worry that any type of physical activity will cause additional injuries to their backs. This type of thinking leads patients to become distracted by their fear and anticipation of pain during sexual activities. Thus, pain-related fear and catastrophizing may mediate the relationship between pain and sexual satisfaction, which may mediate pain and relationship satisfaction.

Future research should also consider assessing individuals with chronic pain and their partners (e.g., Flor et al., 1987b; Flor et al., 1989; Kerns et al., 1990; Maruta et al., 1981; Romano et al., 1995). As previously mentioned, the experience of pain does not occur in isolation of the individual, but instead impacts the psychological, physical and interpersonal health of both individual and partner. For example, previous research has found that women, whether they are the individual in pain or the partner of a patient, tend to be more depressed and less satisfied with their marriages compared to their male partners (Romano et al., 1989), while Flor et al., (1987b) found that pain patients and their partners present with greater biopsychosocial problems when compared to pain-free couples. Therefore, it is suggested that examining the patient's and the partner's perspectives is essential to a full examination of how both parties influence the course of the intimate relationship.

Additional research must also consider the type of assessment methodology selected for the study. Obtaining self-report data from both patients and partners would allow for comparisons between perceived and actual responses and behaviours. In order to better assess the effects of negative responses and relationship satisfaction, researchers should also consider examining in vivo behavioural responses to pain behaviours exhibited by the patient. Recruiting partners of patients with pain may also aid researchers in examining how maladaptive and negative relationship communication can affect both partners. This is particularly important during activities that may produce pain. Examining the quality of interaction, communication and coping styles, and problem-solving abilities will provide a more comprehensive picture of the factors that contribute to psychosocial and relationship distress, and lend further support for the use of marital therapy component in the treatment of chronic pain.

Ultimately, longitudinal studies are needed to validate the current findings and help establish the course of relationship satisfaction as pain moves from an acute to a chronic stage. By establishing a temporal sequence, a prospective study would allow for inferences to be made concerning significant variables, such that pain preceded negatives responses by a partner and depression, and that both of these factors result in decreased relationship satisfaction. Researchers will also be able to conclude whether the couple's relationship was poor prior to the experience of pain, or whether pain was the crucial contributing factor to the decline of the relationship. Longitudinal studies may also help to tease apart the influence of each of the four primary variables on each other: pain, depression, negative responses, and relationship satisfaction, (Cano et al., 2000). This will allow for the generation of more complex models that may include such factors as

catastrophizing, sexual satisfaction, communication, and improve treatment services for individuals with pain, as well as their partners.

Conclusions

This research contributes to the study of both chronic pain and relationships.

1. When considered independently, both depression and negative responses significantly mediated pain and relationship satisfaction for the total sample.
2. Negative responses was the only unique mediator in the relationship between pain and relationship satisfaction for the total sample. Thus, the relation between pain and relationship satisfaction is fully accounted for by negative responses.
3. Gender differences emerged such that depression and negative responses were both significant mediators for female participants; however, no significant mediators were identified for male participants.

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Appendix A

Demographics

Demographic Survey

INSTRUCTIONS: This questionnaire is designed to help you describe your pain experience. Please answer all of the questions on each page. These pages cover your *pain's history, current status, and pain quality.*

1. Birthdate (d/m/y): _____
2. Age: _____
3. Gender: _____ Male _____ Female
4. Do you suffer from pain? ____ Yes ____ No
5. Write **#1** next to your **primary area of pain**, and a #2, #3 etc. next to your secondary sites of pain. Please write number next to the body part below.

____ head/face/mouth ____ neck ____ shoulders/upper arms ____ lower arms ____
 hands/fingers ____ abdomen/stomach ____ chest ____ upper back ____ mid-back
 ____ low back ____ upper legs ____ lower legs ____ feet ____ pelvis ____ buttocks
 ____ hips ____ anal area ____ genital area ____ other: _____

6. Using the "0 to 10" SCALE below, rate the strength or intensity of your pain for each area you marked above. Please record a pain rating on the line next to each area or site of your pain below.

No Pain								Worst Pain
Imaginable	0	1	2	3	4	5	6	7
8	9	10						

____ head/face/mouth ____ neck ____ shoulders/upper arms ____ lower arms
 ____ hands/fingers ____ abdomen/stomach ____ chest ____ upper back ____ mid-back ____ low
 back ____ upper legs ____ lower legs ____ feet ____ pelvis ____ buttocks ____ hips ____ anal area
 ____ genital area ____ other: _____

7. Number of years of formal education: _____
 (e.g., high school graduate = 12 years, 2 years collage or Associate Degrees = 14 years; Bachelors Degree = 16 years; Masters Degree = 18 years)

8. Marital Status: ☐ Married ☐ Living w/ someone ☐ Single ☐ Separated ☐ Divorced ☐ Widowed
9. Length of time in relationship: _____
10. Length of time living together: _____
11. Ethnic Background: ☐ White ☐ Black ☐ Hispanic ☐ Asian ☐ Native American ☐ Other
12. What do you think is the **primary cause** for your pain? (write #1 next to the primary cause, #2, #3, and so on, next to any secondary causes, and write in the specific cause/s if you can)

☐ motor vehicle accident ☐ a fall ☐ a lifting accident ☐ arthritis: _____

☐ moving wrong ☐ cancer: _____ ☐ a chronic illness: _____ ☐ an assault ☐ pulmonary disease _____ an infectious disease: _____ ☐ diabetes

☐ herniated disk ☐ cardiac disease ☐ a repetitive strain injury: _____

☐ an inflammatory disease: _____ ☐ a degenerative condition: _____

☐ a metabolic condition: _____ ☐ unknown cause

☐ other known cause: _____

13. Please explain the causes for your pain that you have marked down above: _____

14. What is/are your primary medical diagnosis or diagnoses? _____

15. What percentage of time are you in pain? Please circle the % of time you are in pain below.

% Time in pain = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

16. Is pain due to a work-related accident? ☐ Yes ☐ No

17. Onset of pain: Gradual _____, Abrupt _____

18. How long have you had the pain? When did it start? Months/Years _____

19. Are you working now? ☐ Yes ☐ No

20. If not, why not?

21. If yes, how many hours/week? _____

22. What type of work do you do or did you do? _____

23. Are you receiving disability? ☐ Yes ☐ No

24. Is an application planned? ☐ Yes ☐ No

25. Are you involved in a lawsuit related to your pain? ☐ Yes ☐ No

26. List all medications you are currently taking below.

Medication Name	Dosage	No. times per day?	Taking for what?
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

27. How many surgeries have you had to correct the cause of the pain? _____

Date	Surgery
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

28. List the types of medical and other treatments you've had for your primary and secondary pain problems.

Type of treatment?

29. Using the numbers below, rate the strength of your primary pain on the following scale for each situation or time below. For example, if you are experiencing no pain now, place a **0** on the line next to pain now.

No Pain										Worst Pain Imaginable
0	1	2	3	4	5	6	7	8	9	10

A. pain now ___ B. least pain this week ___ C. worst pain this week ___ D. usual level of pain___ E. pain early in the morning ___ F. pain at breakfast ___ G. pain in midmorning ___ H. pain at noon ___ I. pain in the mid-afternoon ___ J. pain in the late-afternoon ___ K. pain in the early-evening ___ L. pain at dinner time ___ M. pain in the late-evening ___ N. pain at bedtime ___ O. pain at work ___

30. What kinds of things ease or relieve your pain? _____

31. What kinds of things make your pain worse? _____

32. Below, list the kinds of things you used to do or enjoy that now your pain prevents you from doing. Next to each item or activity, record a percentage (0 to 100%) to show how much your pain disables or stops you from doing that activity.

% Disabled = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Activity	%	Activity	%	Activity	%
_____		_____		_____	
_____		_____		_____	
_____		_____		_____	

33. Circle a percentage below to show how much your pain disables you overall.

% Disabled = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

34. At what time/s of the day is your pain the worst? _____ The least? _____

35. Currently, what is your primary pain treatment? _____

For this past week, circle how much relief your primary pain treatment has given you.

% Pain relief = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

36. Are you able to do any household chores? ___ Yes ___ No

37. Circle a percentage below to show how much your pain disables you from doing your household chores?

% Disabled = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

38. What is your regular type of work? _____

39. Are you able to do your regular type of work, or go to work? ___ Yes ___ No

40. Circle a percentage below to show how much your pain disables you from doing your regular type of work?

% Disabled = 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

41. Medical History: Mark an X next to each medical problem you've had/have. Mark XX next to your main problems.

<input type="checkbox"/> Alcoholism	<input type="checkbox"/> Diabetes	<input type="checkbox"/> Heart disease	<input type="checkbox"/> Kidney disease
<input type="checkbox"/> Cancer	<input type="checkbox"/> Colitis	<input type="checkbox"/> Hepatitis	<input type="checkbox"/> Eye problems
<input type="checkbox"/> Stomach problems	<input type="checkbox"/> Mitral valve prolapse	<input type="checkbox"/> Genital herpes	<input type="checkbox"/> High blood pressure/hypertension
<input type="checkbox"/> Heart murmur	<input type="checkbox"/> Liver disease	<input type="checkbox"/> Hearing problem	<input type="checkbox"/> Skin problems
<input type="checkbox"/> Jaundice	<input type="checkbox"/> Oral herpes	<input type="checkbox"/> Panic attacks	<input type="checkbox"/> Rheumatoid arthritis
<input type="checkbox"/> Herpes zoster	<input type="checkbox"/> Emphysema	<input type="checkbox"/> Osteoarthritis	<input type="checkbox"/> Foot problems
<input type="checkbox"/> Lung disease	<input type="checkbox"/> Nightmares	<input type="checkbox"/> Esophagitis	<input type="checkbox"/> Sinus problems
<input type="checkbox"/> Depression	<input type="checkbox"/> Chronic fatigue	<input type="checkbox"/> AIDS or HIV +	<input type="checkbox"/> Frequent urinary tract infections
<input type="checkbox"/> Frequent colds	<input type="checkbox"/> Fractures	<input type="checkbox"/> Cluster headaches	<input type="checkbox"/> Ulcers
<input type="checkbox"/> Herniated disk	<input type="checkbox"/> Other arthritis	<input type="checkbox"/> Thyroid problems	<input type="checkbox"/> Tuberculosis
<input type="checkbox"/> Fibromyalgia	<input type="checkbox"/> Stroke	<input type="checkbox"/> Serious injuries	<input type="checkbox"/> Glaucoma
<input type="checkbox"/> Tension headaches	<input type="checkbox"/> Gynecological problems	<input type="checkbox"/> Trouble concentrating	<input type="checkbox"/> Clot/freezing hands or feet
<input type="checkbox"/> Other urinary problems	<input type="checkbox"/> Migraine headaches	<input type="checkbox"/> Anxiety and nervousness	<input type="checkbox"/> Repetitive strain injury
<input type="checkbox"/> Venereal disease	<input type="checkbox"/> Low blood sugar	<input type="checkbox"/> Constipation	<input type="checkbox"/> Dizziness/lightheaded
<input type="checkbox"/> Rheumatic fever	<input type="checkbox"/> Lupus	<input type="checkbox"/> Fainting spells	<input type="checkbox"/> Attention deficit disorder
<input type="checkbox"/> Multiple sclerosis	<input type="checkbox"/> Hemorrhoids	<input type="checkbox"/> Obesity	<input type="checkbox"/> Coronary artery disease
<input type="checkbox"/> Hernias	<input type="checkbox"/> Shaking/tremor	<input type="checkbox"/> Hemophilia	<input type="checkbox"/> Serious infection
<input type="checkbox"/> Gas/cramps/indigestion	<input type="checkbox"/> Trouble remembering	<input type="checkbox"/> Near death experience	<input type="checkbox"/> Physical or sexual abuse
<input type="checkbox"/> Weakness or paralysis	<input type="checkbox"/> Menstrual problems	<input type="checkbox"/> Psychiatric problems	<input type="checkbox"/> Unable to use your hands
<input type="checkbox"/> Pneumonia	<input type="checkbox"/> Sickle cell anemia	<input type="checkbox"/> Endometriosis	<input type="checkbox"/> Blurred vision
<input type="checkbox"/> A head injury	<input type="checkbox"/> Blackouts	<input type="checkbox"/> Loss of balance	<input type="checkbox"/> Diverticulitis
<input type="checkbox"/> Ringing in the ears	<input type="checkbox"/> Frequent heartburn	<input type="checkbox"/> Allergies/hay fever	<input type="checkbox"/> Pins and needles sensation
<input type="checkbox"/> Insomnia	<input type="checkbox"/> Frequent diarrhea	<input type="checkbox"/> Severe nausea	<input type="checkbox"/> Other:
<input type="checkbox"/> Double vision	<input type="checkbox"/> Asthma	<input type="checkbox"/> Numbness	<input type="checkbox"/>
<input type="checkbox"/> Severe appetite change	<input type="checkbox"/> Major weight change	<input type="checkbox"/> Epilepsy/seizures/convulsions	<input type="checkbox"/>
<input type="checkbox"/> Loss of smell or taste	<input type="checkbox"/> Loss of coordination	<input type="checkbox"/> Irritable bowel syndrome	<input type="checkbox"/>
<input type="checkbox"/> Anemia	<input type="checkbox"/> Drug addiction	<input type="checkbox"/> Heart attack	<input type="checkbox"/>

Appendix B

Multidimensional Pain Inventory- Part II

(Never) 0 1 2 3 4 5 6 (Very often)

8. Tries to get me to rest.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

PLEASE ONLY CHOOSE ONE RESPONSE FOR EACH ITEM

9. Tries to involve me in some activity.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

10. Gets angry with me.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

11. Gets me pain medication.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

12. Encourages me to work on a hobby.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

13. Gets me something to eat or drink.

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

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

☐ ☐ ☐ ☐ ☐ ☐ ☐

(Never) 0 1 2 3 4 5 6 (Very often)

Appendix C

Short-Form McGill Pain Questionnaire

SHORT FORM – MCGILL PAIN QUESTIONNAIRE (SF-MPQ)

Think of your current pain. Rate how much the following words describe your pain. Indicate the severity of each pain experience word by shading “None”, “Mild”, “Moderate”, “Severe”. Please choose only one response per item.

	None	Mild	Moderate	Severe
Throbbing	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Shooting	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Stabbing	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Sharp	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Cramping	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Gnawing	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Hot-Burning	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Aching	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Heavy	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Tender	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Splitting	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Tiring-Exhausting	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Sickening	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Fearful	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃
Punishing-Cruel	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃

Shade a circle above the number that shows your **PAIN**:

Current Pain – now... ☐₀ ☐₁ ☐₂ ☐₃ ☐₄ ☐₅ ☐₆ ☐₇ ☐₈ ☐₉ ☐₁₀
No Pain *Worst Possible Pain*

Pain at its least – past wk... ☐₀ ☐₁ ☐₂ ☐₃ ☐₄ ☐₅ ☐₆ ☐₇ ☐₈ ☐₉ ☐₁₀
No Pain *Worst Possible Pain*

Worst Pain – past wk... ☐₀ ☐₁ ☐₂ ☐₃ ☐₄ ☐₅ ☐₆ ☐₇ ☐₈ ☐₉ ☐₁₀
No Pain *Worst Possible Pain*

Average Pain – past wk... ☐₀ ☐₁ ☐₂ ☐₃ ☐₄ ☐₅ ☐₆ ☐₇ ☐₈ ☐₉ ☐₁₀
No Pain *Worst Possible Pain*

Shade in a descriptor below for your **Current** pain:

- ☐₀ **NO PAIN**
- ☐₁ **MILD**
- ☐₂ **DISCOMFORTING**
- ☐₃ **DISTRESSING**
- ☐₄ **HORRIBLE**
- ☐₅ **EXCRUCIATING**

Appendix D

Center for Epidemiological Studies Depression Scale

Center for Epidemiological Studies – Depression Scale

Circle the number of each statement, which best describes how often you felt or behaved this way – DURING THE PAST WEEK. Please choose only one response per item.

	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
DURING THE PAST WEEK:				
1. I was bothered by things that usually don't bother me	0	1	2	3
2. I did not feel like eating; my appetite was poor	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends	0	1	2	3
4. I felt that I was just as good as other people	0	1	2	3
5. I had trouble keeping my mind on what I was doing	0	1	2	3
6. I felt depressed	0	1	2	3
7. I felt that everything I did was an effort	0	1	2	3
8. I felt hopeful about the future	0	1	2	3
9. I thought my life had been a failure	0	1	2	3
10. I felt fearful	0	1	2	3
11. My sleep was restless	0	1	2	3
12. I was happy	0	1	2	3
13. I talked less than usual	0	1	2	3
14. I felt lonely	0	1	2	3

15. People were unfriendly	0	1	2	3
16. I enjoyed life	0	1	2	3
17. I had crying spells	0	1	2	3
18. I felt sad	0	1	2	3
19. I felt that people disliked me	0	1	2	3
20. I could not get "going"	0	1	2	3

Appendix E

Pain Catastrophizing Scale

PAIN CATASTROPHIZING SCALE - PCS

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. [**Please shade circle completely**]. Please choose only one response per item.

<i>When I'm in pain ...</i>	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time
1. I worry all the time about whether the pain will end.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
2. I feel I can't go on.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
3. It's terrible and I think it's never going to get any better.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
4. It's awful and I feel that it overwhelms me.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
5. I feel I can't stand it anymore.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
6. I become afraid that the pain will get worse.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
7. I keep thinking of other painful events.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
8. I anxiously want the pain to go away.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
9. I can't seem to keep it out of my mind.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
10. I keep thinking about how much it hurts.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
11. I keep thinking about how badly I want the pain to stop.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
12. There's nothing I can do to reduce the intensity of the pain.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄
13. I wonder whether something serious may happen.	<input type="radio"/> ₀	<input type="radio"/> ₁	<input type="radio"/> ₂	<input type="radio"/> ₃	<input type="radio"/> ₄

Appendix F

Tampa Scale for Kinesiophobia

TAMPA SCALE FOR KINESIOPHOBIA (TSK)

Please read each of the following statements and check the number that better represents your feelings over the last week. Please choose only one response per item.

Strongly disagree
Somewhat disagree
Somewhat agree
Strongly agree

- | | | | | |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1. I'm afraid that I might injure myself if I exercise | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 2. If I were to try to overcome it, my pain would increase | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 3. My body is telling me I have something dangerously wrong | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 4. My pain would probably be relieved if I were to engage in sexual activity | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 5. People aren't taking my medical condition seriously enough | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 6. My accident has put my body at risk for the rest of my life | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 7. Pain always means I have injured my body | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 8. Just because something aggravates my body does not mean it is dangerous | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 9. I am afraid that I might injure myself accidentally | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 10. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 11. I wouldn't have this much pain if there weren't something potentially dangerous going on in my body | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 12. Although my condition is painful, I would be better off if I were Physically active | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 13. Pain lets me know when to stop engaging in sexual activity so that I don't injure Myself | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 14. It's really not safe for a person with a condition like mine to be physically active | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 15. I can't do all the things normal people do because it's too easy for me to get injured | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 16. Even though something is causing me a lot of pain, I don't think it's actually dangerous | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 17. No one should have to engage in sexual activity when he/she is in pain | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

Appendix G

Derogatis Sexual Functioning Inventory

DEROGATIS SEXUAL FUNCTIONING INVENTORY

Drive:

Below we would like you to indicate the frequency with which you typically engage in certain sexual activities. Please indicate how often you experience each of the sexual activities below by checking (✓) the category that is closest to your personal frequency. Categories range from from “NOT AT ALL” to “4 OR MORE TIMES A DAY” . Please do not skip any items. Please choose only one response per item.

	Not at all	Less than 1/month	1-2/ month	1/week	2-3/ week	4-6/ week	1/day	2-3/ day	4 or more/ day
1. Intercourse									
2. Masturbation									
3. Kissing and Petting									
4. Sexual Fantasies									

5. What would be your ideal frequency of sexual intercourse? _____

Sexual Satisfaction:

Below are some statements about sexual satisfaction. Please indicate whether each statement is true of you by checking the box labeled either TRUE or FALSE for each item.

	TRUE	FALSE
1. Usually, I am satisfied with my partner		
2. I feel I do not have sex frequently enough		
3. There is not enough variety in my sex life		
4. Usually, after sex I feel relaxed and fulfilled		
5. Usually, sex does not last long enough		
6. I am not very interested in sex		
7. Usually, I have a satisfying orgasm with sex		
8. Foreplay before intercourse is usually very arousing for me		
9. Often, I worry about my sexual performance		
10. Usually, my partner and I have good communication about sex		

General Sexual Satisfaction:

Below is a rating scale upon which we would like you to record your personal evaluation of how satisfying your sexual relationship is. The rating is simple. Make your evaluation by placing a check in the appropriate box that best describes your present sexual relationship.

8	Could not be better	
7	Excellent	
6	Good	
5	Above Average	
4	Adequate	
3	Somewhat inadequate	
2	Poor	
1	Highly inadequate	
0	Could not be worse	

Appendix H

Dyadic Adjustment Scale

DAS

Most persons have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list. Circle the number under one answer for each item.

	Always Agree	Almost Always Agree	Occasionally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
1. Handling family finances	5	4	3	2	1	0
2. Matters of recreation	5	4	3	2	1	0
3. Religious matters	5	4	3	2	1	0
4. Demonstrations of affection	5	4	3	2	1	0
5. Friends	5	4	3	2	1	0
6. Sex relations	5	4	3	2	1	0
7. Conventionality (correct or proper behavior)	5	4	3	2	1	0
8. Philosophy of life	5	4	3	2	1	0
9. Ways of dealing with parents or in-laws	5	4	3	2	1	0
10. Aims, goals, and things believed important	5	4	3	2	1	0
11. Amount of time spent together	5	4	3	2	1	0
12. Making major decisions	5	4	3	2	1	0
13. Household tasks	5	4	3	2	1	0
14. Leisure time interests and activities	5	4	3	2	1	0
15. Career decisions	5	4	3	2	1	0
	All The Time	Most Of The time	More Often Than Not	Occasionally	Rarely	Never
16. How often do you discuss or have you considered divorce, separation, or termination your relationship?	0	1	2	3	4	5
17. How often do you or your mate leave the house after a fight?	0	1	2	3	4	5

18.	In general, how often do you think that things between you and your partner are going well?	5	4	3	2	1	0
19.	Do you confide in your mate?	5	4	3	2	1	0
20.	Do you ever regret that you married (or lived together)?	0	1	2	3	4	5
21.	How often do you and your partner quarrel?	0	1	2	3	4	5
22.	How often do you and your mate get on each others' nerves?	0	1	2	3	4	5
23.	Do you kiss your mate?	4	3	2	1	0	
24.	Do you and your mate engage in outside interests together?	4	3	2	1	0	

How often do the following occur between you and your mate?

25.	Have a stimulating exchange of ideas	Never	Less Than Once a Month	Once Or Twice a Month	Once Or Twice a Week	Once a Day	More Often
26.	Laugh together	0	1	2	3	4	5
27.	Calmly discuss something	0	1	2	3	4	5
28.	Work together on a project	0	1	2	3	4	5

These are some things about which couples sometimes agree or disagree. Indicate if either item caused differences of opinions or were problems in the past few weeks.

		Yes	No
29.	Being too tired for sex	0	1
30.	Not showing love	0	1

31. The numbers on the following line represent different degrees of happiness in your relationship. The middle point, "happy," represents the degree of happiness of most relationships. Please circle the number above the phrase which best describes the degree of happiness, all things considered, of your relationship.

0	1	2	3	4	5	6
Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect

*32. Which of the following statements best describes how you feel about the future of your relationship? Circle the number for **one** statement.*

5	I want desperately for my relationship to succeed, and would go to almost any length to see that it does.
4	I want very much for my relationship to succeed, and will do all I can to see that it does.
3	I want very much for my relationship to succeed, and will do my fair share to see that it does.
2	It would be nice if my relationship succeeded, but I can't do much more than I am doing now to keep the relationship going.
1	It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
0	My relationship can never succeed, and there is no more that I can do to keep the relationship going.

Appendix I

Advertisement

Chronic Low Back Pain? *Free Workshop!*

Are you....

❖ A chronic low back pain sufferer
(3 months or longer)?

❖ In a committed relationship (married
or living together for 6 months or
longer)?



If so, the Department of Psychology at Queen's University invites you to participate in an interesting study on the impact of chronic low back pain on relationships. For your time, we will be offering a **FREE WORKSHOP** entitled "Living with Chronic Low Back Pain" for you and your partner.

Research Investigators

Samantha Waxman, B.A., Dr. Dean Tripp, Ph.D.

Study procedure

You will be asked to complete a package of questionnaires. It will take approximately 45 minutes to complete and you will be **reimbursed \$10** for your time. All information will be kept strictly confidential.

For more information on how you can participate, please contact our research team at (613) 533-6000, ext. 75459:

(613) 533-6000, ext.
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Appendix J

Letter of Information



Chronic Low Back Pain and the Impact on Relationship Satisfaction LETTER OF INFORMATION

Department of Psychology, Pain Research Lab
Queen's University, Kingston, ON
K7L 3N6, Canada

Dear Sir or Madam,

The number of people suffering from low back pain is far too high! Although many research groups are examining medical and physical factors in back pain, little work has looked at how couples try to manage back pain together and what effects it has on their relationship. We are conducting a study that will be the first to examine relationships in back pain. Our hope is that a better understanding of the factors that contribute to the quality of your relationship will allow us to advise patients in what successful couples do to live a better quality of life. Samantha Waxman, a Master's student researcher in the Department of Psychology at Queen's University is conducting this study under the supervision of Dr. Dean Tripp. The research has been approved by the Queen's University General Ethics Review Board.

This study will ask about the thoughts, feelings, and behaviours of living with chronic low back pain by using questionnaires. There are no known physical, psychological, economic, or social risks involved. If you decided to participate, you will be asked to complete a package of questionnaires which will take approximately 45 minutes to complete.

In completing the package of questionnaires, you may benefit by potentially gaining more insight into the various issues that affect and are affected by your chronic pain. In addition, your efforts may have significant benefits to future patients or to yourself by helping researchers and physicians understand how these issues influence your experience with chronic pain.

To participate in this study, the following criteria must be met:

- 1 Individual must read and write English at grade level 8.
- 2 Individual must be diagnosed as having CLBP, lasting a minimum of three months as diagnosed by their family physician or other health care provider.
- 3 Individual must be married and/or cohabitating with his or her partner for more than six months.
- 4 The pain condition must not be related to neurological damage (e.g. stroke).
- 5 At the time of the study, the individual must not be involved in marital or relationship counselling.

Your participation in this study is voluntary and you are free to withdraw at any point. All information is kept completely confidential in locked research cabinets and only members of the research team will have access to the information. At no time will you be identified as an individual as the data will be numerically coded to ensure confidentiality and anonymity. **This material will at no time be available to insurance companies or the government.** Only the

group data will be reported in the research. However, if you would like a GENERAL SUMMARY of findings from this study, you may obtain them by contacting (after July 2006) Samantha Waxman by e-mail at 4sew@qmlink.queensu.ca.

We greatly appreciate you participating in this research project and sharing your personal experiences. If the recounting of experiences leads you to feel distressed and you would like to speak to someone, you are encouraged to contact your family physician or mental health professional. At the end of this information sheet we have provided telephone numbers of agencies which you can contact should you feel any distress.

To thank you for your participation, we will be mailing you a \$10 cheque when we receive your completed questionnaires. In addition, we will be offering a workshop titled "Living with Chronic Low Back Pain" in March, 2006. This workshop will be available to you and your partner at no charge (value of \$150). Topics to be discussed include mood, pain management, communication skills, and current research on couples and pain.

If you have any questions regarding the purpose or process of the study, please contact me, Samantha Waxman (E-mail: 4sew@qmlink.queensu.ca or telephone at (613) 533-6000, ext. 75459. You may also contact Dr. Dean Tripp (E-mail: Dean.Tripp@queensu.ca, 613-533-6955), the Head of the Department of Psychology at Queen's University (613-533-2492), or the Chair of the Queen's University General Research Ethics Board (613-533-6000, ext. 74579). Your participation in this research is greatly appreciated.

Sincerely,

Samantha Waxman, B.A., M.A. Candidate
Queen's University Pain Research Lab

Mental Health Resources

Belleville General Hospital.....(613) 969-5511

Brockville General Hospital.....(613) 345-5645

Kingston General Hospital.....(613) 548-2333

Frontenac Community Mental Health Services:

Information.....544-1356

24 Hour Crisis Line.....544-4229

Leeds and Grenville Rehabilitation and Counselling Services:

Toll Free.....1 800 267-4406

Delta.....(613) 928-3460

Gananoque.....(613) 382-4016 ext. 100

Kemptville.....(613) 258-7204

Prescott.....(613) 925-5940

Appendix K

Instruction Sheet

INSTRUCTION SHEET

1. Please sign the letter of consent.
2. If you have any questions at any point during the completion of the questionnaires, please contact any of the members of the research team listed on the consent form.
3. In order to ensure confidentiality, please do **NOT** put your name, address, or any other personally identifying information on the questionnaires. Your responses will not be connected to your name in any publications or presentations at scientific conferences that may come from this study.
4. Complete questionnaires. It would be appreciated if you would answer **ALL** questions as honestly as possible. However, you should not feel obligated to answer any questions that you find offensive or that make you feel uncomfortable. It is important that you complete the questionnaires on your own.
5. Please mark **ONLY ONE** response for each question. If you feel a question could be answered with more than one response, please choose the response that best reflects your situation.
6. Return the questionnaires and consent form to the pre-stamped envelope that is addressed to Queen's University, and mail out. The letter of information and debriefing sheet are yours to keep.

Thank you again for your participation, it is greatly appreciated!

Sincerely,
Samantha Waxman, B.A.

Appendix L

Consent Form

Chronic Low Back Pain and the Impact on Relationship Satisfaction PATIENT CONSENT FORM

I, _____, have volunteered to participate in the study examining chronic low back pain and its impact on relationship satisfaction.

I have read the letter of information regarding the current study and understand what is required for participation. I understand that I will complete a package of questionnaires that will ask me questions about various aspects of my life, including my pain, mood, sexual relations, and relationships. All of my questions regarding this study have been answered to my satisfaction.

I understand that if I find some questions offensive or cause me emotional distress, I am free to skip those items. I also understand that if I feel any emotional distress I should contact my family physician or a mental health provider. I have been given telephone numbers of agencies, which I can contact should I feel any distress.

I understand that my participation in this study is completely voluntary and that I am free to withdraw at any time. I also understand that my confidentiality will be protected throughout the study, and that the information I provide will be used for research purposes only.

Should I have further questions, I understand that I can contact any of the following individuals: Samantha Waxman (4sew@qlink.queensu.ca, or (613) 533-6000, ext. 75459), Head of the Psychology Department (613-533-2492), or the Chair of the Queen's University General Research Ethics Board (613-533-6000, ext. 74579).

Name: _____

Address: _____

Please check **ONE** of the following boxes:

- ☐ **I would like any identifying information destroyed once the thesis is completed, and I would like to remain anonymous.**
- ☐ **I agree to let the researchers keep my identifying information on file in the secure lab, and contact me if needed.**
- ☐ **I agree to let the researchers keep my identifying information on file in the secure lab, and contact me for participation in future research projects.**

Appendix M

Mental Health Resources

Mental Health Resources

Belleville General Hospital.....(613) 969-5511

Brockville General Hospital.....(613) 345-5645

Kingston General Hospital.....(613) 548-2333

Frontenac Community Mental Health Services:

Information.....544-1356

24 Hour Crisis Line.....544-4229

Leeds and Grenville Rehabilitation and Counseling Services:

Toll Free.....1 800 267-4406

Delta.....(613) 928-3460

Gananoque..... (613) 382-4016 ext. 100

Kemptville.....(613) 258-7204

Prescott.....(613) 925-5940

Appendix N

Debriefing Sheet

Debriefing Sheet

Thank you for your participation in the study “Chronic Low Back Pain and the Impact on Relationship Satisfaction”. Our hope is that by gaining a better understanding of the factors that contribute to the quality of your relationship, we will be able to advise patients in what successful couples do to live a better quality of life.

In completing the package of questionnaires, you may benefit by potentially gaining more insight into the various issues that affect and are affected by your chronic pain. In addition, your efforts may have significant benefits to future patients or to yourself by helping researchers and physicians understand how these issues influence your experience with chronic pain.

Just a reminder: All information is kept completely confidential in locked research cabinets and only members of the research team will have access to the information. At no time will you be identified as an individual as the data will be numerically coded to ensure confidentiality and anonymity. **This material will at no time be available to insurance companies or the government.** Only the group data will be reported in the research. However, if you would like a GENERAL SUMMARY of findings from this study, you may obtain them by contacting (after July 2006) Samantha Waxman by e-mail at 4sew@qmlink.queensu.ca.

We greatly appreciate you participating in this research project and sharing your personal experiences. If the recounting of experiences leads you to feel distressed and you would like to speak to someone, you are encouraged to contact your family physician or mental health professional. If you would like to contact someone regarding feelings of distress, please refer to the telephone numbers provided at the beginning of the session.

Thank you again!
Sincerely,

Samantha Waxman, B.A., M.A. Candidate
Queen's University Pain Research Lab

The references provided below are for further information regarding this topic:

- Flor, H., Turk, D. C., & Scholz, O. B. (1987). Impact of chronic pain on the spouse: Marital, emotional and physical consequences. *Journal of Psychosomatic Research*, 31(1), 63-71.
- Monga, T. N., Tans, G., Ostermann, H. J., Monga, U., & Graboys, M. (1998). Sexuality and sexual adjustment of patients with chronic pain. *Disability and Rehabilitation*, 20(9), 317-329.
- Turk, D. C., Flor, H., & Rudy, T. E. (1987). Pain and families. I. Etiology, maintenance, and psychosocial impact. *Pain*, 30, 3-27.
- Cano, A., Gillis, M., Heinz, W., Geisser, M., & Foran H. (2004). Marital functioning, chronic pain, and psychological distress. *Pain*, 107, 99-106.

Appendix O

Bootstrap Estimates and Confidence Intervals

Bootstrap Estimates and Confidence Intervals of Regression Coefficients in Meditational Models for Total Sample

	Unstandardized		Bootstrap 95%		Bootstrap 99%	
	Regression Coefficients		Confidence Interval		Confidence Interval	
	Data	Bootstrap	Lower	Upper	Lower	Upper
<i>Model with Depression mediating Pain and Relationship Satisfaction</i>						
Total Effect	-.399	-.397	-.668	-.137	-.769	-.051
Path <i>a</i>	.742	.745	.516	.991	.441	1.061
Path <i>b</i>	-.385	-.374	-.655	-.050	-.732	.072
Direct Effect (Path <i>c</i>)	-.113	-.117	-.410	.175	-.510	.279
Indirect Effect (<i>ab</i>)	-.286	-.281	-.604	-.065	-.751	-.001
<i>Model with Negative Responses mediating Pain and Relationship Satisfaction</i>						
Total Effect	-.399	-.491	-.678	-.144	-.764	-.065
Path <i>a</i>	.062	.063	.022	.107	.010	.122
Path <i>b</i>	-3.788	-3.730	-5.542	-1.747	-6.099	-1.101
Direct Effect (Path <i>c</i>)	-.165	-.154	-.390	.123	-.474	.240
Indirect Effect (<i>ab</i>)	-.235	-.246	-.545	-.053	-.653	-.017

Note. Analyses based on 10,000 bootstrap samples. Bias-corrected and accelerated confidence intervals were used. Paths *a*, *b*, and *c* are illustrated in Figure 1.

Bootstrap Estimates and Confidence Intervals of Regression Coefficients in Mediation Models for Females

	Unstandardized Regression Coefficients		Bootstrap 95% Confidence Interval		Bootstrap 99% Confidence Interval	
	Data	Bootstrap	Lower	Upper	Lower	Upper
<i>Model with Depression mediating Pain and Relationship Satisfaction</i>						
Total Effect	-.516	-.520	-.876	-.190	-1.010	-.074
Path <i>a</i>	.674	.668	.356	.969	.233	1.067
Path <i>b</i>	-.490	-.472	-.835	-.033	-.952	.146
Direct Effect (Path <i>c</i>)	-.186	-.211	-.613	.134	-.790	.242
Indirect Effect (<i>ab</i>)	-.330	-.306	-.685	-.099	-.893	-.005
<i>Model with Negative Responses mediating Pain and Relationship Satisfaction</i>						
Total Effect	-.516	-.521	-.872	-.192	-1.005	-.079
Path <i>a</i>	.055	.056	.003	.121	-.011	.146
Path <i>b</i>	-5.271	-5.273	-6.859	-3.425	-7.363	-2.323
Direct Effect (Path <i>c</i>)	-.227	-.212	-.484	.134	-.571	.246
Indirect Effect (<i>ab</i>)	-.290	-.304	-.770	-.018	-.999	.045

Note. Analyses based on 10,000 bootstrap samples. Bias-corrected and accelerated confidence intervals were used. Paths *a*, *b*, and *c* are illustrated in Figure 1.