Social Support in Urologic Chronic Pelvic Pain Syndrome: The Stress-Buffering Model and Gender Differences

by

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Abstract

Chronic pain is recognized for its intra- and interpersonal stress, with greater social support being associated with better patient outcomes. Urologic Chronic Pelvic Pain Syndromes (UCPPS) are pain-associated conditions that are prevalent across genders and are strongly associated with diminished quality of life (QOL). To date, no gender-based research has examined such supportive behaviours in UCPPS samples. One model, the stress-buffering model of social support, suggests people with greater support within their proximal (e.g., marriage) and distal (e.g., physician) social environment may be protected from negative stressor impact (i.e., pain). Due to their strong associations with poorer QoL, I hypothesized catastrophizing and perceived pain control as important intrapersonal cognitive variables to also consider in such relations between pain and patient QoL. In this dissertation, I examined several research questions using two self-report studies: 1) Are there gender differences in social support for people with UCPPS?; 2) Does social support moderate the relationship between pain and patient outcome variables and are there gender differences in this effect?; and 3) If social support moderates the relationship between pain and outcomes, is this effect further moderated by cognitive variables and/or gender?

In Studies 1 and 2, women with IC/PBS endorsed higher levels of solicitous and distracting spouse responses to pain behaviour than did men with CP/CPPS. Additionally, in Study 2 women reported greater support from friends than did men. In regard to moderation effects in Study 1, distracting spouse responses buffered the relationships between patient pain and mental QoL, and between pain and disability.
However, spouse solicitousness had a detrimental effect on the relationship between patient pain and mental QoL but only at low levels of catastrophizing in the patient. The genders did not differ in the effect of spouse responses to pain behaviour in Study 1, and Study 1 results with respect to the stress-buffering role of distracting spouse responses were not replicated in Study 2. In Study 2, sources of social support from outside of the marriage also did not have a stress-buffering effect on the relationship between pain and patient outcome. Of the models reviewed, no one current model for understanding the role of social support or catastrophizing in chronic pain was sufficient to account for the findings reported in these studies. However, a dyadic emotion regulation perspective is suggested with implications for marital therapy with couples with chronic pain.
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Abstract

Introduction

Present Study

Methods

Participants

Measures

Procedure

Results

Preliminary Analyses

Bivariate Correlations

Research Question 1: Are there gender differences in reported spousal responses to pain behaviour and social support from family, friends and physician between women with IC/PBS and men with CP/CPPS?

Research Questions 2 and 3: Does social support moderate the relationship between pain and patient outcome variables and are there gender differences in this effect? Does social support continue to moderate the relationship between pain and patient outcome when catastrophizing is included as a potential moderator and are there gender differences in this effect?
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Chapter 1: General Introduction

This series of studies is focused on understanding how social support perceived by a patient suffering from a chronic pain condition can potentially act to buffer the negative impact of pain. What follows in this chapter (Chapter 1) is a review of what pain “is,” how it has been considered in the relevant research, and an illustration of some of the important variables (i.e., social support, cognitive variables) and models relevant to patient pain and QOL. Following this, in Chapter 2, I will review the psychological research in Urologic Chronic Pelvic Pain Syndromes and the gender differences in social support, and I will provide an overview of the present line of research. Chapters 3 and 4 contain the respective studies followed by the General Discussion in Chapter 5.

What is Pain?

The most common definition of pain suggests it is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Bonica, 1979, p. 250). Pain serves as an important warning signal of disease or injury and is much more than a process of neural transmission and sensory transduction. Pain is complex involving emotions, culture, experience, sensation, and even spirituality. Pain is typically described as chronic when it lasts longer than three months since pain onset (Turk & Okifuji, 2001), but some researchers suggest the modification from acute to chronic is the 12-month mark (Spanswick & Main, 2000). Beyond duration, chronic pain also differs from acute pain in that it is often referred to as a disease state of the central nervous system. In such a disease state, a sensitization or
wind-up process amplifies neural responses to the initial painful stimuli altering the usual function of neural mechanisms.

According to (Schopflocher, Taenzer, & Jovey, 2011), a survey of a representative sample across Canada indicated 18.9% of Canadians suffer from chronic pain (i.e., pain lasting ≥ 6 months). Moreover, LaChapelle (2004) reports that up to 80% of physician visits in Canada are for issues resulting from pain. Chronic pain costs more than cancer, heart disease, and HIV combined, with estimated direct health care costs greater than $6 billion per year and productivity costs related to job loss and sick days at $37 billion per year. In a three-month span, 32% of all Canadians reported suffering losses of income, used sick days, reported reductions in workplace productivity, or lost jobs as a result of pain (Angus Reid Research for the Canadian Pain Society: March 4-7, 2011).

The impact of chronic pain cannot be considered only in economic terms; it also has a significant impact on patient’s lives. Patients with chronic pain may be socially, vocationally, and interpersonally disabled. Pain is considered an area of healthcare that remains undertreated (Craig, 2009) and takes a significant psychological toll on patients (Tang & Crane, 2006). Pain that is poorly assessed and chronic in nature is not only common and costly to Canadians, but it is also associated with a lower quality of life than other chronic diseases including chronic lung or heart disease (Choinière et al., 2010).

**Current Perspectives of Pain**

Modern models of pain suggest pain is not entirely a sensory experience, and identical painful stimulation (i.e., same experimental pain applied by pressure or temperature) does not produce identical reports of pain and distress across research
participants and clinical patients alike. Pain varies between people and is influenced by their subjective meanings of situation, attention, and other personal appraisals (Sullivan et al., 2001).

A biomedical model applied to the understanding and treatment of pain with no consideration of psychological and social factors is incomplete. As suggested by Sullivan and colleagues (2001) above, the research showing that psychosocial factors are significant in determining pain-related outcomes is extremely strong (Clay et al., 2010; Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Katz et al., 2012; Tripp, Nickel, Wong, et al., 2012; Turk & Okifuji, 2002) and is viewed as necessary in both research and the provision of care to individuals with chronic pain (Hadjistavropoulos et al., 2011).

According to the biopsychosocial model, determinants of pain-related outcomes consist of three dimensions: biology, psychology, and the social context. In a biopsychosocial model of pain, biological aspects of chronic illness (e.g., changes in muscles, joints, or nerves generating nociceptive input) affect psychological factors (e.g., catastrophizing, helplessness) and the social context of the individual (e.g., social activity, activity of daily living, interpersonal relationships) and vice-versa (see Figure 1).

**Interpersonal aspects of pain.** Pain research has been critiqued as being largely focused on the intrapersonal processes (i.e., biological and psychological) and less so on the interpersonal processes (i.e., social context) of the biopsychosocial model (Hadjistavropoulos et al., 2011). Historically, research examining interpersonal processes in pain was largely motivated by the operant model of pain, which emphasizes the role of
reinforcement processes in the development and maintenance of pain behaviour, and subsequently pain-related outcomes (Fordyce, 1976; Fordyce, Shelton, & Dundore, 1982). Spouse responses to pain behaviour as reinforcement processes have primarily been investigated within this literature because the marital relationship, in comparison to other close relationships, provides the most opportunities for operant learning. Spouse responses to pain behaviour have classically been conceptualized as solicitous (e.g., “tries to get me to rest,” “does some of my chores”), distracting (e.g., “tries to get me involved in some activity”) and negative (e.g., "gets angry with me"; Kerns, Turk, & Rudy, 1985). Solicitous and distracting spouse responses to pain behaviour are associated with higher levels of pain and disability in individuals with chronic pain (Leonard, Cano, & Johansen, 2006). However, studies have not been able to demonstrate a causal relationship between spouse responses to pain behaviour and disability as experimental manipulation of such
variables are unfeasible and would be unethical. Observational studies do suggest that spouse responses to pain behaviour can maintain pain and disability (Romano, Jensen, Turner, Good, & Hops, 2000; Romano et al., 1992; Romano et al., 1995). For example, in couples with a chronic pain sufferer, solicitous spouse responses are associated with higher levels of verbal and nonverbal pain behaviours (Romano et al., 2000; Romano et al., 1992). However, counter to predictions of the operant model, correlational studies have also demonstrated positive associations between negative spouse responses to pain behaviour and reports of emotional distress, disability, and pain (Boothby, Thorn, Overduin, & Ward, 2004; Cano, Gillis, Heinz, Geisser, & Foran, 2004).

Social support is also considered part of the social context of chronic pain. The benefits of social support have been demonstrated, indicating that social support is associated with greater well-being (Cohen & Wills, 1985). The stress-buffering model of social support asserts that social support “buffers” (protects) persons from the potentially pathogenic influence of stressful events” (Cohen & Wills, 1985, p. 310). This model suggests that social support enhances efficacy, esteem, and confidence, and thus the individual feels that he or she can cope with a particular stressor (Bova, 2001). The stress-buffering model of social support has been most heavily examined within the depression literature, with prospective studies providing minimal support (Burton, Stice, & Seeley, 2004; Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000). However, studies examining other outcomes (e.g., health-related quality of life, marital satisfaction, reactivity to stress, job burnout), some of which were cross-sectional and others were longitudinal, provide support of this model (Carlsson, Bjorvatn, Engebretsen, Berglund,
It has been suggested that the degree of life threat and functional impairment may also determine which types of support are beneficial (Penninx et al., 1998). For example, individuals who are faced with a life-threatening disease may benefit most from emotional support, as it may prevent depressive symptoms (Penninx et al., 1998). Whereas an individual who suffers from a condition that renders him or her physically unable to carry out daily functions may benefit most from instrumental support (Penninx et al., 1998). As such, Penninx and colleagues suggest that the stress-buffering effects of social support may be disease specific, as coping strategies that focus on the emotional distress caused by a disease may be most successful in diseases that cannot be managed by individual or medical intervention. Therefore, the stress-buffering model of social support is especially relevant in chronic pain research.

Within the chronic pain literature, social support has been examined as spousal responses to pain behaviour. More recent conceptualizations of spouse solicitousness and distracting responses suggest a positive valence for these responses (Cano, Barterian, & Heller, 2008), whereas traditional operant conceptualizations suggest a negative valence (Fordyce, 1976). However, the valence of spouse responses to pain behaviour continues to be up for debate. A recent study on chronic low back pain patients suggests that solicitous spouse responses may have a dual role (Campbell, Jordan, & Dunn, 2012). In this cross-sectional study, for individuals with low levels of depressive symptoms, partner solicitous responses were associated with disability, whereas this relationship was not
significant for individuals with high levels of depressive symptoms. Campbell and colleagues (2012) argued that because depressive symptoms were strongly associated with higher levels of disability, solicitous spouse responses might have an operant effect of increasing disability and a buffering effect on depressive symptoms. This stress-buffering effect of spouse solicitousness is consistent with previous studies that demonstrated a buffering effect of solicitous spouse responses on depressive symptoms (Goldberg, Kerns, & Rosenberg, 1993; Kerns, Haythornthwaite, Southwick, & Giller, 1990).

A factor analysis conducted by Cano and colleagues (2008) showed that solicitous and distracting spouse responses loaded onto the same factor, which the authors labelled as solicitousness, whereas negative spouse responses to pain behaviour loaded onto a factor representing invalidation or lack of validation. According to these results, solicitous and distracting spouse responses to pain behaviour may be conceptualized as social support, whereas negative spouse responses are conceptualized as lack thereof. However, a recent qualitative study demonstrated that none of the observed spouse response categories were rated exclusively as positive or negative, including responses traditionally conceptualized as punishing responses to pain behaviour (Newton-John & Williams, 2006). Overall, preliminary data suggest that solicitous and distracting spouse responses may share a similar valence, and negative spouse responses to pain behaviour are of the opposite valence. However, most research indicates that spouse responses to pain behaviour are associated with a variety of negative psychosocial and physical outcomes such as increased depression and anxiety, physical and psychosocial disability,
pain catastrophizing, and greater pain severity in the identified patient (Buenaver, Edwards, & Haythornthwaite, 2007; Cano, Gillis, et al., 2004; Cano, Johansen, & Franz, 2005; Cano, Weisberg, & Gallagher, 2000).

**Intrapersonal psychological aspects of pain.** It is clear that following nociceptive input the perception or interpretation of pain occurs. Therefore, an individual’s adaptive and/or maladaptive pain interpretation is not solely based on objective reality but also on one’s idiosyncratic interpretations of reality (Turk, 2002). These interpretations are highly subject to long-held core beliefs about one’s ability to manage pain. Research shows that pain appraisals (i.e., pain catastrophizing) are prominent in poor experimental and clinical pain outcomes (Sullivan et al., 2001). Catastrophizing is a negative cognitive-affective appraisal process that consists of magnification, helplessness, and rumination (Sullivan, Bishop, & Pivik, 1995). Rumination and magnification may be related to primary appraisal processes whereby an individual focuses on and exaggerates the threat value of a painful stimuli. Whereas helplessness may be related to secondary appraisal processes whereby an individual negatively evaluates his or her ability to cope effectively (i.e., self-efficacy) with the painful stimuli (Sullivan et al., 1995). Catastrophizing is thought to contribute to fear, leading to avoidance or escape activity associated with pain (Vlaeyen & Linton, 2000), and it is robustly and positively associated with pain (Heyneman, Fremouw, Gano, Kirkland, & Heiden, 1990; Jensen, Turner, Romano, & Karoly, 1991; Keefe, Brown, Wallston, & Caldwell, 1989; Sullivan & D'Eon, 1990).
Alternatively, catastrophizing may be conceptualized as an inability to suppress or inhibit pain-related cognitions (Van Damme, Crombez, & Eccleston, 2002, 2004). Van Damme and colleagues demonstrated that pain catastrophizers were unable to consolidate disconfirming evidence that pain cues were not necessarily followed by pain experiences. This tendency may not be unique to high catastrophizers and may be common to all pain-related negative mental sets (e.g., fear of pain, pain anxiety). An alternative perspective, the communal coping model of pain catastrophizing, states that catastrophizing, and the resulting pain expression, may actually be a means of garnering social support (Sullivan et al., 2001; Sullivan, Tripp, & Santor, 2000).

Sullivan and colleagues (2000) suggest that the adaptiveness of catastrophizing may be contextually determined. Pain duration or chronicity is suggested to form part of this context. In a sample of individuals with musculoskeletal pain, higher catastrophizing was found to be associated with greater perceptions of pain-specific spousal support only in individuals with shorter pain durations, suggesting that catastrophizing may be adaptive in earlier stages of disease progression and becomes maladaptive in later stages (Cano, 2004). Cano hypothesized that in the earlier stages of pain duration, catastrophizing serves as a distress signal and need for support. In later stages, catastrophizing may become maladaptive as others’ responses become increasingly negative in reaction to the individual’s inability to divert his or her attention from pain or the realization that previous attempts to help have not been successful. However, a direct test of this hypothesis has not been undertaken.
Self-efficacy may also be involved in secondary appraisal processes of stress and, thus, may be a part of the psychological determinants of well-being in individuals with pain. I speculate that evaluations of self-efficacy may contribute to feelings of helplessness if the individual believes that he or she does not have the skills to manage with the situation/stressor at hand. In the chronic pain literature, two types of self-efficacy have been studied -- functional self-efficacy (i.e., one’s confidence in his or her ability to perform specific activities) and self-efficacy for managing pain or perceived control of pain. Higher levels of self-efficacy have been associated with lower levels of depressive symptoms, pain intensity, and disability in various pain samples (Beckham, Rice, Talton, Helms, & Young, 1994; Lorig, Chastain, Ung, Shoor, & Holman, 1989; J. A. Turner, Ersek, & Kemp, 2005; Woby, Roach, Urmston, & Watson, 2007). Patients with greater self-efficacy tend to engage in more effective self-care, which is ultimately associated with better psychological outcomes (McCormick, 1997; Webster & Brennan, 1998). For example, in a sample of rheumatoid arthritis patients, individuals with greater self-efficacy were more likely to engage in active coping strategies (e.g., task persistence, exercise, diversion of attention from pain), whereas individuals with lower self-efficacy were more likely to engage in passive coping strategies (e.g., resting, guarding; Brown & Nicassio, 1987). Further, active coping was found to predict better outcomes at 6-months follow-up, whereas passive coping predicted poorer outcomes (Brown & Nicassio, 1987). Interestingly, in a community sample, general self-efficacy and health-related self-efficacy were found to be differentially associated with outcome variables (W. J. Taylor, Dean, & Siegert, 2006). Individuals were divided into three groups: no pain, pain present...
for less than 12 months, and pain present for 12 months or longer. Health-related self-efficacy, but not general self-efficacy, was associated with health-related QoL in all groups. Both health-related and general self-efficacy were associated with psychological distress in all groups. The authors suggest that given these associations were not dependent on presence or chronicity of pain that self-efficacy may predate the development of pain and are likely influenced by factors other than pain itself.

**Summary and Critique of Previous Research**

The preceding literature review suggests a role for social support and cognitive factors (i.e., catastrophizing and perceived control over pain) in predicting adjustment to chronic pain. Few published studies report on the stress-buffering role of spouse responses to pain behaviour, with studies primarily reporting that solicitous spouse responses have a stress-buffering effect on depressive symptoms (Campbell et al., 2012; Goldberg et al., 1993; Kerns et al., 1990). However, with respect to the roles of social support and cognitive variables in chronic pain, our knowledge is primarily based on bivariate correlations, which do not allow for the consideration of interpersonal alongside intrapersonal variables. Both intra- and interpersonal factors are of great importance in our understanding of chronic pain, and it is acknowledged that the best management of chronic pain employs a multidisciplinary and biopsychosocial approach (Gatchel et al., 2007).

The primary purpose of this research was to examine the moderating effect of social support (i.e., stress-buffering model) on the relationships between pain and patient outcomes (i.e., mental and physical QoL, disability, and depressive symptoms) and to
examine if the moderating effect of social support was further qualified by intrapersonal variables (i.e., catastrophizing and perceived control over pain). Documenting such relationships would further inform existing psychosocial treatment models for couples with chronic pain (Saarijarvi, Lahti, & Lahti, 1989; Saarijarvi, 1991; Saarijarvi, Rytokoski, & Alanen, 1991; Saarijarvi, Alanen, Rytokoski, & Hyypa, 1992; Keefe, Caldwell, Baucom, & Salley, 1996; Keefe et al., 1999; Keefe, Blumenthal, Baucom, Affleck, Waugh, Caldwell et al., 2004).
Chapter 2: Literature Review

The stress-buffering model of social support was examined in individuals suffering from Urologic Chronic Pelvic Pain Syndromes (UCPPS). UCPPS are chronic conditions with acute symptom flare-up episodes and pain that is mild to moderate (Association of Reproductive Health Professionals, 2008). However, for many individuals, pain is constant, severe, and usually associated with bladder filling (Warren et al., 2008) and only temporarily relieved by voiding. Similar to other painful chronic conditions, UCPPS pain does not correspond strongly with medical findings (Deyo & Weinstein, 2001; Egan & Krieger, 1997). Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) in men and Interstitial Cystitis/Painful Bladder Syndrome (IC/PBS) predominantly in women are two such syndromes that manifest overlapping symptom profiles of urogenital pain (Hanno, Landis, Matthews-Cook, Kusek, & Nyberg, 1999; Krieger, Nyberg, & Nickel, 1999; Litwin et al., 1999b; Schaeffer, Datta, et al., 2002) and voiding symptoms of urgency and frequency (Nickel, 2002; van de Merwe et al., 2008). Although their aetiology is unknown, IC/PBS and CP/CPPS have a similar pathogenesis, and the two syndromes represent urogenital manifestations of regional or systemic abnormalities rather than organ-specific syndromes (i.e., bladder or prostate; Moldwin, 2002; Pontari, 2006).

A prostatitis diagnosis is common and accounts for as many as 8% of urology outpatient visits in the United States and almost 3% in Canada (Nickel, Downey, Nickel, & Clark, 2002). For many men, symptoms peak at 35-65 years of age (Collins, Stafford, O'Leary, & Barry, 1999). The adult North American prevalence of Chronic
Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) is variable but is estimated between 2-16% across community dwelling and other samples (Nickel, Downey, Hunter, & Clark, 2001; Nickel, Teichman, Gregoire, Clark, & Downey, 2005). In a North-American male adolescent sample, 8.3% reported experiencing CP/CPPS-like symptoms (Tripp, Nickel, Ross, Mullins, & Stechyson, 2009), and an African adolescent male sample indicated 13.3% (Tripp, Nickel, Pikard, & Katz, 2012). Unfortunately, CP/CPPS symptoms do not routinely remit, and in community-based samples, 66% of patients continue experiencing symptoms one year later (Nickel et al., 2002), with newer studies suggesting no change in symptoms over two years (Tripp, Nickel, Shoskes, & Koljuskov, 2013). Furthermore, treatment successes for CP/CPPS is bleak, with strategies based on sequential monotherapies considered suboptimal for many patients (Nickel, Downey, Ardern, Clark, & Nickel, 2004). The QoL of individuals with CP/CPPS is greatly affected by their symptoms and is comparable to individuals suffering severe congestive heart failure, diabetes, myocardial infarction, unstable angina, hemodialysis-dependent end-stage renal disease, or active Crohn’s disease (McNaughton Collins et al., 2001; Wenninger, Heiman, Rothman, Berghuis, & Berger, 1996).

Estimated prevalences of Interstitial Cystitis/Painful Bladder Syndrome (IC/PBS) range from 8 per 100000 to 510 per 100000 (Lukban et al, 2001), whereas symptoms suggestive of IC/PBS are estimated to range from 3300 to 11200 per 100000 (Clemens et al., 2005). Disease progression may initiate with presence of urgency and frequency, followed by pain, and this progression may develop over the course of 2 years (Curhan, Speizer, Hunter, Curhan, & Stampfer, 1999). Typically, symptoms have an onset
between the ages of 20 and 40, and many report symptoms after an acute episode of bacterial cystitis (Clemens, Joyce, Wise, & Payne, 2007). IC/PBS is almost exclusively diagnosed in women, with a female to male ratio of 9:1 (Clemens et al., 2007). Biomedical treatments for IC/PBS that target and repair the bladder lining are often ineffective (Peters, 2012).

UCPPS differ from other chronic pain conditions in that it presents a greater degree of uncertainty owing to its unknown pathology, frequent socially awkward symptoms (urgency to urinate resulting in need for constant access to a bathroom), and lack of controllability regarding exacerbation (Nickel, 2002). There is a degree of comfort afforded by the ability to apply heat to the lower back or rub a sore hand, but in the case of UCPPS, the pain is located in areas including the pelvic area, genitalia, or the bladder, which are much more difficult to intervene. Therefore, there may be an increased reliance on psychosocial variables such as social support to improve QoL.

Although researchers have investigated social support in UCPPS or related samples (e.g., Warwick, Joseph, Cordle, & Ashworth, 2004; Nickel et al., 2008), and in other pain conditions such as chronic low back pain (Goldberg et al., 1993), rheumatoid arthritis (Revenson & Majerovitz, 1990), and osteoarthritis (Cano, 2004), much remains unknown beyond bivariate relationships between social support and factors such as QoL. Sampling UCPPS may be important because researchers purport that associations between marital processes, pain severity, disability, and psychological distress may differ depending on the chronic pain samples recruited (Leonard et al., 2006; Penninx et al., 1998). For example, perceived spousal solicitousness was correlated with higher pain
intensity among low back pain patients, but the reverse was true for patients with sickle cell disease and arthritis (Anderson & Rehm, 1984).

**Psychological Research in UCPPS**

Sufferers of CP/CPPS and IC/PBS frequently report depressive symptoms (Novi et al., 2005; Pontari et al., 2005), marital discord (Michael, Kawachi, Stampfer, Colditz, & Curhan, 2000), disability (Azevedo et al., 2005; Nickel et al., 2008), diminished QoL (Michael et al., 2000; Tripp, Nickel, Landis, Wang, & Knauss, 2004), and comorbid medical conditions (e.g., allergies, sinusitis, irritable bowel syndrome; Clemens, Brown, Kozloff, & Calhoun, 2006; Nickel et al., 2010a).

**Depression and stress.** In a phenotyping study of women with IC/PBS, patients reported diminished physical QoL, greater pain, sleep problems, depression, catastrophizing, anxiety, and stress (Nickel et al., 2010b). In another study, 13% of men with CP/CPPS compared to 4% of otherwise healthy men met criteria for a mental health diagnosis (Clemens et al., 2006). Furthermore, 23% of women with IC/PBS versus 3% of otherwise healthy women met criteria for a mental health diagnosis (Clemens et al.). Indeed, approximately 35% of women with IC/PBS had a probable current depressive disorder (Watkins et al., 2011), and depending on the measure used, approximately 10-17% of patients scored in the moderate-severe depression range (Rothrock, Lutgendorf, Hoffman, & Kreder, 2002). With respect to men with CP/CPPS, the average study participant reported levels of depression below the cut off for clinical depression (Tripp et al., 2006).
Not only do individuals with UCPPS report psychological distress, but symptoms also appear to be exacerbated by stress. For example, women with IC/PBS report symptom flare up under periods of acute stress, including increased bladder pain and urinary urgency (Koziol, Clark, Gittes, & Tan, 1993; Lutgendorf, Kreder, Rothrock, Ratliff, & Zimmerman, 2000). Additionally, as IC/PBS disease severity increased, the relationships between stress, urgency, and pain became more pronounced. (Rothrock, Lutgendorf, Kreder, Ratliff, & Zimmerman, 2001).

**Pain and QoL.** UCPPS urinary symptoms and pain have significant relationships with functioning and QoL. For women with IC/BPS, greater symptom severity (i.e., frequency, urgency, and pain) is associated with poorer physical and social functioning, as well as poorer mental health (Rothrock et al., 2002). In a psychosocial phenotyping study of women with IC/PBS, pain was the strongest predictor of physical QoL, whereas social support, depression, catastrophizing, and stress significantly predicted diminished mental QoL (Nickel et al., 2010b). With respect to men with CP/CPPS, urinary symptoms and pain-contingent rest (i.e., resting to cope with pain) have been found to be significant predictors of physical QoL, even after controlling for robust predictors such as pain and catastrophizing (Nickel et al., 2008). Similarly, urinary symptoms, pain-contingent rest, and pain significantly predicted disability (Tripp et al., 2006).

In Tripp and colleagues’ (2012) study of women’s IC/PBS pain locations, approximately 25% of the sample endorsed pain in primary sites only (i.e., vagina, lower abdomen, lower back, pelvis, and buttocks), and almost equal proportions of the sample reported pain in primary IC/PBS sites plus one to three additional locations, or four to
nine additional locations, or greater than nine additional locations (Tripp, Nickel, Wong, et al., 2012). The authors suggested that the increasing level of pain locations endorsed by these patients may mean that IC/PBS pain is centrally mediated rather than a visceral nerve abnormality involving only the bladder. Individuals reporting pain in greater than three additional locations also reported higher sensory pain, greater affective pain, and higher depressive symptoms.

**Catastrophizing.** The examination of intrapersonal factors (i.e., catastrophizing) has also indicated that variables beyond disease-specific markers play an important role in determining UCPPS patient outcomes. Various interpersonal coping strategies by women with IC/PBS, like venting of negative emotions, was associated with greater depression and poorer mental QoL, whereas seeking instrumental support (i.e., asking for assistance with activities or duties) was associated with less depression (Rothrock, Lutgendorf, & Kreder, 2003). In the first study examining pain catastrophizing in CP/CPPS, catastrophizing was associated with greater disability, depression, urinary symptoms, and pain (Tripp et al., 2006). Catastrophizing has a strong association with poorer UCPPS mental health. Even when disease specific symptoms were controlled, catastrophizing continued to predict depressive symptoms and QoL in women with IC/PBS (Rothrock et al.) and pain severity in men with CP/CPPS (Tripp et al., 2006). Another recent study of men with CP/CPPS suggested that the helplessness dimension of catastrophizing (e.g., “it’s terrible and I think it is never going to get any better”) is particularly salient in predicting poorer mental health status beyond other competing psychosocial variables in the analyses (Nickel et al., 2008).
Stable pain symptoms combined with non-curative medical therapies may cause or assist in the development of helplessness in these men, resulting in poorer mental health. Indeed, helplessness is likely a product of feeling unempowered to make positive changes in one’s ability to manage pain (Sullivan et al., 1995). In a sample of Canadian adolescent males reporting Chronic Prostatitis-like symptoms, catastrophizing magnification of pain (e.g., “I keep thinking of other painful events”) was the lone predictor of poorer adolescent QoL when statistically controlling for pain and urinary status (Tripp et al., 2009). Taken together, catastrophizing appears to play a consistent role in symptom progression and impact, and these preliminary data suggest that different components of catastrophizing are salient predictors in various stages of symptom progression.

UCPPS catastrophizing research has also informed a phenotyping classification system recommended for physicians to direct appropriate therapy. Shoskes and colleagues (2009) proposed an empirically derived 6-point clinical phenotyping system consisting of Urinary symptoms, Psychosocial dysfunction, Organ-specific findings, Infection, Neurologic/systemic, and Tenderness of muscle (UPOINT). In particular, criteria for inclusion in the psychosocial domain consist of clinical depression and/or evidence of catastrophizing (helplessness, hopelessness). Catastrophizing is a suggested target of intervention because it is linked to symptom propagation. Indeed, a psychotherapy model has been proposed and tested for UCPPS psychosocial risk factors (e.g., depressed mood, social support, catastrophizing; Tripp, Nickel, & Katz, 2011). CP/CPPS symptom scores and negative QoL impact were significantly reduced at end of
treatment, and the mean baseline scores showed significant linear reductions for pain, disability, and catastrophizing. Although positive changes were observed in depressive symptoms and social support, these changes were not significant.

**Social support.** No research with a specific focus on social support has been conducted in UCPPS. Studies that have reported findings on social support have reported associations only between social support and mental QoL (Nickel et al., 2010b). A qualitative study on women with chronic pelvic pain (not necessarily IC/PBS) conducted by Warwick and colleagues (2004) is the most in-depth examination of social support in a related sample to date. Warwick and colleagues interviewed 8 women attending a secondary care service meeting the inclusion criteria of having continuous or intermittent pain in the pelvic or lower abdominal region that had lasted for at least 6 months and was not exclusively associated with sexual intercourse or menstruation. The women were asked how others (i.e., partner, family member, friends, others who have had chronic pelvic pain, doctors, nurses, and acquaintances and strangers) have been helpful or unhelpful since the onset of their pain. Emotional and practical support from close others were valued, and women expressed a need for sustained and enduring support. Furthermore, provision of support while maintaining autonomy was of great importance.

**Summary.** UCPPS are significant health problems in North America, if not internationally. Psychosocial research on UCPPS is still in its early stages and largely consists of bivariate relationships between psychosocial predictors and patient outcome. Catastrophizing has been demonstrated as an important predictor in UCPPS impact, and some data also suggest a role for social support. Historically, UCPPS has been
understood and treated within a biomedical model, but more recent conceptualizations of UCPPS such as the UPOINT system have incorporated empirically supported psychosocial variables and suggest a biopsychosocial approach with respect to treatment (Shoskes et al., 2009). Relative to other domains in the UPOINT system, the psychosocial domain is much less established, and thus, further research is needed in this particular domain to advance the UPOINT system.

**Gender Differences in Social Support**

An examination of social support would not be complete without discussion of gender differences. In the general social support literature, theorists propose that gender differences exist in social support provision for various reasons. First, women prefer to be support providers (Fausto-Sterling, 1985), whereas other theorists suggest that social role expectations for women lead them to be providers of nurture and support (Barbee et al., 1993). Yet other theorists focus on how cultural and relational dynamics lead women to be more supportive (Wood, 1994). Based on the aforementioned ideas, the support gap hypothesis (SGH) suggests that women receive less support from their husbands than husbands receive from their wives (Belle, 1982). Additionally, spousal support is suggested to be such an important source of social support that the availability of support from outside of a marital relationship does not adequately compensate for low levels of spousal support (Coyne & DeLongis, 1986; Lieberman, 1982).

A large body of research has been generated by the support gap hypothesis, but the evidence is mixed and somewhat confusing (Pasch, Bradbury, & Davila, 1997; Schulz & Schwarzer, 2004; Schwarzer & Gutierrez-Dona, 2005; Verhofstadt, Buysse, & Ickes,
2007; Xu & Burleson, 2001). Primary SGH support comes from studies examining gender differences in emotional support or the expressions of love, empathy, and concern, with these studies finding that women provide more emotional support than men do (Antonucci & Akiyama, 1987; Burda, Vaux, & Schill, 1984; Huston-Hoburg & Strange, 1986; Vaux, 1985). In a sample of cancer surgery patients, women reported a decline in social support over time, whereas men reported relatively stable levels of emotional support (Luszczynska, Boehmer, Knoll, Schulz, & Schwarzer, 2007; Schulz & Schwarzer, 2004). Moreover, male partners also reported providing less emotional support at 1-month post surgery than did female partners (Luszczynska et al., 2007). This “support gap” might also be related to age, with Schwarzer and Guttierrez-Dona (2005) finding that the support gap is minimal or non-existent in younger participants, and the support gap increased with age, with older women receiving much lower levels of spousal support than their male counterparts. In contrast, Verhofstadt and colleagues (2007) found that women provide more emotional support than men do but only according to self-reports, whereas this difference was absent when observational data were considered. Additionally, Xu and Burleson (2001) reported that the support gap hypothesis was most consistent with gender differences in desired social support; women reported higher levels of desired social support from their spouses than men desired from their spouses. Schwarzer and Guttierrez-Dona (2005) speculated that the support gap might be a result of “marriage burn out;” that is, as time passes in the relationship, the higher levels of support desired by the female partner takes a toll on their male partner, leading to diminished provision of social support. Although a recent study showed that men were
more likely to respond solicitously than women were (Newton-John & Williams, 2006), men’s supportive responses are accompanied by negativity (Neff & Karney, 2005), further contributing to gender differences in the effect of social support.

There is limited evidence that the SGH applies to forms of support other than emotional support. Other types of support discussed in this literature include esteem support (i.e., expressions of respect, validation, and confidence that bolster another’s self-concept), network support (i.e., generation of feelings of social connection through expressions that create a sense of belonging), tangible support (i.e., provision of material assistance such as goods, or services), and informational support (i.e., expressions that provide facts, advice, and appraisals regarding the situation of concern). Men provide more tangible support and are preferred by others as sources of tangible and informational supports (Barbee, Gulley, & Cunningham, 1990). Although these differences were noted, other studies have not found differences in support types across men and women (Goldsmith & Dun, 1997; Pasch et al., 1997).

Gender differences in social support within the context of chronic pain are much less delineated, but the extant literature does indicate gender differences in the psychological (Sullivan et al., 2001) and social (Newton-John & Williams, 2006) determinants of pain-related outcomes. As such, these gender differences may signify differential outcomes for men and women suffering similar chronic pain conditions and suggest different therapeutic targets for men and women with chronic pain and their spouses.
Gender differences in the relationship between social support and depression, pain severity, and marital satisfaction have been reported (Cano et al., 2000). For instance, negative spousal responses are related to elevated depression and pain severity, and poorer marital satisfaction in men and women. However, the relationship between depression and negative spousal responses was significantly stronger for men than women, whereas the relationship between negative spousal responses and marital satisfaction was stronger for women than men. Further, distracting spousal responses were associated with both increased pain severity and marital satisfaction but only in men. Lastly, solicitous spousal responses were related to marital satisfaction in both men and women, but the relationship was significantly stronger in women. However, given limited research on gender differences in spousal support in chronic pain, these differences noted by Cano et al. (2000) may not replicate in different pain samples.

Further contributing to gender differences in spousal responses to pain behaviour are gender differences in catastrophizing. Women score higher than men do on measures of catastrophizing, and they display more pain behaviour than men (Sullivan et al., 2001). In light of the communal coping model, women are thought to maximize their opportunity for support via increased expressions of pain, whereas men may minimize such potential opportunities (Sullivan, 2012). Furthermore, in comparison to low catastrophizers, individuals who engage in high levels of catastrophizing also perceive others’ pain as more intense (Sullivan, Martel, Tripp, Savard, & Crombez, 2006), suggesting the possibility that high catastrophizers might be better able to recognize and respond to pain
behaviours (e.g., solicitous spouse responses to reduce expressions of distress; M. J. L. Sullivan, 2012).

Overview of the Current Line of Studies

The two studies presented in the current dissertation addressed several gaps in the social support in chronic pain literature. First, spousal responses to pain behaviour were examined within a context rather than in isolation by including intrapersonal variables important to chronic pain (i.e., catastrophizing and perceived control over pain). Second, in Study 2, I expanded chronic pain social support research by examining sources of social support outside of the marital relationship (i.e., support from friends, family, and physicians). Third, I also investigated gender differences in the influence of social support in the prediction of pain-related outcomes. Although gender differences in social support have been researched extensively, gender differences in the impact of social support have not been examined in chronic pain.

The results of two questionnaire-based studies are reported in this dissertation. The primary objective in Study 1 was to investigate the moderating effect of spouse responses to pain behaviour on the relationship between pain and patient outcome. Additionally, I examined if this moderating effect was further moderated by gender or intrapersonal variables (i.e., catastrophizing or perceived control over pain).

The initial objective in Study 2 was to provide a replication of Study 1, as well as examining the moderating effect of additional sources of social support (i.e., support from friends, family, and physicians) on the relationship between pain and patient outcome. Similar to Study 1, I also examined if the moderating effect of different sources of support...
support was further moderated by gender or intrapersonal variables. Given that the operant theory of pain has been the primary perspective in examining the role of others in the maintenance of pain and disability, spouses have been at the centre of this research with little attention to sources of social support outside of the marital relationship.

This line of research has implications for non-medical management strategies specific to UCPPS (i.e., the psychosocial domain of the UPOINT system). Additionally, this line of research contributes to our knowledge of the social context within which UCPPS occurs.
Chapter 3: Study 1

Spouse Responses to Pain Behaviour, Catastrophizing, and Perceived Control Over Pain as Moderators in the Relationship Between Pain and Patient Outcome in Men and Women with Urologic Chronic Pelvic Pain Syndrome
Abstract

Research on the role of social support is needed to inform the biopsychosocial model and its related treatments for Urologic Chronic Pelvic Pain Syndromes (UCPPS). Spousal support, operationalized here as spouse responses to pain, is a key predictor in the outcome of chronic pain, and its impact has yet to be examined in the adjustment of women with Interstitial Cystitis/Painful Bladder Syndrome (IC/PBS) and men with Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS). To determine the moderating effect of spouse responses to pain behaviour, and if this effect is further qualified by gender and/or cognitive variables (i.e., catastrophizing and perceived control over pain), this study examined regression models predicting the outcomes of mental and physical quality of life (QoL), disability, and depressive symptoms. Ninety-six women with IC/PBS and 188 men with CP/CPPS completed questionnaires of demographics, depressive symptoms, disability, QoL and a measure of perceived spousal responses to their pain. Distracting spouse responses to pain behaviour buffered the relationships between pain and mental QoL and between pain and disability. Of note, this effect was neither qualified by gender nor cognitive variables. Additionally, solicitous spouse responses strengthened the relationship between pain and mental QoL but only at low levels of catastrophizing, and there were no gender differences in this effect.
Introduction

Social support has long been considered a crucial aspect of successful stress management. The stress-buffering hypothesis, which suggests that social support diminishes the negative impact of physical or psychosocial stress (Cohen & Wills, 1985), has direct relevance to the social support in chronic pain literature. Individuals who experience chronic pain are faced with a consistent health/life stressor that increases demand for support from one’s social support network.

The current study focuses on the moderating role of spousal social support on the relationship between pain and pain-related outcomes given the frequency of contact and intimacy of the relationship. When social support is considered positive, it is associated with improvements in physical health (Cunningham & Barbee, 2000; Sarason, Sarason, & Gurung, 1997), mental health (Cohen & Wills, 1985; Schwarzer & Leppin, 1992), and marital satisfaction (Conger, Rueter, & Elder, 1999; Pasch & Bradbury, 1998; Saitzyk, Floyd, & Kroll, 1997).

Social Support and Pain

In pain research, social support often has been examined as spouse responses to pain behaviour within the context of an operant model of pain. The three major categories of spousal responses to patient pain behaviour are: solicitous (e.g., “tries to get me to rest,” “does some of my chores”), distracting (e.g., “tries to get me involved in some activity”), and negative or punishing (e.g., “gets angry with me”) as measured by the West Haven-Yale Multidimensional Pain Inventory (MPI; Kerns et al., 1985). According to the operant model of pain, solicitous and distracting responses to pain
behaviour should reinforce and subsequently increase pain behaviours, whereas negative responses to pain behaviour should punish and subsequently decrease pain behaviour (Fordyce, 1976). The literature has been somewhat at odds with these hypotheses, demonstrating that all three types of spouse responses to pain behaviour are associated with a variety of negative psychosocial and physical outcomes, such as increased depression and anxiety, physical and psychosocial disability, pain catastrophizing, and greater pain severity in the identified patient (Buenaver et al., 2007; Cano, Gillis, et al., 2004; Cano et al., 2005; Cano et al., 2000).

A series of studies employing observational methods in interactions between individuals with chronic pain and their spouses have provided evidence in support of an operant model of pain, suggesting a sequential relationship between spouse responses to pain behaviour and pain behaviour (Romano et al., 2000; Romano et al., 1992; Romano et al., 1995). In videotaped interactions, individuals with chronic musculoskeletal pain and their partners, as well as matched control couples, performed a series of household activities (e.g., sweeping floor). Individuals with chronic pain were more likely to display verbal and nonverbal pain behaviours following solicitous spouse behaviours than were individuals without chronic pain (Romano et al., 1992). In a separate publication using the same sample, solicitous spouse responses to pain behaviour were found to predict higher levels of reported disability, but the authors did not assess other types of spouse responses and, therefore, could not account for their effect (Romano et al., 1995). In a later study, Romano et al. (2000) found that the rate of verbal and nonverbal pain behaviour was significantly and positively associated with the rate of spouse solicitous
behaviours (Romano, et al., 2000). Furthermore, negative spouse responses to pain behaviour were negatively associated with the rate of nonverbal pain behaviour after controlling for solicitous spouse responses (Romano et al., 2000). Of note, distracting spouse responses were not assessed in any of the aforementioned studies. This line of research suggests that spouse responses to pain behaviour are important in the maintenance of pain and disability and are important to consider even after controlling for biological indicators of pain severity.

Although the stress-buffering hypothesis is particularly relevant to chronic pain, the effects of spouse responses to pain behaviour on pain-related outcomes within the context of the stress-buffering hypothesis are rarely examined (Holtzman, Newth, & Delongis, 2004). Spousal responses to pain behavior can buffer the relationship between the patient perceived interference of pain and depression (Goldberg et al., 1993). In this particular study, Goldberg and colleagues combined the support scale of the West Haven-Yale Multidimensional Pain Inventory with the spouse responses to pain behaviour scale by summing standardized scores. However, a more recent study by Cano and colleagues (2008) suggested that negative spouse responses to pain behaviour loads on to a factor representing validation and invalidation, which was qualitatively distinct from the factor on to which solicitous and distracting spouse responses loaded. Therefore, combining the different types of spouse responses to pain behaviour into one variable is problematic.

Studies examining general social support show satisfaction with support has a stress-buffering effect. For example, in a community sample of individuals with rheumatoid arthritis, higher support satisfaction earlier in the day buffered the relationship
between catastrophizing reported earlier in the day and subsequent negative affect (i.e., symptoms of anxiety and depression; Holtzman & Delongis, 2007). To consolidate discrepant results regarding social support, Turk, Kerns, and Rosenberg (1992) speculated that negative and positive spouse responses to pain behaviour may not be opposite ends of a continuum but rather have effects on different outcomes. Positive responses to pain behaviour appear to be more influential on the outcomes of pain severity and disability, whereas negative responses appear to be more influential in determining depressive symptoms. However, no studies have reported findings on the moderating effects of spouse responses on the relationship between chronic pain and pain-related outcomes.

**Gender Differences in Social Support**

A discussion of the benefits of social support would be insufficient without acknowledgement of the support gap hypothesis (SGH), which is the notion that women receive less social support from their husbands than men receive from their wives (Belle, 1982). Much of the research examining the SGH has been conducted on non-clinical samples, with mixed results (Pasch et al., 1997; Verhofstadt et al., 2007; Xu & Burleson, 2001). Few gender differences in social support have been reported within the pain literature but in the opposite direction of the SGH, and these gender differences were dependent on type of social support and who reported the social support (i.e., spouse vs. individual with chronic pain; Newton-John & Williams, 2006). In Newton-John and Williams (2006), husbands and wives of individuals with chronic pain were provided with a set of vignettes in which the partner with pain expresses some form of pain behaviour. Spouses selected vignettes that they had experienced and indicated how they would
normally respond to each situation. Individuals with chronic pain then were given the pain vignettes selected by their respective spouse and indicated how their spouse would normally respond to each situation. In comparison to female spouses, male spouses identified fewer pain-related interactions. Based on the self-report of spouses, husbands responded more solicitously (i.e., provided help) than did wives (41% vs. 28% of provided responses). However, based on the reports of individuals with chronic pain, there was no gender difference in solicitous spouse responses. Interestingly, based on reports of individuals with chronic pain, husbands offered help more frequently than did wives (14% vs. 9%). The distinction between providing and offering help was made based on the presumption that the individual with chronic pain has the opportunity to refuse help when it is offered as opposed to when it is provided.

Other studies also have reported gender differences in associations between spouse responses and pain-related outcomes. In a study of individuals with benign musculoskeletal pain, negative spouse responses to pain behaviour were associated with higher levels of pain severity and interference of pain in daily living but only for men (Burns, Johnson, Mahoney, Devine, & Pawl, 1996). However, Fillingim and colleagues (2003) found that differences in observed associations were dependent on the type of data collected (i.e., self-report vs. more objective functional or behavioural measures). For men, high spousal solicitousness was associated with greater self-reported disability, and the association between spousal solicitousness and reported pain severity appeared to be more consistent for men. However, for women but not men, self-reported activity level, functional performance, and pain tolerance were associated with solicitous spouse
responses. The authors concluded that spousal solicitousness appears to be more strongly associated with self-report measures in men and with more objective functional or behavioural measures in women. However, overall reports of gender differences in relationships among marital variables (i.e., satisfaction, spouse responses to pain behaviour), pain severity, and depression are scarce within the chronic pain literature, as researchers rarely examine data collected from men separately from data collected from women within the same study (Cano et al., 2000; Fillingim, Doleys, Edwards, & Lowery, 2003).

**Integration of Inter- and Intrapersonal Variables**

A biopsychosocial approach to pain is the standard for research and treatment. Therefore, an examination of the effects of social support without consideration of intrapersonal variables is simply incomplete (Hadjistavropoulos et al., 2011). Pain catastrophizing and perceived control over pain are two variables of importance due to their positive and negative associations with the pain (Hill, 1993; Keefe & Williams, 1990; Strong, Ashton, Cramond, & Chant, 1990; Sullivan et al., 2001).

Cognitive processes such as catastrophizing are also important predictors in diminished quality of life. Quality of life is more associated with the person’s beliefs about pain than with the intensity of the pain itself (Lame, Peters, Vlaeyen, Kleef, & Patijn, 2005). Indeed, within a heterogeneous chronic pain sample, pain catastrophizing was the most prominent predictor of poorer QoL, and the associations between catastrophizing and the physical aspects of QoL (i.e., physical functioning, role limitations physical, bodily pain) were stronger than the association between pain
intensity and QoL (Lame et al., 2005). These findings were later corroborated in a study of men with Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS), indicating catastrophizing as the single strongest predictor of pain experience over and above urinary and depressive symptoms (Tripp et al., 2006).

Additionally, perceived control over pain is shown to be associated with patient functioning. For example, improvement in functioning was related to increased perceived control over pain in a multidisciplinary treatment study (Jensen, Turner, & Romano, 2007). Self-efficacy, a construct related to perceived control over pain, also accounts for a significant portion of the variance in disability even after controlling for pain (Ayre & Tyson, 2001).

**Present Study**

The current study examines gender differences in social support in UCPPS, as previous research has primarily examined the support gap hypothesis within non-clinical samples. Research indicates women are more responsive with respect to social support provision in times of stress (Neff & Karney, 2005), suggesting possible gender differences in social support in the presence of chronic pain. Spouse responses to pain behaviour have primarily been examined within a negative context of reinforcing pain behaviour and have not been examined as a buffer of the impact of pain. Additionally, the role of spouse responses to pain behaviour has most frequently been examined in bivariate correlations without consideration of intrapersonal/cognitive variables. Given the importance of the biopsychosocial model in chronic pain, examining interpersonal variables (i.e., social support) within the context of intrapersonal variables (i.e., cognitive)
is crucial to furthering our understanding of adjustment to chronic pain and also increases ecological validity.

Therefore, my objectives in the present research were to extend previous research on gender differences in social support with Urologic Chronic Pelvic Pain Syndromes and to test the stress-buffering hypothesis of social support, as applied to spousal responses to pain behaviour. Social factors may be relatively more important moderators of pain experience in women (Fillingim et al., 2003), but studies reporting gender differences in the role of social support in pain are rare.

The second aim of the present study was to determine if the effect of spouse responses to pain behaviour are further moderated by gender or intrapersonal variables (i.e., catastrophizing, perceived control over pain).

As such, the following research questions were posed along with related hypotheses:

1.1. Are there gender differences in reported spousal responses to pain behaviour?

Hypothesis 1.1: Consistent with previous research (Newton-John & Williams, 2006), women were expected to report higher levels of solicitous responses. No predictions were made with respect to distracting and negative responses, as previous research has not examined gender differences in these spouse responses.

1.2. Do spouse responses to pain behaviour moderate (i.e., buffer) the relationships between pain and patient outcomes and are there gender difference in this effect?

Hypothesis 1.2a: I predicted that both solicitious and distracting responses would buffer the relationships between pain and depressive symptoms and between pain and mental QoL (Cano, Barterian & Heller,
I predicted that the stress-buffering effect of solicitous and distracting spouse responses would be stronger for men with CP/CPPS than women with IC/PBS given that husbands’ supportive responses are also accompanied by expressions of negativity (Neff & Karney, 2005).

**Hypothesis 1.2b:** I predicted that solicitous and distracting spouse responses would strengthen the relationships between pain and disability and between pain and physical QoL (Campbell et al., 2012) and that the relationships between pain and disability and between pain and physical QoL would be stronger for women (Neff & Karney, 2005).

**Hypothesis 1.2c:** I also predicted that negative spouse responses would strengthen the relationships between pain and each outcome variable (i.e., mental and physical QoL, disability, depressive symptoms). No predictions regarding gender differences of the effect of negative spouse responses, as previous research has not commented on these differences.

1.3. If spouse responses to pain behavior moderate the relationships between pain and outcomes, is this effect further moderated by cognitive variables (e.g., perceived control over pain, catastrophizing) and/or gender?

**Hypothesis 1.3a:** At low levels of catastrophizing, I predicted that solicitous or distracting spouse responses would buffer the relationships between pain and depressive symptoms and between pain and mental QoL. In contrast, at high levels of catastrophizing, solicitous or distracting spouse responses should not buffer the relationships between pain and depressive symptoms and between pain and mental QoL. Gender differences were not predicted, as research has not previously examined these higher order interactions.

**Hypothesis 1.3b:** At both low levels and high levels of catastrophizing, I predicted that solicitous or distracting spouse responses would not buffer the relationships between pain and disability and between pain and physical QoL, but this relationship would be stronger at high levels of catastrophizing. Gender differences were not predicted.
Hypothesis 1.3c: At both low levels and high levels of catastrophizing, consistent with the stress-buffering hypothesis, I predicted that negative spouse responses would not buffer the relationships between pain and outcomes (i.e., mental and physical QoL, disability, depressive symptoms), and that the relationships would be stronger at high levels of catastrophizing. Gender differences were not predicted.

Hypothesis 1.3d: At high levels of perceived control over pain, I predicted that solicitous and distracting spouse responses would buffer the relationships between pain and depressive symptoms and between pain and mental QoL. In contrast, at low levels of perceived control over pain, I predicted that solicitous and distracting spouse responses would buffer the relationships between pain and depressive symptoms and between pain and mental QoL. Additionally, I predicted that the relationships between pain and depressive symptoms and between pain and mental QoL would be weaker at high levels of perceived control over pain. Gender differences were not predicted.

Hypothesis 1.3e: At low levels of perceived control over pain, I predicted that solicitous and distracting spouse responses would increase the strength of relationships between pain and disability and between pain and physical QoL in comparison to high levels of perceived control over pain. Gender differences were not predicted.

Hypothesis 1.3f: At both low levels and high levels of perceived control over pain, consistent with the stress-buffering hypothesis, I predicted that negative spouse responses would not buffer the relationships between pain and outcomes (i.e., mental and physical QoL, disability, depressive symptoms), and that the relationships would be stronger at low levels of perceived control over pain. Gender differences were not predicted.

Method

Participants

Data were drawn from two existing data sets: one collected from male patients suffering from CP/CPPS and the other from female patients suffering from IC/PBS. All
patients were previously diagnosed with their respective syndrome in outpatient tertiary care specialty clinics in Urology.

**Male sample.** For the male sample, 253 men diagnosed with CP/CPPS were recruited from an existing cohort enrolled in the NIH (National Institutes of Health) Chronic Prostatitis Cohort (CPC) Study from seven North American tertiary care clinical centers (6 U.S., 1 Canada, see Appendix; Schaeffer, Landis, et al., 2002). These patients met the NIH definition for CP/CPPS, which is described as pain in the pelvic region for 3 of the last 6 months, in the absence of pathogenic bacteria (Krieger et al., 1999). For the current study only men who reported having a spouse or partner were included. Of this larger sample, 188 men met this criterion. The mean age of these men was 48.4 years ($SD = 10.8$), with 76% reporting current employment, and 90% reported education of high school or more. The ethnicity of this sample was primarily white (91%), with 4% African-American, 2% Asian, 1% American Indian, and 2% other.

**Female sample.** The female patient sample diagnosed with IC/PBS was recruited from three North American NIH-funded centers (i.e., Queen's University, Canada; Loyola University, IL, USA; University of Rochester, USA; Tripp, Nickel, Fitzgerald, et al., 2009). These patients fulfilled the diagnostic criteria described in the US National Institutes of Health Interstitial Cystitis Database Study (Hanno et al., 1999) and the definition described at the US National Institutes of Health Urological Chronic Pelvic Pain Consensus Symposium (Nickel, 2008). Although not available at the time, most patients would have fulfilled the criteria for diagnosis of BPS/IC outlined in the recently published American Urological Association guidelines (Hanno et al., 2011) as well as
European Society for the Study of Interstitial Cystitis and European Association of Urology definition of BPS (Fall et al., 2010; van de Merwe et al., 2008). A total of 120 women were recruited, of which 96 reported having a spouse or partner. These women had a mean age of 50.6 years ($SD=13.89$). Ninety-seven percent reported education of high school or more, and 46% were employed. The majority of participants were Caucasian (94%), with 2% African-American, 2% Asian, and 2% Hispanic.

**Measures**

**Demographics questionnaire.** All participants provided information on age, race (American Indian, Asian, Hispanic or Latino, Black/African American, Native Hawaiian/Pacific Islander, White), level of education (less than high school, high school or GED, some college or university, graduate professional after college/university), and whether living with a spouse or partner.

**Multidimensional Pain Inventory (MPI).** The MPI (Kerns et al., 1985) is a 52-item inventory that assesses psychosocial variables associated with pain. It consists of three sections, but for the current study, only scores on section II of the MPI were used. Section II assesses the responses of a spouse to communications of pain as identified by the respondent (3 subscales: solicitous responses, distracting responses, and negative responses). For each item, respondents indicate from 0 (*never*) to 6 (*very often*) how often their significant other responds to them when in pain. Scores for each subscale are the mean of the subscale items, with a range of 0 to 6. Kerns et al. (1985) report internal consistency of .78 for the solicitous responses scale, with a two-week test-retest reliability coefficient of .89. Internal consistency for the MPI for the current study was good ($\alpha =$
.83), as was internal consistency for the individual subscales (negative $\alpha = .81$, solicitous $\alpha = .87$, distracting $\alpha = .79$)

**Survey of Pain Attitudes – Control Scale (SOPA-C).** The SOPA-C (Jensen, Karoly, & Huger, 1987) is a 10-item scale that assesses each respondent’s perceived control over their own pain, with scores ranging from 0 to 40. Scores higher than 26 are within the adaptive range, whereas scores between 4 and 26 (inclusive) are within the subclinical range, and scores below 4 are in the clinical range. Example items include, “There are times when I can influence the amount of pain I feel,” and “The amount of pain I feel is out of my control.” Responses are rated from 0 (very untrue) to 4 (very true). The control scale has shown adequate internal consistency, $r = .71$ (Jensen, Turner, & Romano, 1994) and 6-week test-retest reliability, $r = .68$ (Jensen, Turner, Romano, & Lawler, 1994). In the current study, internal consistency was also found to be acceptable ($\alpha = .78$).

**Center for Epidemiological Studies Depression Scale (CES-D).** The CES-D (Radloff, 1977) is a 20-item inventory assessing depressive symptoms within the last week in the general population with an emphasis on mood; scores range from 0 to 60. Example items include: “I had trouble keeping my mind on what I was doing,” and “My sleep was restless.” A standard threshold of 16 or greater has been used to classify depressed outpatients (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977), whereas a cutoff of 27 is suggested for individuals with chronic pain (Geisser, Roth, & Robinson, 1997b). Radloff reports internal consistency for the general population and patient samples of .84-.90 and test-retest reliability of .48-.67. The CES-D correlates
highly with clinician-rating measures of depression, such as the Hamilton Depression Rating Scale and global ratings (Radloff, 1977), and the CES-D has better sensitivity in chronic pain patients than does the Beck Depression Inventory (Geisser, Roth, & Robinson, 1997a). Internal consistency in the current study was good ($\alpha = .88$).

**Short-Form McGill Pain Questionnaire (SF-MPQ).** The SF-MPQ (Melzack, 1987) consists of 15 word descriptors of pain that assess sensory and affective qualities of pain and overall pain intensity. Eleven descriptors represent the sensory dimension of pain experience (e.g., throbbing, stabbing, gnawing), and four descriptors represent the affective dimension (e.g., tiring-exhausting, fearful). Each descriptor is rated on a 4-point intensity scale ranging from 0 (*none*) to 3 (*severe*), and the items are summed to provide the Pain Rating Index Total (PRIT), with scores ranging from 0 to 45. Higher scores on the PRIT indicate greater overall pain. The SF-MPQ is a reliable and valid measure commonly used in clinical pain applications (Melzack, 1987). Wright et al. (2001) report internal consistencies of .70 for both subscales. A study of the Norwegian translation of the SF-MPQ suggests a change of greater than 5 on the 0-45 scale is clinically significant (Strand, Ljunggren, Bogen, Ask, & Johnsen, 2008). For the current study, internal consistency of items included in the PRIT was excellent ($\alpha = .90$).

**Pain Disability Index (PDI).** The PDI (Pollard, 1984) assesses the extent to which chronic pain interferes with a person’s ability to engage in various life activities (Pollard, 1984). For each of seven categories of life activity (Family/Home Responsibility, Recreation, Social Activity, Occupation, Sexual Behaviour, Self-Care, and Life Support Activity), patients rate their level of disability on a numeric rating scale

42
ranging from 0 (no disability) to 10 (total disability); scores range from 0 to 70. Higher scores on the PDI indicate higher pain-related disability, and patients with high PDI scores report more psychological distress, more pain, and more restriction of activities than do patients with low PDI scores. Internal consistency of the PDI is reported at .86 demonstrating that the PDI has high internal consistency (Sullivan et al., 1995; Tait, Chibnall, & Krause, 1990). A recent study of chronic back pain patients suggest that a change between 8.5 and 9.5 in PDI total score is clinically significant (Soer, Reneman, Vroomen, Stegeman, & Coppes, 2012). Internal consistency for this scale in the current study was excellent (α = .90).

The Pain Catastrophizing Scale (PCS). The PCS (Sullivan et al., 1995) is a 13-item instrument that assesses three components of catastrophizing: Rumination (e.g., I can’t stop thinking about how much it hurts), Magnification (e.g., I worry that something serious may happen), and Helplessness (e.g., There is nothing I can do to reduce the intensity of the pain). Each item is rated on a scale ranging from 0 (not at all) to 4 (all the time), with total scores ranging from 0 to 52 and higher scores representing higher levels of pain catastrophizing. Initial studies show catastrophizing to predict levels of pain and distress reported in response to pain inductions (Sullivan et al., 1995). In applied settings, PCS scores have been associated with pain, disability, and employment status among patients with intractable musculoskeletal pain (Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998). Internal consistencies of .93 for the total PCS, and .91 for the Rumination subscale, .75 for Magnification, and .87 for the Helplessness subscale have been reported, all indicative of a high internal consistency (Osman et al., 1997). Internal consistency for
the scale was excellent in the current study ($\alpha = .94$). A score of 30 represents clinically relevant levels of catastrophizing (Sullivan, 2009), and a reduction of 38-44% in catastrophizing scores is associated with return to work and low pain severity following treatment.

**MOS Short Form Quality of Life Questionnaire (SF-12).** Health-related quality of life was assessed using the Medical Outcomes Study Short Form 12 (Ware, Kosinski, & Keller, 1996). Using 12 items, two SF-12 subscales can be computed -- the Physical Component Summary (SF12-PCS) and the Mental Component Summary (SF12-MCS). The SF-12 is a generic measure and does not target a specific age or disease group. The mean is set at 50 (range 0-100; higher scores indicate better QOL) for both the SF12-MCS and SF12-PCS scores in the general population. Ware, Snow, Kosinski, and Gandek (1993) suggest that a 5-point difference on a MOS scale is clinically significant. Internal consistency was good ($\alpha$ for SF12-PCS = .81, $\alpha$ for SF12-MCS = .83).

**The NIH-Chronic Prostatitis Symptom Index (NIH-CPSI).** The NIH-CPSI is a commonly used 13-item questionnaire for the assessment of symptom severity in men with CP/CPPS. For each item, score ranges are 0–1 (6 items), 0–3 (2 items), 0–5 (3 items), 0–6 (1 item), and 0–10 (1 item), with a range for the NIH-CPSI total score of 0–43 points. Higher scores represent greater symptom severity. This measure demonstrates excellent test-retest reliability ranging from .83 to .93 over a two-week period, and good internal consistency (Litwin et al., 1999a). The validation sample reported a mean total
score of 19.5. Scale items demonstrated good internal consistency in the current study (\( \alpha = .84 \)).

**Interstitial Cystitis Symptom Index/Interstitial Cystitis Problem Index (ICSI/ICPI).** The ICSI/ICPI (O'Leary, Sant, Fowler Jr, Whitmore, & Spolarich-Kroll, 1997) assesses the most important voiding and pain symptoms of IC/PBS, as well as the extent to which these symptoms are problematic. The ICSI consists of 4 items, each rated on a scale of 0 (*not at all*) to 5 (*almost always/usually*) with total scores ranging from 0 to 20. The ICPI also consists of 4 items, with each item rated on a scale of 0 (*no problem*) to 4 (*big problem*) with total scores ranging from 0 to 16. Scale items demonstrated acceptable internal consistency, ICPI \( \alpha = .78 \), ICPI \( \alpha = .71 \).

**Procedure**

**Male sample.** Following approval from institutional review boards, study materials were sent by mail, including a consent form, demographic sheet, and study measures. Participants signed the consent before completing their measures. The measures took approximately 35-45 minutes to complete, and completed packages were returned in a postage-paid envelope to the research centers.

Men with CP/CPPS from an existing cohort (\( N=488 \)) enrolled in the NIH Chronic Prostatitis Cohort (CPC) Study (see Appendix A; Schaeffer, Landis, et al., 2002) were contacted, and approximately 52% (\( n = 253 \)) of participants agreed to participate in the present study. Men who decided to participate in the present study had previously reported lower rates of prostatitis symptoms (i.e., pain, voiding, impact symptoms; \( p < .05 \)), a better quality of life (i.e., both physically and mentally; \( p < .05 \)), longer time of
diagnosis (1.6 years; \( p < .05 \)), being older by 4 years \( (p < .05) \), more likely to be White \( (p < .05) \), and better educated \( (p < .05) \), and more likely to be living with a spouse/cohabiting partner \( (p<.05; \text{Tripp et al., 2006}) \). Of the 253 participants, 188 reported having a partner or spouse, and only these participants were included in the present study.

**Female sample.** Female participants were recruited by letter invitation after approval from the respective ethics boards. Adult women with a clinical diagnosis of IC/PBS were identified as eligible for participation during their routine clinical care. Materials were sent by mail, including a consent form, demographic sheet, and study measures. The participants read and signed the consent before completing their measures. The measures took approximately 35-45 minutes to complete, and completed packages were returned in a postage-paid envelope to the research centers. A total of 120 women participated in this survey (Tripp, Nickel, Fitzgerald, et al., 2009). Of these 120 women, the responses of 5 were not included because of incomplete data for 15% of their measures. Of the remaining 115 participants, 96 reported having a partner or spouse, and only these participants were included in the present study.

**Results**

**Preliminary Analyses**

Men in the current study reported a mean score of 16.5 on the NIH-CPSI, which is comparable to that reported in the development study of the NIH-CPSI \( (\text{total score range: 0-43}; \text{Litwin et al., 1999a}) \). Additionally, women in the current study reported a mean score of 10.6 and 12 on the ICPI and ICSI, respectively, and this is similar to other
reported IC/PBS samples (score range: 0-16; Sirinian, Azevedo, & Payne, 2005).

Unfortunately, mean scores were not reported in the validation study of the ICSI/ICPI.

Chi-square tests of independence were conducted to determine if there was a relationship between gender and categorical demographic variables (i.e., ethnicity, education level, and employment status; see Table 1.1 for the proportions). The chi-square was significant for employment status, $\chi^2(3) = 32.55, p < .001$, and education level, $\chi^2(4) = 124.65, p < .001$, but not for ethnicity, $\chi^2(1) = 0.29, p = .59$. Women were less likely to be employed, more likely to be unemployed and more likely to be on disability than men. With respect to education level, women were less likely to have high school education, more likely to have a college/university degree and more likely to have a graduate or professional degree than men.

Table 1.1

Demographics and t-Tests for Gender Differences in Study 1 Variables.

<table>
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<tr>
<th></th>
<th>CP/CPPS %</th>
<th>IC/PBS %</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
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<td>Employment Status</td>
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<td>Employed</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
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<td>13.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
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<td>21.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Disability</td>
<td>4.2</td>
<td>18.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
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</tr>
<tr>
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<td>2</td>
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<td></td>
</tr>
<tr>
<td>American Indian</td>
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<td>0</td>
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</tr>
<tr>
<td>Other</td>
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<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>124.65</td>
<td>&lt;.001</td>
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<tr>
<td>Less than high school</td>
<td>9.6</td>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>55.1</td>
<td>18.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure (range)</td>
<td>CP/CPPS $M (SD)$ (min.-max.)</td>
<td>IC/PBS $M (SD)$ (min.-max.)</td>
<td>$t(282)$</td>
<td>$p$</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>----------</td>
<td>-----</td>
</tr>
<tr>
<td>Age</td>
<td>48.38 (10.77) (23.54-84.86)</td>
<td>50.56 (13.82) (21-83)</td>
<td>-1.47</td>
<td>.144</td>
</tr>
<tr>
<td>SF-MPQ (0-45)</td>
<td>7.16 (6.73) (0-29)</td>
<td>13.71 (9.54) (0-42)</td>
<td>-6.70</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SOPA-C (0-40)</td>
<td>19.59 (5.05) (0-33)</td>
<td>18.01 (8.65) (0-37)</td>
<td>1.93</td>
<td>.054</td>
</tr>
<tr>
<td>PCS (0-52)</td>
<td>15.53 (9.75) (0-43)</td>
<td>21.68 (12.13) (0-50)</td>
<td>-4.62</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CES-D (0-60)</td>
<td>16.03 (6.38) (0-33)</td>
<td>19.00 (12.04) (1-48)</td>
<td>-2.72</td>
<td>.007</td>
</tr>
<tr>
<td>PDI (0-70)</td>
<td>12.88 (13.09) (0-61)</td>
<td>28.27 (15.32) (0-63)</td>
<td>-8.84</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SF-12 PCS (0-100)</td>
<td>47.87 (9.51) (15.26-63.11)</td>
<td>34.63 (7.99) (17.35-55.64)</td>
<td>11.67</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SF-12 MCS (0-100)</td>
<td>47.37 (10.13) (18.24-65.29)</td>
<td>44.45 (13.66) (18.13-67.72)</td>
<td>2.03</td>
<td>.043</td>
</tr>
</tbody>
</table>

*Note.* SF-MPQ = Short-Form McGill Pain Questionnaire; PDI = Pain Disability Index; PCS = Pain Catastrophizing Scale; CES-D = Centre for Epidemiological Studies Depression Scale; SOPA-C = Survey of Pain Attitudes-Control Scale; SF-12 PCS = Physical Component Subscale of the Medical Outcomes Study Short Form 12; SF-12 MCS = Mental Component Subscale of the Medical Outcomes Study Short Form 12.

Using independent-samples $t$ tests, the two genders were compared on demographics (i.e., age) and study variables of interest (see Table 1.1). To control for Type I error, a Bonferroni correction was employed, and thus a $p$ level of .006 was used (.05/8). In comparison to men, women reported higher levels of pain, catastrophizing,
and disability and lower physical QoL. The differences in pain, disability, and physical QoL were also considered to be clinically significant.

Both men and women had a mean catastrophizing score below clinically significant relevant levels and reported subclinical levels of depressive symptoms according to guidelines suggested for individuals with chronic pain. Although men and women scored below clinically significant levels of catastrophizing, the gender difference in catastrophizing is considered clinically significant (Scott, Wideman, & Sullivan, 2013). As well, both men and women reported levels of perceived control over pain within the subclinical range (Jensen, Karoly, & Huger, 1987). Men with CP/CPPS reported mental and physical QoL within half a standard deviation below the mean of the normative sample. Women with IC/PBS reported mental QoL similar to the normative sample, but they reported physical QoL approximately 1.5 standard deviations below the mean of the normative sample.

**Bivariate Correlations**

Pearson correlations for the overall sample were calculated for all variables of interest and are displayed in Table 1.2. A conservative $p$ value of .001 was used (.05/45). Solicitous, distracting, and negative spouse responses to pain behaviour were associated with higher levels of disability. Only negative spouse responses to pain behaviour were significantly associated with depressive symptoms, mental QoL, and catastrophizing. In contrast, solicitous and distracting spouse responses were significantly associated with physical QoL and pain.
Examining the correlations by gender indicates that for men with CP/CPPS (lower half of Table 1.3), higher reports of solicitous spouse responses to pain behaviour were associated with poorer physical QoL and greater disability. Unlike the CP/CPPS group, in the IC/PBS group (upper half of Table 1.3), solicitous spouse responses were not significantly related to any of the outcome variables of interest (i.e., depressive symptoms, physical or mental QoL, disability). Distracting spouse responses to pain behaviour were not associated with any of the outcome variables in either group. In both the IC/PBS and the CP/CPPS groups, higher negative spouse responses to pain behaviour were associated with higher levels of depressive symptoms. However, in the CP/CPPS group, higher negative spouse responses were also associated with poorer physical and mental QoL and disability. In sum, negative spouse responses are most consistently related to outcomes in men with CP/CPPS.
Table 1.2

*Bivariate Correlations Among Study Variables in Overall Sample.*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
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<tbody>
<tr>
<td>1. SR</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. DR</td>
<td>.65*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. NR</td>
<td>-.19*</td>
<td>.01</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. SF12-PCS</td>
<td>-.34*</td>
<td>-.19*</td>
<td>-.18</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. SF12-MCS</td>
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<td>-.12</td>
<td>-.28*</td>
<td>.18</td>
<td>-</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. PDI</td>
<td>.34*</td>
<td>.21*</td>
<td>.25*</td>
<td>-.66*</td>
<td>-.42*</td>
<td>-</td>
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<tr>
<td>7. CES-D</td>
<td>.06</td>
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<td>.29*</td>
<td>-.23*</td>
<td>-.72*</td>
<td>.46*</td>
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<td>-.46*</td>
<td>.51*</td>
<td>.51*</td>
<td>-</td>
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<tr>
<td>9. SF-MPQ</td>
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<td>.14</td>
<td>-.50*</td>
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<td>.62*</td>
<td>.40*</td>
<td>.48*</td>
<td>-</td>
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<tr>
<td>10. SOPA-C</td>
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<td>-.06</td>
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<td>-.17</td>
<td>-.09</td>
<td>-.17</td>
<td>-.16</td>
</tr>
</tbody>
</table>

*Note.* SR = Solicitous spouse responses; DR = Distracting spouse responses; NR = Negative spouse Responses; SF12-PCS = SF-12 Physical Component Scale; SF12-MCS = SF-12 Mental Component Scale; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale; PCS = Pain Catastrophizing Scale; SF-MPQ = Short-Form McGill Pain Questionnaire; SOPA-C = Survey of Pain Attitudes-Control Scale.

*p < .001.
### Table 1.3

**Bivariate Correlations Among Study Variables Separated by Gender**

<table>
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<td>-.01</td>
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<td>.04</td>
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<td>.33*</td>
<td>.16</td>
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<td>.53*</td>
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</tbody>
</table>

*Note. Correlations below diagonal are for men, above diagonal for women. SR = Solicitous spouse responses; DR = Distracting spouse responses; NR = Negative spouse Responses; SF12-PCS = SF-12 Physical Component Scale; SF12-MCS = SF-12 Mental Component Scale; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale; PCS = Pain Catastrophizing Scale; SF-MPQ = Short-Form McGill Pain Questionnaire; SOPA-C = Survey of Pain Attitudes-Control Scale. *p<.001.*
Research Question 1: Are There Gender Differences in Reported Spousal Responses to Pain Behaviour Between Women with IC/PBS and Men with CP/CPPS?

A mixed-design ANCOVA was conducted to address this research question. The within-subjects factor was spouse responses to pain behaviour, and the between-subjects factor was gender. Pain, physical QoL, catastrophizing, and disability were included as covariates, as the two genders differed on these measures (see Table 1.1). There was no main effect of gender, $F(1, 278) = 1.81, p = .18$, nor spouse responses to pain behavior, $F(2, 556) = 2.55, p = .08$. There was a significant interaction between gender and spouse responses to pain behavior, $F(2, 277) = 7.35, p = .001$, with women reporting higher levels of solicitous, $t(282) = 7.47, p < .001$, and distracting, $t(282) = 2.86, p = .004$, spouse responses than men did. However, men and women did not differ in reported levels of negative spouse responses to pain behavior, $t(282) = 0.96, p = .65$.

Table 1.4

<table>
<thead>
<tr>
<th>Measure (range)</th>
<th>CP/CPPS $M(SD)$ (min.-max.)</th>
<th>IC/PBS $M(SD)$ (min.-max.)</th>
<th>$t(282)$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR (0-6)</td>
<td>1.94 (1.51) (0-6)</td>
<td>3.22 (1.69) (0-6)</td>
<td>7.47</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>DR (0-6)</td>
<td>1.38 (1.34) (0-6)</td>
<td>1.89 (1.51) (0-5.75)</td>
<td>2.86</td>
<td>.004</td>
</tr>
<tr>
<td>NR (0-6)</td>
<td>0.89 (1.10) (0-6)</td>
<td>0.97 (1.29) (0-6)</td>
<td>0.45</td>
<td>.653</td>
</tr>
</tbody>
</table>

*Note. SR = solicitous spouse responses; DR = distracting spouse responses; NR = negative spouse responses*
Research Questions 2 and 3: Do Spouse Responses to Pain Behaviour Moderate the Relationship Between Pain and Patient Outcome and Is There a Gender Difference? If Spouse Responses to Pain Behavior Moderate the Relationships Between Pain and Outcomes, Do Cognitive Variables (e.g., perceived control over pain, catastrophizing) Influence the Stress-Buffering Effect of Spouse Responses and Are There Gender Differences in the Aforementioned Effects?

General Linear Model analysis was conducted using SPSS 18 (Chicago, IL). This approach was selected because the data consisted of continuous predictor variables and multiple dependent outcome variables. The dependent variables were patient outcomes of physical QoL, mental QoL, disability, and depressive symptoms. The predictors were gender (women with IC/PBS = -1; men with CP/CPPS = 1); pain (SF-MPQ); and solicitous, distracting, and negative spouse responses. Four-way interaction terms involving gender, pain, a spouse response variable (i.e., solicitous or distracting or negative responses), and an intrapersonal variable (i.e., catastrophizing or perceived control over pain), and their associated lower order interaction terms were included. Because interaction terms were included in the models, all continuous predictors were centered to reduce multicollinearity between the main effect and product terms (Aiken & West, 1991). In these analyses, if the highest-order interaction was significant, then follow-up analyses were conducted for this interaction only. If the highest-order interaction was not significant, then only lower order interactions involving pain and one of the spouse response variables were examined. Simple slopes analyses of significant interactions were also conducted as necessary as outlined below.
Contrary to predictions, gender did not significantly interact with any interaction terms involving pain and a spouse response variable, $p_s > .10$. There was a significant interaction between pain and solicitous responses, $F(3, 708) = 4.11, p = .007$, and between pain and distracting responses, $F(3, 708) = 6.79, p < .001$, but the interaction between pain and negative responses was not significant, $F(3, 708) = 1.91, p = .13$. The interaction between pain and distracting responses predicted mental QoL, $B = 0.32, t(282) = 2.91, p = .004$, and disability, $B = -0.38, t(282) = -3.16, p = .002$. However, the interaction between pain and solicitous responses was qualified by a marginally significant three-way interaction among pain, solicitous responses, and catastrophizing, $F(3, 708) = 2.37, p = .07$. The interaction among pain, solicitous responses to pain behavior, and catastrophizing predicted only mental QoL, $B = 0.01, t(282) = 2.01, p = .04$. Simple slopes analyses for interactions were conducted as detailed below (i.e., three-way followed by two-way interactions).

**Interaction among pain, solicitous responses, and catastrophizing (3-way interaction).** At high (i.e., 1 SD above the mean) and mean levels of catastrophizing, the interaction between pain and solicitous responses was not significant for mental QoL, $B = 0.08, t(282) = 0.86, p = .39$, and $B = -0.07, t(282) = -0.77, p = .44$, respectively. At low catastrophizing (i.e., 1 SD below the mean), the interaction between pain and solicitous responses was marginally significant for mental QoL, $B = -0.22, t(282) = -1.61, p = .10$. Contrary to predictions, at low catastrophizing and high solicitous responses, higher pain was associated with lower mental QoL (see Figure 1.1), $B = -0.67, t(282) = -2.72, p = .007$. Additionally, at low catastrophizing and mean or low levels of solicitous responses, pain was not
significantly associated with mental QoL, $B = -0.30$, $t(282) = -1.33$, $p = .19$, and $B = 0.07$, $t(282) = 0.19$, $p = .85$, respectively.

*Figure 1.1.* The relationship between pain (SF-MPQ) and mental QoL at low levels of catastrophizing.

*p < .05

**Interaction between pain and distracting spouse responses (2-way interaction).**

**Prediction of mental QoL.** Consistent with predictions, pain was not significantly associated with mental QoL at high levels (i.e., 1 SD above the mean) of distracting spouse responses to pain behaviour (see Figure 1.2), $B = 0.08$, $t(282) = 0.40$, $p = .69$. Additionally,
higher pain was associated with lower mental QoL at mean, $B = -0.38$, $t(282) = -2.73, p = .007$, and low (i.e., 1 SD below the mean) distracting responses, $B = -0.83$, $t(282) = -3.71, p < .001$.

Figure 1.2. The relationship between pain (SF-MPQ) and mental QoL.

*p < .05

**Prediction of disability.** Consistent with predictions, pain was not significantly associated with disability at high (i.e., 1 SD above the mean) distracting spouse responses, $B = 0.07$, $t(282) = 0.33, p = .74$. However, higher pain was associated with higher levels of disability at mean, $B = 0.61$, $t(282) = 4.01, p < .001$, and low (i.e., 1 SD below the mean) distracting responses, $B = 1.16$, $t(282) = 4.67, p < .001$. 
Discussion

The primary aims of Study 1 were to examine gender differences in social support in a novel chronic pain sample (i.e., UCPPS), and to explore whether the stress-buffering effect of social support was dependent upon gender and/or cognitive variables (i.e., pain catastrophizing or control over pain).

**Research Question 1: Are There Gender Differences in Reported Spousal Responses to Pain Behaviour Between Women with IC/PBS and Men with CP/CPPS?**
Women perceived higher levels of solicitous and distracting spouse responses to pain behaviour even after controlling for pain, physical QoL, catastrophizing, and disability. However, men and women reported similar levels of negative spouse responses to pain behaviour. These gender differences are contrary to the support gap hypothesis but consistent with research indicating men provide more solicitous responses than women in response to their partner’s pain (Newton-John & Williams, 2006). Therefore, results of the current study suggest that the support gap hypothesis is not applicable even in a clinical sample.

However, a finer grained analysis may support the support gap hypothesis. Neff and Karney (2005) reported that although men and women did not differ in the amount of social support they provided to their spouse, in comparison to men, women provided more support on days that their spouse experienced greater stress. Women also desire more social support than men (Xu & Burleson, 2001), suggesting that perhaps women communicate this desire resulting in increased reports of perceived social support by women. Data from the current study do indicate that women scored higher on pain catastrophizing, which is speculated as a form of pain communication and social-support seeking (Sullivan, 2012). Therefore, it may not be an issue of gender differences in responsiveness, but individuals who request more support simply get more support.

Still it is possible on days of UCPPS symptom flare-ups that husbands and wives differ in their responsiveness to their partner’s pain or men and women with UCPPS request different amounts of social support. A daily diary study documenting days of symptom flare-ups would be an important area for future research to further clarify the application of the support gap hypothesis in UCPPS.
Research Questions 2 and 3: Do Spouse Responses to Pain Behaviour Moderate the Relationship Between Pain and Patient Outcome? If Spouse Responses to Pain Behavior Moderate the Relationships Between Pain and Outcomes, is this Effect Further Moderated by Cognitive Variables (e.g., perceived control over pain, catastrophizing) and/or Gender?

Although there were no gender differences, the stress-buffering hypothesis was supported, indicating that both men and women suffering from UCPPS equally benefit from social support. That is, distracting spouse responses buffered the relationships between pain and disability and between pain and mental QoL, and this effect was not dependent upon gender or cognitive variables. As well, the effect of solicitous spouse responses on the relationship between pain and mental QoL was moderated by catastrophizing, such that at high levels of catastrophizing, spouse solicitousness did not influence the relationship between pain and mental QoL (e.g., pain was negatively associated with mental QoL). Contrary to the stress-buffering hypothesis, at low levels of catastrophizing, solicitous spouse responses moderated the relationship between pain and mental QoL such that the relationship between pain and mental QoL was only significant (and negative) at high levels of solicitous spouse responses. The distracting behavior finding is discussed in the next section, followed by a discussion of the solicitous spouse responses finding.

**Interaction between pain and distracting spouse responses.** Although the moderating role of distracting spouse responses to pain behaviour is consistent with the stress-buffering hypothesis, the stress-buffering hypothesis does not suggest how distracting responses attenuate the negative impact of pain. Findings from the current study may be best understood within the
context of cognitive models of pain that predict attention and subsequent emotional processing of sensory information results in distress (McCaul & Malott, 1984). That is, distraction buffers the negative effect of pain by occupying attentional resources and preventing the processing of the pain experience. This speculation is based on the notion that humans have a finite attentional capacity. In direct contrast, pain catastrophizing has the opposite effect of distraction and floods attentional capacity with pain-related sensory and emotionally-charged (i.e., fear) information, acting to amplify the negative impact of pain through rumination and magnification processes.

Spousal attempts to distract the individual with chronic pain (e.g., “Reads to me;” “Talks to me about something else to take my mind off the pain;” “Tries to involve me in some activity;” “Encourages me to work on a hobby”) may provide the individual with “mental breaks” from ruminating cognitive and sensory pain processes, allowing individuals to experience meaningful contact with their spouse in spite of pain. In a related study, task persistence (i.e., ignoring pain and continuing an activity despite pain) is also shown to be associated with lower levels of disability (Ersek, Turner, & Kemp, 2006). Therefore, the distracting behavior provided by spouses may be one of the methods individuals with chronic pain engage in to assist them in ignoring their pain.

There is mixed evidence of the efficacy of distraction on pain reduction with some researchers reporting pain reduction (Damme, Crombez, Wever, & Goubert, 2008; McCaul & Malott, 1984; Miron, Duncan, & Catherine Bushnell, 1989; Petrovic, Petersson, Ghatan, Stone-Elander, & Ingvar, 2000; Tracey et al., 2002; Valet et al., 2004), and some researchers reporting no effect (Hodes, Rowland, Lightfoot, & Cleeland, 1990; McCaul, Monson, & Maki, 1992). Of
note, most research on pain reduction efficacy for distraction was conducted with non-clinical samples using experimentally induced pain and laboratory distraction tasks.

In one reported study of individuals with chronic low back pain, the distraction group (i.e., participants were instructed to press a button as quickly as possible in response to a tone) did not experience less pain when compared to the non-distract controls during a lifting task (i.e., lifting and holding a 5.5 kg bag for 60 s; Goubert, Crombez, Eccleston, & Devulder, 2004). In contrast, an evaluation of attention management as treatment for chronic pain indicated strategies including brief relaxation, use of imagery, and distraction towards external objects resulted in reduced pain intensity and pain-related interference in a sample of chronic pain patients (Elomaa, Williams, & Kalso, 2009).

Evidence with respect to the efficacy of distraction on pain reduction in clinical samples is not clearly delineated, but contrasting results reported by Goubert and colleagues and by Elomaa and colleagues suggest that the type of distracter is important. That is, distracters that counter the stress response (e.g., relaxation via use of imagery) may be more effective than distracters that simply occupy attentional resources (i.e., pressing a button in response to tone). It may also be that distraction, as assessed in this study as form of spousal engagement, may act as a viable distracter in an interpersonal manner.

Researchers hypothesize the efficacy of distraction may be dependent on affective-motivational characteristics of the distracters (Eccleston & Crombez, 1999; Verhoeven et al., 2010). According to this perspective, the allocation of attention is determined by whether or not information is goal-relevant. Only one published study to date has examined the influence of the
affective-motivational characteristics of distracters on pain reduction, and the authors did not find supporting evidence. Verhoeven and colleagues reported individuals reported similar levels of pain regardless if they were presented with a motivated distraction task (i.e., reward and punishment for task performance) or distraction task only (i.e., no reward or punishment for task performance).

Here, it is important to note that laboratory distraction tasks differ from distracting spouse responses. In the laboratory, distraction tasks comprise of button-pressing in the presence of predetermined stimuli and performance is assessed by reaction time. In contrast, the MPI assesses interpersonal distraction or engagement in an enjoyable activity (e.g., “Talks to me about something else to take my mind off the pain”). Therefore, the MPI assesses distracters that may be more salient with respect to affective-motivational characteristics when compared with button-pressing distracters in the laboratory. Distraction assessed in an interpersonal manner may act to help regulate the pain experience, as it has desirable affective-motivational characteristics including emotional closeness and enjoyment from pleasurable activities with people you have meaningful relations with.

Of note, Verhoeven and colleagues (2010) have recently reported that the effect of distraction may be moderated by catastrophizing, such that individuals high in catastrophizing reported lower levels of pain intensity than the control group but only when presented with the motivated distraction task. In contrast, and despite differences in measures used and sample characteristics, both the current study and Goubert et al. (2004) found the effect of distraction was not moderated by catastrophizing in individuals with chronic pain. Furthermore, the mean catastrophizing score of participants in the current study was below clinical significance and may
account for the absence of a moderating effect of catastrophizing on the role of distracting responses, as the level of catastrophizing may have been insufficient to occupy attentional resources. However, if indeed the mean level of catastrophizing insufficiently occupied attentional resources, one would not expect catastrophizing to moderate the effect of spouse solicitousness, but it did moderate the effect. Distraction may very well be an important component of adjustment to chronic pain in UCPPS, and in the particular case of distracting spouse responses to patient pain, the stress-buffering effect of distracting spouse responses is not dependent upon one’s level of catastrophizing.

**Interaction among pain, solicitous spouse responses, and catastrophizing.** As noted above, the effect of solicitous spouse responses was moderated by level of catastrophizing. Following the cognitive resource model for pain again, when catastrophizing is high, a pain sufferer uses attentional resources attending to and processing painful sensory information leaving insufficient attentional resources to attend to and/or process solicitous spouse responses. Therefore, when catastrophizing is high, solicitous spouse responses do not act as a moderator of the relationship between pain and mental QoL. In contrast, when catastrophizing is low, attentional resources are available to process solicitous spouse responses. Speculatively, the emotional processing of solicitous responses may then reinforce one’s beliefs and attitudes about pain and therefore, increase the strength of the relationship between pain and mental QoL. Indeed attitudes and beliefs about pain are associated with adjustment (Jensen, Turner, & Romano, 2007; Moseley, 2004). However, a test of such a mechanism could not be conducted in the current study. Therefore, one possible area for future research is to examine if attitudes and
beliefs about pain mediate the moderating effect of solicitous spouse responses on the relationship between pain and mental QoL.

Alternatively, according to the communal coping model of catastrophizing high catastrophizers’ expressive pain displays serve a communicative function to maximize the probability that distress will be managed within a social or interpersonal context (Sullivan et al., 2000). Research does support this notion; high catastrophizers exhibit more pain behaviour during a cold-pressor task when there was someone present to receive their pain communication (e.g., M. J. L. Sullivan, Adams, & Sullivan, 2004). Therefore, an alternative explanation for the negative relationship between pain and mental QoL at high levels of catastrophizing is that individuals who are highly distressed by their pain also tend to catastrophize to communicate their distress. However, researchers suggest catastrophizing may serve a communal coping function only in situations involving acute pain, as prolonged expressions of distress in the situation of chronic pain may actually result in negative responses from others (Buenaver et al., 2007; Cano, 2004). Unfortunately, pain duration was not assessed in the current sample, and therefore, comparisons cannot be made among the sample in the current study with samples reported by Buenaver et al. or Cano.

Pain may be associated with poorer mental QoL when spouse solicitousness is high because the patient may interpret spouse solicitousness negatively. When individuals with chronic pain do not seek social support (i.e., are low on catastrophizing) but continue to receive it in the form of spouse solicitousness, the unsolicited social support may actually undermine their efforts to develop coping strategies, acting to exacerbate the impact of pain on mental QoL. Evidence from the general social support literature does suggest invisible support (i.e., social
support that the provider reported enacting, but the recipient does not report receiving) is more effective in promoting adjustment than visible support (i.e., social support that the recipient reported receiving; Bolger & Amarel, 2007; Bolger, Zuckerman, & Kessler, 2000). Researchers speculate that visible social support has a paradoxical negative effect because support recipients feel burdensome and incompetent (Bolger & Amarel, 2007; Bolger et al., 2000). In the current study, visible social support in the form of spouse solicitousness may have had an especially negative impact when individuals with chronic pain do not request such social support (i.e., individuals are low on pain catastrophizing). Furthermore, individuals with chronic pain rate spouse responses that involve providing or offering help most frequently as negative in comparison to responses that involve task persistence (Newton-John & Williams, 2006).

**Gender Differences**

It is surprising gender differences in the moderating role of spouse responses to pain behaviour were not observed in the current study, as the pain literature provides evidence for gender differences in pain catastrophizing (see review by Sullivan et al., 2001), and solicitous spouse responses to pain behaviour (Fillingim et al., 2003; McWilliams, Dick, Bailey, Verrier, & Kowal, 2012; Newton-John & Williams, 2006), both in clinical and non-clinical samples. Also, preliminary analyses in the current study showed that women with IC/PBS reported higher levels of pain, catastrophizing, and disability and lower levels of physical QoL than did men with CP/CPPS. The aforementioned gender differences are consistent with research indicating that women with osteoarthritis report higher pain severity and disability but inconsistent with research on other types of musculoskeletal pain (i.e., back pain, fibromyalgia) and cancer pain, which has limited evidence of gender differences (see review by Fillingim, King, Ribeiro-
Dasilva, Rahim-Williams, & Riley, 2009). Results from the current study suggest that despite differences in the aforementioned variables, spouse responses to pain behaviour do not differentially moderate the relationship between pain and outcome across men and women with UCPPS.

**Limitations and Directions for Future Research**

The current study was the first to examine gender differences in the influences of spousal responses to pain behaviour, catastrophizing, and perceived control over pain in UCPPS. Although there are a number of strengths including examination of both inter- and intrapersonal pain variables, there are also a number of limitations.

Participants in the present study may not represent the general IC/PBS and CP/CPPS population, and more importantly, their spouses may not represent the general population of their respective spouses. Men with CP/CPPS presented in the current study were drawn from a subsample \((n = 253)\) of men enrolled in the NIH Chronic Prostatitis Cohort Study \((N = 488)\). Differences were previously noted between survey responders and non-responders that impact data generalizability (e.g., symptom severity, QoL; Tripp et al., 2006). Additionally, samples used in the current study were not ethnically diverse primarily consisting of European Canadians and Americans. However, that said the findings specific to these samples can be further supported by replication studies including more diverse samples with respect to ethnicity, socioeconomic status, and employment, as these are important predictors of health (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010). As well, much of the literature in UCPPS is conducted on samples sharing very similar profiles in regard to demographics and symptoms (e.g., Berry et al., 2011; Clemens et al., 2005; Tripp et al., 2013).
Data were also collected from tertiary-care patients, where it can be expected that patients will have longer symptom duration and more medical treatments and diagnostic experiences in comparison to individuals in primary care (Turner, et al., 2002). There is also the issue of generalizability of these data to non-treatment seekers who are suffering from UCPPS. Non-treatment seeking chronic pain patients may have better emotional and physical self-regulatory skills and potentially superior social support as indicated by lower levels of distress (Vera, Michael, & Jeff, 2000). However, research in this area is intended to inform treatment models intended for individuals who are currently distressed.

In the current study, reports of spousal responses were provided by the patient, not self-reports from their spouses, which is argued as a necessary method in many studies due to time and resource limits. However, there is mixed evidence with respect to congruence between patient and spouse reports of spouse responses to pain behaviour. Some researchers have reported patients perceive fewer solicitous responses (Lousberg, Schmidt, & Groenman, 1992; Williamson, Robinson, & Melamed, 1997), and greater punishing responses (Williamson et al., 1997), whereas other researchers have not found differences in solicitous or negative spouse responses (Cano, Johansen, & Geisser, 2004) or distracting spouse responses (Williamson et al., 1997). However, patients’ perceptions of their spouses’ behavior may account for a larger proportion of the variance in pain-related outcomes when compared to spouses’ self-reports (Flor, Kerns, & Turk, 1987). Thus, although corroborating information from the non-identified spouse may be ideal, it is not suggested as necessary. However, future research examining the moderating effect of social support should examine social support both from the perspective of the spouse and the individual with chronic pain.
Additionally, the current study was cross-sectional, and therefore, directionality of relationships cannot be concluded—plausible directions of relationships have been discussed above. However, it is the first study to examine the relationships among pain, social support, and pain-related outcomes in men and women with UCPPS, which will provide the basis for future research in this area to advance our understanding of the role of social support in UCPPS. Longitudinal or sequential examination of the relationships among pain, social support, and pain-related outcomes will be important in facilitating our understanding of the mechanisms involved in predicting adjustment to chronic pain.

Lastly, the current study examined social support only from spouses and does not comment on the role of social support from other sources. Although spousal support is especially relevant relative to other sources of support, women with chronic pain may seek more social support and use a wider range of coping strategies than men and use more problem solving, positive self-statements, and palliative behaviours than men (Unruh, Ritchie, & Merskey, 1999). The use of social support networks also vary across men and women such that men tend to participate in more activity-focused relationships and women maintain more emotionally intimate relationships (Belle, 1987; Flaherty & Richman, 1989). More recent studies also suggest that women feel and express more emotion with people outside of their marriages than men (Monin et al., 2010). Furthermore, women are more likely to mobilize social supports in times of stress, and men’s mobilization of support is primarily focused on their wives. As such, future research should examine sources of social support outside of the marriage and how support from other sources (e.g., healthcare providers, family, friends) may influence the relationship between pain and patient adjustment.
Conclusions

This novel study indicated the support gap hypothesis (i.e., men receive more support from their spouses than women receive from their spouses) is not applicable to spouse responses to pain behaviour in men and women with UCPPS. Moreover, the evidence suggests the opposite is true: women suffering from UCPPS receive more social support from their partners than men with UCPPS receive from their partners. Furthermore, different types of spousal support have different effects on the relationships between pain and outcomes, and the effect of spouse responses can be dependent on catastrophizing. That is, distracting spouse responses buffered the relationships between pain and disability and between pain and mental QoL. However, solicitous spouse responses strengthened the relationship between pain and mental QoL but only when catastrophizing was low. These results are consistent with literature emphasizing the role of catastrophizing and solicitous spouse responses to pain behaviour in the prediction of outcomes in individuals with chronic pain (e.g., Boothby et al., 2004). Contrary to the stated hypotheses, the stress-buffering effect was not more apparent in men with CP/CPPS than in women with IC/PBS.

Although it is premature to implicate specific methods or targets for psychosocial interventions for UCPPS, the data do suggest distracting and solicitous spouse responses and catastrophizing as potential targets for psychosocial interventions for individuals with UCPPS. Moreover, solicitous spouse responses may be especially detrimental to individuals with chronic pain who score low on catastrophizing. Further research is needed to clarify the relationship among pain, social support, catastrophizing, and patient outcomes in individuals with UCPPS. The influence of other sources of social support is of particular interest given demonstrated
gender differences in the utilization of social networks and, thus, may bring to light more gender differences in the influence of social support, which is the focus of Study 2.
Chapter 4: Study 2

Spouse Responses to Pain Behaviour, Catastrophizing, and Different Sources of Social Support as Moderators of Relationship Between Pain and Patient Outcome in Men and Women with Urogenital Chronic Pelvic Pain Syndrome
Abstract

Spouse responses to pain behaviour were previously examined as moderators of the relationship between pain and outcomes in men and women with UCPPS. Given the noted gender differences in the general social support literature, gender differences in the moderating effect of spouse responses were also examined, but no gender differences were found in Study 1. To extend Study 1, sources of social support outside of the romantic relationship were examined as some research indicates that men and women use their social support networks for different purposes, suggesting that social support from outside of the marriage may be more important in the prediction of pain-related outcomes in women than men. Two different regression models were tested: 1) to replicate Study 1, catastrophizing along with spouse responses were examined as moderators of the relationship between pain and outcome; and 2) catastrophizing along with support from family, friends, and physician were examined as moderators of the relationship between pain and outcome. Eighty-six men with CP/CPPS and 113 women with IC/PBS completed self-report measures assessing demographics, depressive symptoms, disability, QoL, a measure of spousal responses to their pain, and measures assessing social support from family, friends, and physician. Although gender differences in solicitous and distracting spouse responses to pain behaviour were replicated, results regarding the prediction of pain-related outcomes were not replicated. There were gender differences in social support from friends, with women reporting higher levels of support from their friends, but sources of social support from outside of the romantic relationship did not moderate the association between pain and outcome.
Introduction

No gender differences were found in Study 1 in the moderating effect of spouse responses to pain behaviour and catastrophizing on the relationships between pain and pain-related outcomes (i.e., mental and physical QoL, disability, and depressive symptoms). As discussed in Study 1, perhaps greater gender-based differences would become apparent when examining other sources of support. A significant body of research suggests, in comparison to men, women’s responses to stress are better characterized as “tending and befriending” (i.e., nurturing and affiliation; S. E. Taylor et al., 2000; Turton & Campbell, 2005). According to these authors, seeking social support is more prevalent in the stress regulation of women. Moreover, the marital relationship tends to be more central to the well-being of men than women (Dykstra & de Jong Gierveld, 2004), suggesting that sources of support outside of the spousal relationship may be more significant to well-being for women. These suggestions provide some of the impetus for a deeper examination of sources of social support, which may be important in clarifying such gender differences in chronic pain.

How do men and women benefit from different sources of social support? In a middle-aged cohort study, men’s mental health was predicted by support from the closest person (Stansfeld, Rael, Head, Shipley, & Marmot, 1997), whereas women benefitted more from a combination of support sources (Fuhrer, Stansfeld, Chemali, & Shipley, 1999). Additionally, support from one’s partner was negatively associated with depression for men, but for women it was their friend and family support that provided some protection against depression (Schwarzer & Gutierrez-Dona, 2005). Similarly, in a study of healthy adults, social support from family and
friends buffered the negative impact of relationship strain on life satisfaction and positive mood but only for women (Walen & Lachman, 2000).

In a recent study of late middle-aged men and women, the authors examined gender differences in the association between social support and depressive symptoms (Fiori & Denckla, 2012). Specifically, they examined support obtained from non-kin (i.e., friends, neighbours, or coworkers) and kin (i.e., sons or daughters [19 and older], parents, brothers or sisters, and other relatives). Men and women were then separately grouped into three groups, individuals who reported support from: kin only, non-kin only, and both kin and non-kin. Notably, social support from spouses was not included in their analyses. The authors reported a significant effect of source(s) of support on depressive symptoms in women but not in men. Women who reported receiving support from both kin and non-kin had the lowest depressive symptoms, and there was a trend showing individuals who reported support from kin only had lower depressive symptoms than individuals reporting support from non-kin only. However, the authors did not test if men and women differed in depressive symptoms within each support source group (i.e., kin only, non-kin only, and both kin and non-kin). Considering the research outlined, the source of social support is suggested to be important in predicting health-related outcomes, and that varied sources of social support may be more salient for women than men.

It is possible that differences in the role of type of social support and source of social support are due to the measurement of social support. Social support may be conceptualized in several ways. In the pain literature, social support is conceptualized as responses to pain behavior (e.g., solicitous, distracting, negative, etc.). In the general social support literature, there are several categories of social support (e.g., instrumental/tangible, emotional, esteem,
etc.), and social support can also be assessed with respect to perceived availability and received, amount/frequency, and satisfaction with social support. As such, there are discrepancies with respect to gender differences and what is helpful for whom with respect to social support, but what is clear is that social support appears to benefit individuals across cultures, genders, and health conditions (see reviews by Kim, Sherman, & Taylor, 2008; Uchino, 2006).

Social support can be viewed within an operant theory of pain (Flor et al., 1987; Gil, Keefe, Crisson, & Van Dalmen, 1987; Romano et al., 2000; Romano et al., 1992). This application of operant theory suggests that through learning mechanisms, pain behaviours are influenced by social responses, particularly responses of partners in intimate relationships (Fordyce, 1976). As such, within the pain literature, there is limited research available distinguishing between different sources of support. For example, the rheumatoid arthritis literature indicates social support from family and friends is positively associated with improved QoL (Minnock, Fitzgerald, & Bresnihan, 2003).

There is also a significant association between healthcare provider contact and chronic pain (Blyth, March, Brnabic, & Cousins, 2004; Von Korff, Wagner, Dworkin, & Saunders, 1991), implying physicians may be a significant source of formal social support. Lanza and colleagues (1993) suggest support from healthcare providers is unique and cannot be substituted with support from informal sources, such as friends and family (Dakof & Taylor, 1990; Dunkel-Schetter, 1984). Additionally, the general view is quality of the physician-patient relationship and physician empathy has a positive influence on patient outcomes (Hojat et al., 2011; Street, Makoul, Arora, & Epstein, 2009). Greater patient satisfaction is important, because it is associated with significantly decreased pain and disability (Hurwitz, Morgenstern, & Yu, 2005).
Varied sources of social support are also known to influence mental health outcomes in older adults. In healthy older adults, the absence of social support from family or friends is damaging for mental health (Takahashi, Tamura, & Tokoro, 1997), whereas having contact with both friends and family appears to be beneficial (Dupertuis, Aldwin, & Bossa, 2001). Additionally, in adults aged 50 years and older, social support from spouses, friends, and adult children have been found to be associated with lower levels of depressive symptoms in descending order of importance (Dean, Kolody, & Wood, 1990).

**Present Study**

Within the pain literature, spouses are recognized as providers of behavioural reinforcement given their frequency of contact with the patient suffering from pain. As such, there is limited research regarding other sources of social support in chronic pain. The accumulating research on non-clinical samples suggests sources of support other than one’s intimate partner can have a significant impact on health outcomes (Fiori & Denckla, 2012; Fuhrer et al., 1999; Schwarzer & Gutierrez-Dona, 2005; Stansfeld et al., 1997; Walen & Lachman, 2000). Therefore, Study 2 was designed to replicate and also extend the models originally hypothesized in Study 1 by investigating the role of sources of social support outside of the romantic relationship (i.e., friends, family and physician support) in individuals with UCPPS.

Research questions and hypotheses novel to Study 2:

2.1. Are there gender differences in reported social support from family, friends, and physician?
Hypothesis 2.1: Consistent with previous research on gender differences in use of social support networks and seeking social support, women were predicted to report higher levels of support from family, friends, and physician than men.

2.2. Does social support moderate the relationship between pain and patient outcome variables and are there gender differences in this effect?

Hypothesis 2.2: I predicted that social support from family, friends, and physician would buffer the relationships between pain and each outcome variable (i.e., mental and physical QoL, disability, depressive symptoms). I predicted that the stress-buffering effect of social support from family, friends, and physician would be stronger for women than men given previous research indicating that social support is more prevalent in the stress regulation of women (Taylor et al., 2000; Turton & Campbell, 2005).

2.3. If social supports from other sources buffer the relationships between pain and outcomes, is this effect further moderated by catastrophizing and/or gender?

Hypothesis 2.3: At low levels of catastrophizing, I predicted that social support from family, friends, or physician would buffer the relationships between pain and outcome variables. At high levels of catastrophizing, I predicted that social support from family or friends or physician would not buffer the relationships between pain and outcome variables.

Method

Participants

Male sample. For the male sample, 91 men diagnosed with CP/CPPS were recruited from 5 North American tertiary care clinical centers (3 U.S. centres: The Smith Institute for Urology, Cleveland Clinic, Los Angeles Infertility & Prostatitis Medical Group, and 1 Canadian centre: Kingston General Hospital). These patients met the NIH definition for CP/CPPS, which
is described as pain in the pelvic region for 3 of the last 6 months, in the absence of pathogenic bacteria (Krieger, et al., 1999). Of the 91 men, 5 were excluded as greater than 20% of their data was missing on central study measures (e.g., MPI, CES-D, PDI). Therefore, 86 men were included in the current analyses.

**Female sample.** A total of 113 women with IC/PBS were recruited from 5 North American tertiary care clinical centers (3 U.S. centres: The Smith Institute for Urology, University of Rochester Medical Centre, University Urology, and 2 Canadian centres: Sunnybrook Health Sciences and Kingston General Hospital). These patients fulfilled the diagnostic criteria described in the US National Institutes of Health Interstitial Cystitis Database Study (Hanno, Landis, Matthews-Cook, Kusek, & Nyberg, 1999) and the definition described at the US National Institutes of Health Urological Chronic Pelvic Pain Consensus Symposium (Nickel, 2008). Although not available at the time, patients fulfilled the criteria for diagnosis of BPS/IC outlined in the recently published American Urological Association guidelines (Hanno et al., 2011) as well as European Society for the Study of Interstitial Cystitis and European Association of Urology definition of BPS (Fall et al., 2010; van de Merwe, et al., 2008). One-hundred and ten women were included in the analyses, as 3 women were excluded due to greater than 20% of their data missing on central study measures.

**Measures**

**Demographics questionnaire.** All participants provided information on age, ethnicity (Caucasian/White, Hispanic or Latino, Aboriginal, Asian or Pacific Islander, Black/African-American/African-Canadian, Other), level of education, whether living with a spouse or partner,
employment status, time since diagnosis of UCPPS, and other physical or mental health conditions.

The Multidimensional Scale of Perceived Social Support (MSPPS; Zimet, Dahlem, Zimet, & Farley, 1988) includes 12 reliable and valid items assessing support. This measure assesses one’s perception of availability of social support from friends, family, and significant others. For the current study, only the friends and family subscales were used. Each item is rated on a scale from 1 (very strongly disagree) to 7 (very strongly agree); range for each subscale is 4 to 28. Mean scores in the validation sample were 5.80 for family and 5.85 for friends. Cronbach’s alpha was .93 for family and .94 for friends.

Patient Satisfaction Questionnaire Short-Form (PSQ-18; Marshall & Hays, 1994). The PSQ-18 is a measure of patient satisfaction with their health care. The 18 items assess technical quality, interpersonal manner, communication, time spent with Doctor, general satisfaction, financial aspects, and accessibility and convenience. Each item is rated on a scale of 1 (strongly agree) to 5 (strongly disagree), with 9 items reversed scored, such that higher scores indicate higher levels of satisfaction. Internal consistency in the current study was excellent ($\alpha = .93$).

The following measures were described in detail in Study 1. Therefore, only internal consistencies were reported for the following measures. The Short-Form McGill Pain Questionnaire (SF-MPQ) was used to assess pain, and in the current study, scale items demonstrated excellent internal consistency ($\alpha = .91$). The Multidimensional Pain Inventory (MPI) was used to assess spouse responses to pain behaviour, and subscale items demonstrated acceptable to good internal consistency (Negative $\alpha = .84$, Solicitous $\alpha = .85$, Distracting $\alpha = .85$).
The Center for Epidemiological Studies Depression Scale (CES-D) was used to assess depressive symptoms and scale items demonstrated excellent internal consistency in the current study ($\alpha = .93$). The Pain Disability Index (PDI) was used to assess extent of disability, and internal consistency of the PDI in the current study was excellent ($\alpha = .92$). The Pain Catastrophizing Scale (PCS) was used to assess pain-related catastrophizing and demonstrated excellent internal consistency in the current study ($\alpha = .95$). The MOS Short Form Quality of Life Questionnaire (SF-12) was used to assess mental and physical QoL and has demonstrated scale validity and reliability (Ware, Kosinski, & Keller, 1996). The SF-12 physical component scale and mental component scale demonstrated good internal consistency ($\alpha = .84$ and $\alpha = .82$, respectively). The NIH-Chronic Prostatitis Symptom Index (NIH-CPSI) was used to assess symptom severity in men with CP/CPPS. In the current study, internal consistency was good ($\alpha = .86$). Interstitial Cystitis Symptom Index/Interstitial Cystitis Problem Index (ICSI/ICPI) was used to assess voiding and pain symptoms of IC/PBS as well as the extent to which these symptoms are problematic; scale items demonstrated acceptable to good internal consistency (ICSI $\alpha = .72$, ICPI $\alpha = .82$).

**Procedure**

Following approval from the institutional review boards, men with urologist-diagnosed CP/CPPS and women with urologist-diagnosed IC/PBS were invited to participate by study personnel. Participants were provided with a combined letter of information and consent form and were given the opportunity to ask questions. Individuals agreeing to participate completed the questionnaire package and returned the package to their respective research centre by mail using postage-paid envelopes provided to participants. Participants were also provided with a
contact phone number should they have any questions. Participants were instructed to sign the consent form, which was returned with their completed measures. The measures required approximately 30-45 minutes to complete.

Results

Preliminary Analyses

Men in the current sample reported a mean NIH-CPSI score of 22.79 (SD = 10.29; range of possible scores = 0-43), which is comparable to the validation sample (Litwin et al., 1999a). Similar to other reported samples (e.g., Sirinian et al., 2005), the current sample women reported a mean ICSI score of 12.66 (SD = 4.55; range of possible scores = 0-16) and mean ICPI score of 10.83 (SD = 4.02; range of possible scores = 0-16).

Table 2.1

Demographics and T-tests for Gender Differences in Study 2 Variables.

<table>
<thead>
<tr>
<th></th>
<th>CP/CPPS</th>
<th>IC/PBS</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>64.7</td>
<td>38.5</td>
<td>25.05</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2.4</td>
<td>8.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>23.5</td>
<td>16.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Disability</td>
<td>9.4</td>
<td>36.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>1.34</td>
<td>.25</td>
</tr>
<tr>
<td>Caucasian</td>
<td>96.5</td>
<td>92.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3.5</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/African-Canadian</td>
<td>0</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>0.68</td>
<td>.71</td>
</tr>
<tr>
<td>Less than high school</td>
<td>3.5</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure (range)</td>
<td>$M (SD)$ (min.-max.)</td>
<td>$M (SD)$ (min.-max.)</td>
<td>$t$ (194)</td>
<td>$p$</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>-----------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>(26-73)</td>
<td>(20-75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>52.8 (11.47)</td>
<td>47.75 (14.04)</td>
<td>-2.68$^a$</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>(1.5-51.50)</td>
<td>(0.2-49.58)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship length (in years)</td>
<td>23.27 (13.37)</td>
<td>19.63 (14.18)</td>
<td>-1.60$^b$</td>
<td>.112</td>
</tr>
<tr>
<td></td>
<td>(0.1-37)</td>
<td>(0-33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time since diagnosis</td>
<td>5.71 (6.16)</td>
<td>7.29 (6.21)</td>
<td>1.73$^c$</td>
<td>.086</td>
</tr>
<tr>
<td></td>
<td>(0-37)</td>
<td>(0-33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D (0-60)</td>
<td>16.64 (11.11)</td>
<td>21.67 (13.68)</td>
<td>2.84</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>(0-46)</td>
<td>(0-58)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-MPQ (0-45)</td>
<td>13.2 (9.82)</td>
<td>18.01 (11.09)</td>
<td>3.17</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>(0-39)</td>
<td>(0-45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDI (0-70)</td>
<td>22.94 (16.89)</td>
<td>34.13 (17.88)</td>
<td>4.45</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(0-70)</td>
<td>(0-66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCS (0-52)</td>
<td>20.06 (10.79)</td>
<td>24.95 (13.63)</td>
<td>2.81</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>(0-50)</td>
<td>(0-52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-12 PCS (0-100)</td>
<td>41.58 (10.73)</td>
<td>35.52 (10.62)</td>
<td>-3.94</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(12.93-61.28)</td>
<td>(18.74-58.61)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-12 MCS (0-100)</td>
<td>44.51 (10.76)</td>
<td>41.72 (12.67)</td>
<td>-1.63</td>
<td>.105</td>
</tr>
<tr>
<td></td>
<td>(20.79-66.30)</td>
<td>(16.38-69.01)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* CES-D = Centre for Epidemiological Studies Depression Scale; SF-MPQ = Short-Form McGill Pain Questionnaire; PDI = Pain Disability Index; PCS = Pain Catastrophizing Scale; PSQ-18 = Patient Satisfaction Questionnaire Short-Form; SF-12 PCS = Physical Component Subscale of the Medical Outcomes Study Short Form 12; SF-12 MCS = Mental Component Subscale of the Medical Outcomes Study Short Form 12; SR = Solicitous Spouse Responses; DR = Distracting Spouse Responses; NR = Negative Spouse Responses.

$^a$df=191, $^b$df=149, $^c$df=184
**Study 2 samples.** A chi-square test of independence was conducted to determine if there was a relationship between gender and categorical demographic variables (i.e., ethnicity, education level, and employment status; see Table 2.1 for the proportions). Due to low expected cell counts, education was divided into 3 groups (vocational education/high school or less, university degree, graduate or professional degree), and ethnicity was dichotomized (Caucasian and other). A $\chi^2$ test of independence indicated that education, $\chi^2(2) = 0.68, p = .71$, and ethnicity, $\chi^2(1) = 1.34, p = .25$ were unrelated to gender. However, there was a relationship between gender and employment status, $\chi^2(3) = 25.05, p < .001$, such that more women than men indicated they were on disability.

Using independent-samples $t$ tests, the two genders were compared on demographics (i.e., age, relationship length, time since diagnosis) and study variables of interest (see Table 2.1). To control for Type I error, a Bonferroni correction was employed, and thus a $p$ level of .005 was used (.05/9).

Unlike Study 1, in comparison to men, women reported higher levels of depressive symptoms. Similar to Study 1, using a conservative cutoff for clinically significant depression in individuals with pain (Geisser et al., 1997b), neither men nor women with UCPPS reported clinically significant depressive symptoms. Additionally, consistent with Study 1, women reported higher levels of pain and disability and lower levels of physical QoL, such that the gender difference was also considered clinically significant for disability (Soer et al., 2012) and physical QoL (Ware, Snow, Kosinski, & Gandek, 1993). Similar to Study 1, neither gender met the cutoff for clinically significant catastrophizing (Sullivan, 2009). Generally, gender differences observed in Study 1 were also found in Study 2.
**Study 1 vs. Study 2 sample comparisons.** To determine whether the two study samples were comparable, a series of t tests were conducted. A Bonferroni correction was used (0.5/6) to reduce the probability of Type I errors; therefore, a p level of .008 was used. Of note, the sample in Study 2 reported lower physical and mental QoL, higher pain and higher disability (see Table 2.2).

Table 2.2

<table>
<thead>
<tr>
<th></th>
<th>Study 1 (M (SD))</th>
<th>Study 2 (M (SD))</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>49.11 (11.91)</td>
<td>49.97 (13.10)</td>
<td>-0.72</td>
<td>.469</td>
</tr>
<tr>
<td>Physical QoL</td>
<td>43.29 (10.96)</td>
<td>38.18 (11.06)</td>
<td>5.00</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mental QoL</td>
<td>46.40 (11.50)</td>
<td>42.95 (11.92)</td>
<td>3.16</td>
<td>.002</td>
</tr>
<tr>
<td>SF-MPQ</td>
<td>9.38 (8.37)</td>
<td>15.90 (10.80)</td>
<td>-7.11</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>PDI</td>
<td>18.09 (15.66)</td>
<td>29.22 (18.28)</td>
<td>-6.95</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CES-D</td>
<td>17.04 (8.81)</td>
<td>19.47 (12.83)</td>
<td>-2.30</td>
<td>.022</td>
</tr>
</tbody>
</table>

*Note.* QoL = Quality of Life; SF-MPQ = Short-Form McGill Pain Questionnaire; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale.

T-tests were conducted to compare women with IC/PBS from Study 1 with women in Study 2 (see Table 2.3) and similarly for men with CP/CPPS (see Table 2.4). A Bonferroni correction was also used for these analyses, resulting in p < .006 (.05/8) and p < .007 (.05/7) for women and men, respectively. Women from the two studies were similar with the exception of pain; individuals from Study 2 reported higher levels of pain. In contrast, men from the two studies differed on a number of measures; men from Study 2 were older, reported lower physical QoL, higher pain, higher disability, and higher CP/CPPS symptom severity. Differences in pain,
NIH-CPSI scores and disability also reached clinical significance (Propert et al., 2006; Soer et al., 2012; Strand et al., 2008).

Table 2.3

*Mean Differences Between Women with IC/PBS in Study 1 vs. Study 2*

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Women M (SD)</td>
<td>Women M (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>50.56 (13.82)</td>
<td>47.75 (13.98)</td>
<td>1.45</td>
<td>.149</td>
</tr>
<tr>
<td>Physical QoL</td>
<td>34.63 (7.99)</td>
<td>35.52 (10.62)</td>
<td>-.68</td>
<td>.497</td>
</tr>
<tr>
<td>Mental QoL</td>
<td>44.45 (13.66)</td>
<td>41.72 (12.67)</td>
<td>1.45</td>
<td>.139</td>
</tr>
<tr>
<td>SF-MPQ</td>
<td>13.71 (9.54)</td>
<td>18.01 (11.09)</td>
<td>-.99</td>
<td>.003</td>
</tr>
<tr>
<td>PDI</td>
<td>28.27 (15.32)</td>
<td>34.13 (17.88)</td>
<td>-.53</td>
<td>.012</td>
</tr>
<tr>
<td>CES-D</td>
<td>19.00 (12.04)</td>
<td>21.67 (13.68)</td>
<td>-.48</td>
<td>.138</td>
</tr>
<tr>
<td>ICPI</td>
<td>10.57 (3.86)</td>
<td>10.83 (4.02)</td>
<td>-.47</td>
<td>.640</td>
</tr>
<tr>
<td>ICSI</td>
<td>12.03 (4.58)</td>
<td>12.66 (4.55)</td>
<td>-.99</td>
<td>.322</td>
</tr>
</tbody>
</table>

*Note.* QoL = Quality of Life; SF-MPQ = Short-Form McGill Pain Questionnaire; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale.

Table 2.4

*Mean Differences Between Men with CP/CPPS in Study 1 vs. Study 2*

<table>
<thead>
<tr>
<th></th>
<th>Study 1 Men M (SD)</th>
<th>Study 2 Men M (SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>48.38 (10.77)</td>
<td>52.80 (11.34)</td>
<td>-3.10</td>
<td>.002</td>
</tr>
<tr>
<td>Physical QoL</td>
<td>47.71 (9.55)</td>
<td>41.57 (10.73)</td>
<td>4.74</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mental QoL</td>
<td>47.39 (10.12)</td>
<td>44.51 (10.76)</td>
<td>2.15</td>
<td>.033</td>
</tr>
<tr>
<td>SF-MPQ</td>
<td>7.16 (6.73)</td>
<td>13.20 (9.82)</td>
<td>-5.17</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>PDI</td>
<td>12.88 (13.09)</td>
<td>22.94 (16.88)</td>
<td>-4.89</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CES-D</td>
<td>16.04 (6.38)</td>
<td>16.64 (11.11)</td>
<td>-.47</td>
<td>.639</td>
</tr>
<tr>
<td>NIH-CPSI</td>
<td>16.52 (8.66)</td>
<td>22.79 (10.29)</td>
<td>-5.02*</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* QoL = Quality of Life; SF-MPQ = Short-Form McGill Pain Questionnaire; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale.
Bivariate Correlations

Pearson correlations for the overall sample were calculated for all variables of interest and are displayed in Table 2.5. A p value of .001 was used given the large number of correlations. Of the different types of spouse responses, only solicitous spouse responses to pain behaviour were associated with poorer physical QoL, whereas only negative spouse responses to pain behaviour were associated with poorer mental QoL. Both solicitous and negative spouse responses to pain behaviour were associated with higher levels of disability. Of the three types of spouse responses, only negative spouse responses to pain behaviour were associated with higher levels of depressive symptoms. All three types of spouse responses to pain behaviour were associated with higher levels of catastrophizing. Interestingly, of the three types of spouse responses, only solicitous spouse responses to pain behaviour were associated with higher pain. Support from family and friends were associated with higher mental QoL, lower disability, lower depressive symptoms, and lower catastrophizing. However, only support from friends was associated with lower levels of pain. Interestingly, lower support from physicians was associated with poorer physical QoL but was not associated with mental QoL, disability, or depressive symptoms.

Examining the correlations by gender indicates that for men with CP/CPPS (lower half of Table 2.6), higher reports of solicitous spouse responses to pain behaviour were associated with higher levels of disability and pain. Similarly, for women with IC/PBS (upper half of Table 2.6), higher reports of solicitous spouse responses to pain behaviour were associated with higher pain and also with lower physical QoL. For men with CP/CPPS, distracting spouse responses to pain behaviour were associated with higher disability and higher pain. However, for women with
IC/PBS, distracting spouse responses to pain behaviour were not significantly associated with other variables. For men with CP/CPPS, higher levels of negative spouse responses to pain behaviour were associated with lower physical QoL, lower mental QoL, higher disability, higher depressive symptoms, higher catastrophizing, and higher pain. However, for women with IC/PBS, negative spouse responses to pain behaviour were significantly associated with lower mental QoL, higher depressive symptoms, and higher catastrophizing.

For both men and women with UCPPS, negative spouse responses to pain behaviour were most consistently associated with pain-related outcomes (i.e., physical and mental QoL, disability, and depressive symptoms) when compared to solicitous and distracting spouse responses to pain behaviour. Support from family was associated with higher levels of mental QoL and lower levels of depressive symptoms for both men and women with UCPPS. For women with IC/PBS, support from family was also associated with lower catastrophizing, and for men with CP/CPPS, support from family was also associated with lower disability. Support from friends was associated with higher mental QoL, lower disability, lower depressive symptoms, lower catastrophizing, and lower pain for both men and women with UCPPS. Support from physicians was associated with higher mental QoL and lower depressive symptoms but only in men with CP/CPPS.
Table 2.5

Correlations Among Study Variables in Overall Study 2 Sample

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Note. SR = Solicitous spouse responses; DR = Distracting spouse responses; NR = Negative spouse Responses; SF12-PCS = SF-12 Physical Component Scale; SF12-MCS = SF-12 Mental Component Scale; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale; PCS = Pain Catastrophizing Scale; SF-MPQ = Short-Form McGill Pain Questionnaire; Rel. Length = Relationship Length; Time Dx = Time since diagnosis; MSPSS = Multidimensional Scale of Perceived Social Support; PSQ-18 = Patient Satisfaction Questionnaire.

*p<.001
Table 2.6

Correlations Among Study Variables Separated by Gender

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Note. Correlations below diagonal are for men, above diagonal for women. SR = Solicitous spouse responses; DR = Distracting spouse responses; NR = Negative spouse Responses; SF12-PCS = SF-12 Physical Component Scale; SF12-MCS = SF-12 Mental
Component Scale; PDI = Pain Disability Index; CES-D = Centre for Epidemiological Studies Depression Scale; PCS = Pain Catastrophizing Scale; SF-MPQ = Short-Form McGill Pain Questionnaire; Rel. Length = Relationship Length; Time Dx = Time since diagnosis; MSPSS = Multidimensional Scale of Perceived Social Support; PSQ-18 = Patient Satisfaction Questionnaire.

*p<.001
Research Question 1: Are there gender differences in reported spousal responses to pain behaviour and social support from family, friends, and physician between women with IC/PBS and men with CP/CPPS?

Two mixed-design ANCOVAs were conducted to address this research question. In the first ANCOVA the within-subjects factor was spouse responses to pain behaviour, whereas in the second ANCOVA the within-subjects factor was source of social support (i.e., family, friends, physician), and the between-subjects factor was gender for both ANCOVAs. Depressive symptoms, pain, disability, and physical QoL were included as covariates, as the two genders differed on these measures (see Table 2.1).

In the first ANCOVA, the main effect of gender, $F(1, 190) = 8.70, p = .004$, was qualified by an interaction between gender and spouse response to pain behaviour, $F(2, 380) = 10.31, p < .001$. As expected, follow-up analyses indicated women reported higher levels of solicitous spouse responses and distracting spouse responses than did men (see Table 2.7). Consistent with Study 1, men and women did not differ in reported levels of negative spouse responses to pain behavior.

In the second ANCOVA, the main effect of gender, $F(1, 190) = 17.01, p < .001$, was qualified by an interaction between gender and source of social support, $F(2, 380) = 9.42, p < .001$. Consistent with predictions, in comparison to men, women reported higher levels of social support from their friends. However, contrary to predictions men and women did not differ in social support from family or their physician.
Table 2.7

*Gender Differences in Social Support*

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<th>Measure (range)</th>
<th>CP/CPPS $M (SD)$ (min.-max.)</th>
<th>IC/PBS $M (SD)$ (min.-max.)</th>
<th>$t(194)$</th>
<th>$p$</th>
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<th>Study 1</th>
<th>Study 2</th>
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<td>.001</td>
<td>Yes; women higher</td>
<td>Yes; women higher</td>
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<tr>
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Research Questions 2 and 3: Does social support moderate the relationship between pain and patient outcome variables and are there gender differences in this effect? If social support buffers the relationships between pain and outcomes, is this effect further moderated by catastrophizing and/or gender?

**Replication of Study 1.** The General Linear Model (GLM) analysis was conducted using SPSS 18 (Chicago, IL). This approach was selected because the data consisted of continuous predictor variables and multiple dependent outcome variables (i.e., mental and physical QoL, depressive symptoms, and disability). The dependent variables were patient outcomes of physical QoL, mental QoL, disability, and depressive symptoms. The predictors were gender (women with IC/PBS = -1; men with CP/CPPS = 1); pain (SF-MPQ); and
solicitous, distracting, and negative spouse responses. Additionally, four-way interaction terms involving gender, pain, a spouse response variable (i.e., solicitous or distracting or negative responses), and catastrophizing and their associated lower order interaction terms were included. Because interaction terms were included in the models, all continuous predictors were centered to reduce multicollinearity between the main effect and product terms (Aiken & West, 1991). In this set of analyses, if the highest-order interaction was significant, then follow-up analyses were conducted for this interaction only. If the highest-order interaction was not significant, then only lower order interactions involving pain and one of the spouse response variables were examined. None of the interaction terms of interest were significant, $p < .17$. Therefore, Study 2 failed to replicate results reported in Study 1.

**Study 2 model with social support from other sources as moderators.** A similar GLM analysis was conducted in SPSS as outlined above. The predictors were gender (women with IC/PBS = -1; men with CP/CPPS = 1); pain (SF-MPQ); and social support from family, friends, and physician. Additionally, four-way interaction terms involving gender, pain, a source of social support (i.e., family, friend, physician), and catastrophizing and their associated lower order interaction terms were included. None of the interaction terms of interest were significant, $p < .26$. Therefore, the new hypotheses tested in Study 2 were not supported.

**Discussion**

The objectives of the current study were to replicate findings from Study 1 and extend Study 1 by examining sources of support other than one’s spouse (i.e., family, friends, and physician). Gender differences in the levels of reported spouse responses to pain behaviour were
replicated, but the models predicting disability, depressive symptoms, and mental and physical QoL were not replicated.

**Research Question 1: Are there gender differences in reported spousal responses to pain behaviour and social support from family, friends and physician between women with IC/PBS and men with CP/CPPS?**

Despite noted differences between samples across the two studies, gender differences in spouse responses to pain behaviour were consistent. Consistent with predictions, in both Studies 1 and 2 women reported higher levels of solicitous and distracting spouse responses than did men. As discussed in Study 1, this finding is consistent with reports that men provide more tangible support than women (Barbee et al., 1990). However, findings are inconsistent with the support gap hypothesis (SGH; Belle, 1982), which states that men receive more social support from their wives than women receive from their husbands. There is some suggestion that the support gap is minimal or nonexistent in early marriage and increases with age (Schwarzer & Gutierrez-Dona, 2005). Men and women in the current sample were equivalent in age and reported similar relationship lengths of approximately 20 plus years, suggesting the likelihood of a support gap. Evidence from recent observational studies suggest the SGH may be too simplistic and suggests the importance of considering gender role socialization when examining gender differences in social support provision (Verhofstadt & Devoldre, 2012; Verhofstadt & Weytens, 2013). In these studies, masculine people reported providing higher levels of tangible support, and feminine individuals reported higher levels of emotional support provision. The SGH was supported only in couples in which at least one spouse was stereotypically masculine.
or feminine. Masculinity and femininity are, therefore, important constructs to examine in future studies regarding gender differences in social support in UCPPS. Such research would clarify treatment recommendations regarding spousal support.

Consistent with previous research indicating that women are more likely to seek, use, and receive social support (e.g., Day & Livingstone, 2003; S. E. Taylor et al., 2000; R. J. Turner & Marino, 1994), women with IC/PBS also reported higher levels of support from friends. Some researchers suggest that men and women use their social support networks differently such that men tend to participate in more activity-focused relationships and women maintain more emotionally intimate relationships (Belle, 1987; Flaherty & Richman, 1989). If men do not use their network for social support, then it could be argued that their perceived availability of social support from outside of the romantic relationship is lower for this very reason.

In the current study, men and women reported similar levels of social support from family. This finding is inconsistent with research demonstrating that women receive more social support from their family when compared to men (e.g., Umberson, Chen, House, Hopkins, & Slaten, 1996). However, others suggest that gender differences in support from family members also depends on the gender of the family member (Monin, Clark, & Lemay, 2008). In a sample of American college students, female-female family relationships were most supportive and male-male family relationships were least supportive (Monin et al.). In male-female family relationships, men felt more supported than in their same-gender family relationships, but women felt less supported than in their same-gender family relationships. Unfortunately, the gender of various social support sources was not assessed in the current study and would be an
important variable to consider in future research in this area. Perhaps the sample in the current study referred both to men and women in their family rather than a specific family member when responding to items on the MSPSS, resulting in similar levels of support reported by men and women.

**Research Questions 2 and 3: Does social support moderate the relationship between pain and patient outcome variables and are there gender differences in this effect?** If social support buffers the relationships between pain and outcomes, is this effect further moderated by catastrophizing and/or gender?

**Replication of Study 1.** Models predicting various pain related outcomes were not successfully replicated in Study 2. As previously noted, the two samples differed on a number of variables, suggesting participants in Study 2 have higher pain and disability, as well as lower mental and physical QoL. Of note, with the exception of mental QoL, all of the differences were also clinically significant. As such, at higher pain severity, as is the case in the Study 2 sample compared to Study 1, pain may be the only predictor of outcome. Examination of bivariate correlations in the two studies indicates that the magnitude of associations between pain and each outcome variable was slightly larger in Study 2 than in Study 1. Therefore, failure to replicate results from Study 1 may be due to sample differences, as previously noted. Alternatively, the effects in Study 1 were small in magnitude, were drawn from a larger sample, and may not be as common in smaller samples.¹

¹ Partial eta-squared for significant interactions in Study 1 ranged from .01 to .03. Participant recruitment was discontinued in Study 2 because the pool of potential participants had been exhausted, and there were no additional sites that could be recruited within a reasonable time to increase the sample size and, therefore, power.
**Extension of study 1.** A model including social support from family, friends, and physician to predict various pain-related outcomes to extend Study 1 was tested, and gender differences were expected to become more apparent by examining sources of social support outside of the romantic relationship. However, no significant results for these analyses were produced in Study 2.

As noted in the general introduction, one significant issue in the social support literature is the multiple conceptualizations of social support that may underlie some of the inconsistencies in the social support findings. In much of that literature, the most frequent distinction has been made between perceived and received social support. Perceived support is the perception that support would be available if needed, whereas received support refers to supportive behaviours that are provided by sources of social support (Uchino, 2009). In comparison to received support, perceived support is more consistently related to beneficial health outcomes (Holt-Lunstad, Smith, & Layton, 2010).

In the current study, both measures of perceived (i.e., MSPSS) and received (i.e., MPI, PSQ) support were used. The failure to replicate findings with respect to the role of spouse responses to pain behaviour and non-significant findings with respect to physician support is perhaps case in point regarding variability in the association between received support and health outcomes. However, perceived support from family and friends did not moderate the relationship between pain and outcome in the current study. It is possible that spouses or intimate partners are the most important sources of social support in individuals with chronic pain who have spouses or intimate partners. Research does suggest that social support from outside of the marriage does not compensate for lack of a supportive marriage (in either
individuals who are single or are maritally dissatisfied; Coyne & DeLongis, 1986; Holt-Lunstad, Birmingham, & Jones, 2008), suggesting a unique benefit of spousal support. However, further replication is necessary, as this study was the first to examine the stress-buffering role of various sources of social support in individuals with chronic pain.

It is also important to note that much of the literature reviewed in this thesis is drawn from the general social support literature or from the medical literature associated with chronic pain conditions other than UCPPS. Perhaps the replication of gender differences in the effect of sources of social support was not successful because the UCPPS samples examined were characteristically distinct from the other chronic pain populations. Studies typically examine one pain condition (e.g., musculoskeletal pain, rheumatoid arthritis) and do not compare the role of social support across different chronic pain conditions. This area is one for future research. For example, future studies comparing UCPPS with rheumatoid arthritis and musculoskeletal pain in regard to social support benefit would be interesting.

Alternatively, gender differences in the stress-buffering effect of social support from various sources may not have been observed because the positive effect of social support may have been diluted by the detrimental effect of conflict that comes with increased involvement with one’s social support network. For example, Turner (1994) found that in a sample of physically disabled adults, the protective effects of social support on depressive symptoms was partially negated by the detrimental effect of conflict. This finding was corroborated in a national probability sample indicating that both social support and social strain predicted well-being, but social support exerted a stronger effect (Walen & Lachman, 2000). Therefore, the
negative aspects or stressors associated with one’s social support network would be important to consider in examining the effects of the positive aspects of social support in the future.

**Limitations and Future Directions**

A number of limitations are present in the current study. As noted in Study 1, the current sample may not be representative of the general IC/PBS and CP/CPPS population and their spouses. Although the current sample was similar to other reported samples with respect to UCPPS symptoms severity (Litwin et al., 1999a; Sirinian et al., 2005), the majority of participants in Study 2 had a university/college degree, was Caucasian and employed and most participants had been diagnosed with their condition for at least 1 year. Individuals who are on disability may need more social support, but it is uncertain if they would benefit to the same extent as individuals who continue to be gainfully employed. Moreover, the role of social support may change over the course of chronic pain, with social support in the earlier course of chronic pain being more important in predicting later adjustment (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003; Strating, Suurmeijer, & Van Schuur, 2006). Future studies should examine social support in individuals with UCPPS-like symptoms and/or individuals newly diagnosed with UCPPS to determine the role of social support from various sources in predicting adjustment to chronic pain.

Although the benefit of social support is consistent across cultures (e.g., Morling, Kitayama, & Miyamoto, 2003), there may be cultural differences in how people seek and receive social support from their networks (Kim et al., 2008). For example, in a recent review Kim and colleagues (2008) reported that Asians and Asian Americans are more likely to benefit from forms of social support that do not involve explicit disclosure of stressful events and feelings of
distress. These differences would have implications for interventions targeted for couples coping with chronic pain. However, it appears that psychosocial correlates of IC/PBS are consistent across Hispanics, African-Americans, and Caucasians (Link et al., 2008). Nonetheless, inclusion of participants diverse in ethnicity/culture, employment status, and marital satisfaction would be important in future research.

In retrospect, another limitation of the current study may have been the use of different types of social support measures. A distinction between perceived and received social support has been made in the literature, with some evidence suggesting that perceived support is positively associated with well-being, whereas received support is negatively or unrelated to well-being (Kaul & Lakey, 2003; Reinhardt, Boerner, & Horowitz, 2006; Wethington & Kessler, 1986). The MPI and PSQ-18 are measures of received support (e.g., “when I am in pain, my significant other asks me what he/she can do to help,” “when I go for medical care, they are careful to check everything when treating and examining me”), whereas the MSPSS is a measure of perceived support (e.g., “I can count on my friends when things go wrong”). An examination of bivariate correlations indicate that perceived support (i.e., social support from family and friends) was more strongly associated with pain and outcomes examined in the current study than was received support (i.e., social support from physicians), but neither perceived nor received support buffered the relationship between pain and outcome in the current study. Additionally, whereas the MPI specifically examined spousal support within the context of pain/UCPPS and participants completed the PSQ-18 in relation to their urologist, the MSPSS was not specific to pain. Future studies should examine perceived support from various sources specifically within the context of chronic pain.
Indeed, other types of social support (e.g., emotional [i.e., expressions of love, empathy, and concern], tangible [i.e., provision of material assistance], informational [i.e., expressions that provide facts, advice, and appraisals of situations]) received from other sources were not examined in the current study and may shed further light on gender differences in the effect of social support from various sources. Examining the social support-pain literature suggests that there is a significant range in the amount of social supports provided at least by spouses of individuals with chronic pain (Newton-John & Williams, 2006). Both individuals with pain and their spouses reported that spouses responded most frequently by providing help (i.e., behaviours aimed at either relieving pain or decreasing pain-related distress), followed by observe only (i.e., observing and monitoring in response to witnessing pain behaviour) and offer help (i.e., asking if help is needed thereby allowing the individual with pain to decline the offer). Newton-John and Williams (2006) reported all other response categories (e.g., discourage pain talk, express frustration) were rarely endorsed. Preliminary evidence suggests gender differences in what is preferred with respect to social support in chronic pain, with women preferring solicitude and activity direction more than men (McWilliams et al., 2012). Future research examining social support in chronic pain should assess satisfaction with various types of social support provided by various sources and how satisfaction with various types of social support predicts pain-related outcomes.

The gender of the source of social support (i.e., family, friends, physician) was not assessed in the current study and would be of interest, as it may influence the types of social support enacted (Barbee et al., 1990; Verhofstadt et al., 2007). Studies examining the characteristics of spouses and/or other sources of social support would also provide a better
context within which pain and adjustment to pain is experienced. For example, low
catastrophizers perceive less intense pain in others (Sullivan et al., 2006), suggesting that low
catastrophizers are less likely to provide social support or provide less effective forms of social
support.

Directionality of relationships cannot be concluded given the cross-sectional design of
the current study. However, causality can be concluded only via experimental design, which
cannot be pursued in this line of research while continuing to meet ethical standards in human
research. Studies 1 and 2 represent the first studies to simultaneously examine the moderating
role of social support and catastrophizing in the relationship between pain and outcome, as well
as gender differences, in men and women with UCPPS. Although a direct replication was not
reported, there was some consistency of findings across the two studies, despite clinically
significant differences across the samples used.

Conclusions

Results from Study 2 provides corroborating evidence that the support gap hypothesis is
not applicable in men and women with UCPPS, and in fact, women receive more social support
from their partners than men receive from their partners. Additionally, women also receive more
social support from their friends than men do. However, the stress-buffering effect of distracting
spouse responses and amplifying effect of solicitous spouse responses and catastrophizing were
not replicated. Perceived or received social support from one’s romantic partner, family, friend,
or physician does not buffer the negative impact of pain in individuals who report higher pain
severity—participants in Study 2 reported higher pain than participants in Study 1. These results
suggest that the benefit of social support has limits, such that it loses efficacy at higher pain
severity. Social support can be assessed in many ways and requires further examination in predicting adjustment to chronic pain.
Chapter 5: General Discussion

The objectives of this set of studies were to examine the stress-buffering hypothesis of social support in the relationship between pain and pain-related outcomes in men with CP/CPPS and women with IC/PBS, and to determine if gender differences exist in this effect. Spousal social support and social support from other sources were examined alongside intrapersonal variables, such as pain catastrophizing and perceived control over pain, in their role in determining pain-related outcomes across the two studies. The results suggest that there are stress-buffering effects for spousal support, but these effects were not replicated, and there were no gender differences in the moderating role of spousal support. These studies suggest that no one theory or model examined in the current dissertation sufficiently predicted the data on the role of social support or catastrophizing in UCPPS, perhaps suggesting the need for a new framework to examine these relations.

In the following sections a discussion of related theories and associated research is offered with directions for future research suggested to allow for a better integration of the stress-buffering model for social support and catastrophizing as a form of cognitive appraisal and the communal coping model for catastrophizing. This is a timely discussion because conceptualizations of catastrophizing and spouse responses to pain behaviour are now converging on a theoretical framework emphasizing empathy, intimacy, emotional closeness and emotion regulation in couples with chronic pain (Cano et al., 2008; Goubert et al., 2005; Issner, Cano, Leonard, & Williams, 2012; Leong, Cano, & Johansen, 2011; Sullivan, 2012).

Theoretical Implications
The biopsychosocial model and self-regulation of chronic pain. The biopsychosocial model of chronic pain is a general model implicating biological, psychological, and social factors in determining pain-related outcomes. Within this broad conceptualization many different perspectives may be considered in delineating how each factor may contribute to adjustment. Findings from the current dissertation suggest that the stress-buffering model for social support does not adequately account for the role of social support in UCPPS as it only predicts that social support can diminish the negative impact of stress but does not suggest how social support has this effect.

As discussed in the general introduction, the idea of pain as an exclusive sensory or physiological experience is outdated, with decades of research demonstrating the significant influence of psychosocial factors in the experience of pain (e.g., Clay et al., 2010; Gatchel et al., 2007). A biopsychosocial model suggests that the pain experience is multi-faceted and comprises three dimensions: 1) sensory-discriminative; 2) affective-motivational; and 3) cognitive-evaluative. The sensory and affective dimensions of pain are highly responsive to each other, and supported by parallel neural systems whereby persistent pain appears to be mediated by neural plasticity or sensitization particularly in the medial pain system (responsible for the affective-motivational dimension of pain; Lumley et al., 2011). The relationship between the sensory component of pain and a persons’ affective state has been demonstrated in laboratory pain studies. For example, experimental induction of negative emotions (e.g., anxiety) results in increased pain severity during a cold pressor task (Carter et al., 2002). Additionally, more intense pain experience and lower pain tolerance were reported in a sample of chronic back pain patients listening to sad music, whereas a happy mood induction resulted in lower pain ratings.
and greater pain tolerance (Tang et al., 2008). The relationship between emotions and pain is so strong that several population-based longitudinal studies have actually found that depressed, pain-free individuals are on average two times more likely to develop chronic musculoskeletal pain than non-depressed, pain-free individuals (Carroll, Cassidy, & Cote, 2004; Larson, Clark, & Eaton, 2004; Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994).

Self-regulation has long been suggested as an essential component of psychological interventions for pain ultimately with the aim of altering the physiological experience of pain via altering the psychological (i.e., stress, emotion) experience of pain. Rooted in Melzack & Wall’s (1965) gate control theory of pain, self-regulatory strategies including biofeedback and relaxation training were the earliest of such interventions. The research reviewed above suggests not only are the sensory and affective components of pain inextricably linked but emotions and affective experience in general are strongly linked to pain. Therefore, what regulates one can ultimately regulate the other and influence adjustment to chronic pain. As such, an emotion/pain regulation perspective may be best suited in advancing our understanding of the role of social support in determining adjustment to chronic pain.

Emotion regulation is the process by which we influence which emotions we have, and how and when we experience emotions (Gross, 1998). Emotions can also be regulated in a dyad; that is, involving a partner (e.g., therapist, spouse, friend) who provides assistance (i.e., social support) with the regulation of an affective experience. Emotion dysregulation occurs when an individual is simultaneously unable to accept an emotional experience and change it effectively (Fruzetti & Iverson, 2006) and may be facilitated by problematic responses of others to expressions of emotions, wants, thoughts and goals (Fruzetti & Iverson, 2006). Validation and
invalidation are responses that moderate high emotional arousal, where validation is the communication of acceptance and understanding, and invalidation is the communication of rejection or failure to understand the experiences of the other (Fruzetti & Iverson, 2006). There is some suggestion that negative spouse response to pain behaviour is a form of invalidation, but it is unclear how solicitous and distracting spouse responses to pain behaviour load onto validation and invalidation (Cano et al., 2008). However, Cano and colleagues’ study was the first of its kind, and replication of this work has yet to be published.

The communal coping model of catastrophizing. According to the communal coping model of catastrophizing, the pain expressions of high catastrophizers maximize the probability that distress will be managed within a social/interpersonal context (Sullivan et al., 2001), thereby implying that catastrophizing may be a means of dyadic regulation through emotional disclosure and/or expression of need for social support. Findings from Study 1 suggest that catastrophizing may be an important part of dyadic regulation of pain and emotion, as demonstrated by the strong and negative association between pain and mental QoL at high levels of catastrophizing.

Some evidence suggests that pain duration may help determine the extent to which catastrophizing may be adaptive. In a study by Cano (2004) higher levels of catastrophizing were associated with higher levels of solicitous spouse responses to pain behaviour and were not significantly associated with general spousal support but only in the short term. In the long-term, high catastrophizing was not significantly associated with solicitous spouse responses, but rather it was associated with lower levels of general spousal support. Of note, Cano reported the interaction between catastrophizing and pain duration and the main effect of pain duration did not significantly predict distracting or negative spouse responses, suggesting that catastrophizing
does not necessarily lead to expressions of frustration or hostility by one’s spouse in prolonged situations of pain (i.e., chronic pain). Rather, catastrophizing in the long term leads to a decline in the provision of general spousal support, but is unrelated to the provision of pain-specific support. These findings were corroborated by Buenaver and colleagues (2007), who found that catastrophizing was most strongly associated with solicitous spouse responses at shorter pain durations, but they also found that the interaction between pain duration and catastrophizing was not significant in predicting punishing responses. Pain duration was not examined in the current dissertation in the moderation analyses and was approximated in Study 2 using time since diagnosis (an underestimation of pain duration—this data was not collected in Study 1). Results from Study 2 do not provide conclusive evidence suggesting catastrophizing becomes maladaptive over time, but one possible area for investigation is the interpersonal context within which catastrophizing occurs.

Interpersonal models of depression suggest that individuals with depression behave in ways that actively and negatively shape their interpersonal environments resulting in interpersonal rejection (Coyne, 1976). Research in the pain literature provides some evidence that similar processes occur in the lives of individuals with chronic pain. For example, high catastrophizers report receiving less social support from others (Boothby et al., 2004; Buenaver et al., 2007), and they also feel “entitled” to more support than they receive (Cano, Leong, Heller, & Lutz, 2009). Analyses of observational data also revealed that high levels of support entitlement were associated with greater invalidation responses from spouses (Cano et al., 2009), suggesting that high catastrophizers behave in ways that lead to interpersonal rejection. Results from Study 1 indicated higher pain was associated with lower mental QoL at high levels of
catastrophizing. One possible mechanism of this relationship is through invalidation, resulting in failure to regulate pain and emotions and poorer mental QoL.

Research on catastrophizing suggests that high catastrophizers display more communicative pain behaviours and use fewer coping strategies only in the presence of an observer (Sullivan et al., 2004). Sullivan and colleagues (2004) also reported high catastrophizers indicated higher pain intensity than low catastrophizers during the cold pressor task regardless of the presence of an observer, suggesting that high catastrophizers were less effective in employing coping strategies. As such, it appears that high catastrophizers require social support to supplement their own efforts in managing their pain-related distress as they may have poorer self-regulatory mechanisms. This suggestion is consistent with research demonstrating a relationship between catastrophizing and insecure and anxious attachment styles in both pain-free and clinical samples (Meredith, Strong, & Feeney, 2006; Tremblay & Sullivan, 2010). In response to emotionally distressing or challenging situations, individuals with insecure and anxious attachment are guided by “rules that direct attention toward distress and attachment figures in a hypervigilant manner that inhibits the development of autonomy and self-confidence” (Kobak & Sceery, 1988, p. 142). However, the relationship between catastrophizing and poor self-regulation remains speculative as no published research has directly examined whether high catastrophizers exhibit poor self-regulation, nor does any research report whether catastrophizing predicts the efficacy of self-regulatory approaches to pain management (i.e., biofeedback, relaxation training, hypnotherapy, and mindfulness).

Although not directly supported by data in the current dissertation, based on research reviewed it is speculated that the communal coping model of catastrophizing is qualified by the
context within which it occurs (e.g., attachment style of the couple, spouse’s pain catastrophizing). Further research is required to determine the circumstances under which catastrophizing is an effective means of dyadic emotion and pain regulation.

**UPOINT.** The UPOINT system (Shoskes et al., 2009) for guiding treatment of UCPPS consists of six domains: urinary symptoms, psychosocial dysfunction, organ-specific findings, infection, neurologic dysfunction, and tenderness of muscles. The domain of primary concern in regard to this thesis is that of psychosocial dysfunction, which includes “maladaptive” cognitive coping strategies such as catastrophizing as a potential therapeutic target. However, given recent discussions of catastrophizing in the pain literature that a perspective of catastrophizing as purely a cognitive variable is inadequate (Sullivan, 2012), the view of catastrophizing as categorically maladaptive is outdated. Rather, it may be that the interpersonal context of catastrophizing determines the extent to which it is adaptive or maladaptive. In his recent review of catastrophizing, Sullivan (2012) states that cognitive conceptualizations of catastrophizing do not comment on interpersonal processes related to support seeking, communication, and validation, all of which are characteristic of the experience of high catastrophizers.

Sullivan also suggested that cognitive models tended to “pathologize” catastrophizing, although catastrophizing is demonstrated to be present in many healthy individuals without emotional disorders, once again suggesting that it may be the social responses to catastrophizing that determine whether or not it is adaptive. Therefore, with respect to the psychosocial domain of the UPOINT system, an assessment of catastrophizing alone would be described as inadequate and the inclusion of one’s spouse and the dyadic patterns of perceived social support is recommended to determine what, if indeed any, type of psychological intervention is indicated.
However, much remains unknown regarding helpful social responses to catastrophizing, and this is one of the important areas for future research discussed below.

**Future Research**

Within the biopsychosocial model of pain, it is suggested here that the role of social support and catastrophizing may be best considered within a framework of dyadic emotion and pain regulation. More research is needed to determine the relationships among catastrophizing, social support, validation and invalidation, as this will help to determine what types of responses successfully regulate the pain experience.

The current line of research can be extended in a number of ways. One possible area for future research is to use pain vignettes as described by Newton-John and Williams (2006) whereby individuals with chronic pain would read the vignettes and describe how their spouse, friend, and a designated family member would normally respond to the described pain situation. As this will generate a large amount of data for qualitative analysis, it is proposed that only individuals with chronic pain participate and be separated into 3 groups: one group that will respond to the vignettes with respect to their spouse’s responses, friend’s responses, and family member’s responses. This research will allow us to determine if different sources of support provide different types of support, how much variance there is in the types of support provided within each source and if there are gender differences. This would extend previous research indicating that men and women use their social support networks differently (Belle, 1987; Flaherty & Richman, 1989) by applying it to individuals with chronic pain.
Future research can also more closely examine spouse responses to pain behaviour, as it has been demonstrated that spouses provide a wider array of responses to pain behaviour than evaluated by the MPI (Newton-John & Williams, 2006). The Pain Response Preference Questionnaire (PRPQ; McWilliams, Saldanha, Dick, & Watt, 2009) was developed based on the results of the Newton-John and Williams study and is currently the most exhaustive measure of spouse responses to pain. However, this measure is still in the validation stages, and it remains to be confirmed whether the measure is comprised of 3 factors (i.e., solicitude, suppression and activity direction) or 4 factors (i.e., solicitude, suppression, management and encouragement). Nonetheless, the PRPQ would allow for the assessment of responses to pain not previously assessed, and an exploratory factor analysis is suggested for the PRPQ to determine the relationship of its factors with validation and invalidation, both pertinent to emotion regulation.

Using methods reported by Cano and colleagues (2008), couples with chronic pain (or more specifically with UCPPS) would participate in marital interactions regarding the impact of pain on their lives. Videotaped interactions would then be coded for validating and invalidating behaviours, and exploratory factor analyses would then be conducted along with PRPQ scales. This research would help to determine what types of spouse responses are likely to facilitate emotion regulation, as it is presently unclear how different types of spouse responses should be conceptualized within an emotion regulation perspective (i.e., which responses are validating and which are invalidating).

Daily diary studies are also suggested to determine what spouse responses to pain behaviour look like in vivo as well as to examine the role of empathic effort. Empathic effort (i.e., perception that one’s partner is motivated to understand) is more strongly associated with
women’s relationship satisfaction than men’s relationship satisfaction (Cohen, Schulz, Weiss, & Waldinger, 2012), and therefore, may have differential predictive value in determining outcomes across men and women with UCPPS. Spouses’ maladaptive attributions for events in their relationship are influenced by levels of marital satisfaction, such that distressed spouses are more likely than nondistressed spouses to see their partners’ negative actions as intentional and selfishly motivated (Bradbury & Fincham, 1990; Epstein, Baucom, & Kendall, 1993; Fincham, 1994). Applying this to the social support in chronic pain research, negative spouse responses or expressions of anger and frustration may not necessarily result in pain and emotion dysregulation in the individual with chronic pain if perceived empathic effort is high.

The diary study suggested above could be completed using smartphones whereby individuals with chronic pain would be prompted a number of times daily and asked if they had expressed pain to their spouses in the previous hours, and if so, to describe how their spouse responded and also rate their pain and negative affect pre- and post-spouse response. These data could then be analyzed qualitatively. This type of research would provide a more ecologically valid assessment of how spouses respond to pain and would also allow us to determine how accurately current spouse inventories represent spouse responses to pain. As well, we would be able to determine if empathic effort mediates the interaction between negative spouse responses and marital satisfaction in the prediction of emotion regulation (operationalized as change in level of negative affect pre-post spouse responses). Ideally observational studies would be best to allow for an objective assessment of spouse responses to pain behaviour. However, it would be difficult to get an ecologically valid situation of UCPPS pain in the lab; unlike low back pain, for example, there are no specific tasks that we could reproduce in the lab without being
unethical (e.g., causing flare up with caffeine or spicy food, etc.). An alternative to a daily diary study would be an observational study of experimentally induced pain (e.g., cold pressor task) in individuals with UCPPS.

Of note, intrapersonal characteristics of spouses were not assessed in the current dissertation. This would be an important area for future research, as these characteristics will influence how and under what conditions spouses respond to their partners’ pain, thus regulating the pain experience. Information including spouses’ level of catastrophizing and pain status are of particular interest. For example, low catastrophizers have been shown to perceive less intense pain in others (Sullivan et al., 2006), suggesting that low catastrophizers are less likely to validate a partner’s pain experience. Additionally, Gauthier and colleagues (2011) found that the highest levels of pain behaviour were observed when high catastrophizing chronic pain patients were married to low catastrophizing spouses. Gauthier et al. (2011) hypothesized that high catastrophizers had to increase the “volume” of their pain communication to compensate for their low catastrophizing spouse’s tendency to underestimate pain. Of note, Gauthier and colleagues (2011) assessed spouses’ catastrophizing about their own pain and not their partners’ pain. It is possible that spouses who catastrophize about their partners’ pain may be more sensitive to their partners’ expression of pain and more likely to express validation than spouses who do not catastrophize about their partners’ pain. However, a recent study reported by Leonard and colleagues (2013) suggests that higher catastrophizing about a partner’s pain does not necessarily result in better empathy. Therefore, further research is required to examine the role of spouse catastrophizing about their own pain and their partner’s pain.
In addition to catastrophizing, partners who do not have a pain history may be less likely to empathize thus preventing effective emotion regulation. Johansen and Cano (2007) reported that sadness observed during a recorded marital interaction was related to fewer depressive symptoms and less pain only when both members of a couple reported pain, suggesting that partners with pain are better able to regulate their partner’s experience of pain, which may be a reflection of their interpersonal empathy for others’ pain. Using self-report data, a multiple moderator model could be examined to determine the relationship between pain and outcome, such that when spouse catastrophizing is low and pain history is absent, pain is associated with poorer outcomes. It is also suggested that both spouse’s catastrophizing about their own pain and catastrophizing about their partner’s pain are assessed to determine if there are differential effects between the two variables. Examination of spousal characteristics will help to inform treatment models that are tailored to the couple rather than the individual with chronic pain.

Empathic accuracy is another spouse characteristic suggested for future research. Empathic accuracy is the extent to which one can accurately infer a partner’s thoughts and feelings during an interaction (Ickes & Simpson, 1997); therefore, it is important in determining how spouses respond to regulate their partner’s pain experience. Empathic accuracy is thought to be important in everyday non-conflictual and non-threatening interactions, as it enhances relationship quality. However, in relationship-threatening situations empathic accuracy engenders strong negative feelings toward one’s partner contributing to relationship dissatisfaction. In such situations less accuracy has actually been demonstrated to be related to increased relationship satisfaction (Simpson, Orina, & Ickes, 2003), which has been termed “motivated inaccuracy”. That is, in order to preserve the relationship, the perceiver is motivated
to not attend to the emotions or assume their partner’s thoughts and emotions are less negative than they really are.

Presently, only one published study has examined empathic accuracy in couples with a chronic pain sufferer (Leonard et al., 2013). Leonard and colleagues reported that spouses’ perception of their partner’s pain severity was associated with lower empathic accuracy but only at longer pain durations. The authors interpreted this finding as spouses of individuals with severe chronic pain become less empathically accurate over time because they are discouraged that their partner’s pain has not improved. However, Leonard and colleagues (2013) did not account for marital satisfaction in their analyses. It is possible that empathic accuracy decreases over time, but only for individuals with low marital satisfaction (i.e., for spouses who perceive their partner’s pain as threatening). Using methods described by Cohen and colleagues (2012), empathic accuracy in videotaped marital interactions of couples with a chronic pain sufferer could be tested in a multiple moderation analyses to determine if marital satisfaction moderates the interaction between pain severity and pain duration in predicting empathic accuracy. This research would help inform interventions aimed at couples with a chronic pain sufferer with low marital satisfaction.

**Clinical Implications**

The clinical implications discussed here remain speculative given the relative novelty of research in the role of social support and catastrophizing in chronic pain within an emotion regulation perspective. Additionally, given the number of unmeasured factors (e.g., spouse variables including pain history and catastrophizing) the application of findings in clinical intervention is limited. Furthermore, clinical significance was not assessed in the current study.
and therefore, it is unclear whether spousal support buffers the negative impact of pain to a clinically meaningful extent. With that said results from the current dissertation suggest that distraction in the form of engaging the individual with chronic pain in pleasurable activities or in conversation may facilitate regulation of the pain experience. With respect to solicitous spouse responses, results from the current dissertation suggest that too much solicitousness can be harmful especially when individuals with chronic pain are low in catastrophizing (i.e., do not request social support). However, the right amount of spouse solicitousness can help to reduce distress. Additionally, using cognitive behavioural therapy and assertive communication skills, couples in which one spouse experiences chronic pain can be taught to improve their communication by being explicit with one another regarding intentions of provided social support and interpretation of social support to facilitate improved provision of social support (Keefe et al., 1996, 1999).

Results of the current line of research also suggest that catastrophizing is important in predicting adjustment to chronic pain. It is recommended that catastrophizing be more thoroughly assessed in couples with a chronic pain sufferer by also examining how spouses respond to their partner’s catastrophizing, and the exploration of benefits and disadvantages of catastrophizing for the partner with chronic pain. Such an approach would provide a better context for catastrophizing within each couple, as it is currently unclear what determines catastrophizing as adaptive or maladaptive.

Summary and Conclusions

The current studies shed light on the role of social support in men and women with UCPPS. The studies reported in this dissertation were the first to examine the stress-buffering
role of social support within the context of intrapersonal variables (e.g., catastrophizing and perceived control over pain) and also the first studies to examine the support gap hypothesis within a chronic pain sample. The studies suggest that the support gap hypothesis is not applicable in UCPPS and future studies need to examine other variables including catastrophizing in relation to possible gender differences in social support. Although not replicated in Study 2, Study 1 suggests that the role of solicitous spouse responses to pain behaviour is dependent on catastrophizing, such that high levels of spouse solicitousness strengthens the relationship between pain and mental QoL only when catastrophizing is low. Additionally, results of Study 1 indicate that distracting spouse responses buffer the negative impact of pain and the role of distracting spouse responses requires further investigation in the chronic pain literature. Although the concept of distraction in the pain literature is far from novel, few publications in the pain literature focus on the role of spousal distraction. Future study designs need to examine distracters that also act to regulate the pain experience to further clarify the potential benefits of distraction in chronic pain. Results from Study 1 also suggest that the stress-buffering hypothesis of social support is much too simplistic as it does not consider the context within which supportive transactions occur nor does it suggest how social support can be of benefit.

An additional objective of the current research was also to determine gender differences in the role of social support. Results from the current studies suggest that there are no gender differences in the role of social support in individuals with UCPPS. Gender differences are rarely reported in the social support chronic pain literature either due to non-significant findings or gender was not a variable of interest to the researcher. Given gender differences in seeking
and providing social support, as well as gender differences in pain communication, gender continues to be a variable of interest in the examination of pain regulation. Much remains unknown regarding what is helpful in determining long-term adjustment, and what gender differences exist (if any). The current studies suggest that despite possible gender differences in received social support, social support operates similarly in men and women with UCPPS. Longitudinal studies may be important with respect to advancing our knowledge in this particular area, but cross-sectional studies are valuable in determining the critical variables to be examined in longitudinal studies.

What is apparent from these studies is the importance of examining chronic pain within its interpersonal context, as it shapes the experience of pain and emotions associated with chronic pain. Although the interpersonal context within which chronic pain is experienced has long been considered an important determinant of outcomes, most empirically supported psychological interventions for chronic pain are solely focused on the individual with pain. Research suggests that couples with a chronic pain sufferer could benefit from interventions aimed at both partners, rather than just the individual with pain (Leong et al., 2011). Not only does the pain and relationship literature emphasize the importance of the interpersonal context of pain, but a recent review of catastrophizing by Sullivan (2012) also places great emphasis on examining pain catastrophizing in its interpersonal context. In line with this, researchers such as Cano and colleagues (Cano et al., 2008) specifically suggest examining spouse responses to pain behaviour in light of emotion regulation and empathy theories. Social support and catastrophizing were discussed within a dyadic pain and emotion regulation context and several
directions for future research were suggested to inform the biopsychosocial model of chronic pain.
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Appendix

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