A SELF-REGULATORY MODEL OF COPING IN WOMEN WITH INTERSTITIAL CYSTITIS / BLADDER PAIN SYNDROME

by

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Abstract

Interstitial Cystitis /Bladder Pain Syndrome (IC/BPS) is a chronic and refractory medical condition that is characterized by chronic pelvic pain along with abnormal urinary frequency and urgency. There is no widely accepted etiology or efficacious cure for IC/BPS, thus treatment often relies on pain and symptom management. IC/BPS is associated with a complex array of psychological, behavioural, cognitive and emotional issues, and as such examining these relationships within a comprehensive model is warranted. Current perspective on the biopsychosocial framework has introduced models of self-regulation, which help to explain how individuals cope with chronic illness. The literature reviewed in this dissertation examines the interconnection between impairments (pain and symptoms), illness perceptions, coping (illness-focused, wellness-focused and emotion regulation) and outcomes (mental health and physical disability). Many of these relationships have yet to be investigated within samples of IC/BPS. Thus, the primary aim of this dissertation was to evaluate a self-regulation model of coping with IC/BPS through a series of model building methodologies. Female patients diagnosed with IC/BPS by a urologist in tertiary care hospitals were recruited across centres in North America (n=217). Steps 1 and 2 evaluated the measurement models to determine the structure and composition of the main constructs. Step 3 evaluated the model fit and specified hypotheses in the proposed IC-Self Regulation Model, and step 4 evaluated alternative models. The results support the structural model of the IC-Self Regulation Model that demonstrates relationships amongst impairments, illness perceptions, coping and outcomes. In particular, physical disability was modeled through negative illness perceptions, illness-focused coping and emotion regulation, and mental health was modeled through illness self-efficacy perceptions, wellness-focused coping and adaptive emotion regulation. The specified relationships are discussed in relation to the literature along with theoretical and clinical implications, study limitations and areas for future research.
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Statement of Originality

I hereby certify that all of the work described within this thesis is the original work of the author. Any published (or unpublished) ideas and/or techniques from the work of others are fully acknowledged in accordance with the standard referencing practices.

(Laura Katz)

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List of Abbreviations

B-IPQ: Brief – Illness Perceptions Questionnaire
CBT: Cognitive-behavioural therapy
CPAQ: Chronic Pain Acceptance Questionnaire
CPCI: Chronic Pain Coping Inventory
CP/CPPS: Chronic Prostatitis / Chronic Pelvic Pain Syndrome
ERQ: Emotion Regulation Questionnaire
IBD: Inflammatory Bowel Disease
IBS: Irritable Bowel Syndrome
IC/BPS: Interstitial Cystitis / Bladder Pain Syndrome
ICPI: Interstitial Cystitis Problem Index
ICSI: Interstitial Cystitis Symptom Index
IFC: Illness-Focused Coping
LOT-R: Life Orientation Test – Revised
MPQ: McGill Pain Questionnaire
QoL: Quality of life
PANAS: Positive and Negative Affect Schedule
PCS: Pain Catastrophizing Scale
PDI: Pain Disability Index
PHQ-9: Patient Health Questionnaire – 9
SRM: Self-regulatory Model
SWLS: Satisfaction with Life Survey
WFC: Wellness-Focused Coping
Chapter 1

Introduction

What is Pain?

The most common definition of pain suggests that 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. It is a complex phenomenon involving emotions, culture, experience and sensation. Pain is typically described as chronic when it lasts longer than three months since pain onset (Turk & Okifuji, 2002), though some researchers suggest the modification from acute to chronic is at 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.

Pain is a significant issue within our society. A survey of a representative sample across Canada indicated that 18.9% of Canadian adults suffer from chronic pain (i.e., pain lasting ≥ 6 months) (Schopflocher, Taenzer, & Jovey, 2011). Moreover, it has been reported that up to 80% of physician visits in Canada are for issues resulting from pain (LaChapelle, 2004). 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 (Angus Reid Research for the Canadian Pain Society: March 4-7, 2011). 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 can be considered in more than just economic terms; it also has a significant impact on patients’ lives. Individuals with chronic pain may be socially, occupationally, and interpersonally disabled, and pain takes a significant psychological toll on patients (Tang & Crane, 2006). Moreover, pain is considered an area of healthcare that remains undertreated (Craig, 2009). 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 (QoL) than other chronic diseases including chronic lung or heart disease (Choinière et al., 2010).

**Current Perspectives of Pain**

Modern models of pain suggest it 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), the research showing that psychosocial factors are significant in determining pain-related outcomes is robust (Katz et al., 2013; Nickel et al., 2008; Sullivan et al., 2001; Tripp, Nickel, Pikard, & Katz, 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 these factors interact recursively (Turk & Okifuji, 2002). Our current clinical and theoretical understanding of chronic pain and chronic illness, as well as its impact on peoples’ lives has been formed through various scientific and cultural shifts in thought. More specifically, a strict biomedical approach to chronic pain management has fallen out of favor because it discounts significant research on the strong influences of cognitive, emotional and social factors. One such chronic pain condition that benefits from a biopsychosocial conceptualization is Interstitial Cystitis / Bladder Pain Syndrome (IC/BPS).

**What is Interstitial Cystitis / Bladder Pain Syndrome?**

IC/BPS is a refractory pain condition affecting between 2.7 – 6.5% of North American women (Konkle et al., 2012). The cardinal symptom of IC/BPS is pelvic pain, along with abnormal urinary frequency and urgency (Rosamilia, 2005). The nature of the condition of IC/BPS has been described by individuals as experiencing daily or constant pain that is severe or excruciating, and the pain and symptoms are often exacerbated by a number of factors including stress, physical exertion, sexual intercourse, certain foods/beverages (Koziol, Clark, Gittes, & Tan, 1993), as well as psychological factors such as catastrophizing and depression (Katz et al., 2013; Nickel et al., 2010; Tripp et al., 2009). Medical research has been unable to provide a sufficient etiology for IC/BPS, and treatment is often complex and considered palliative relying on symptom management. What may be the most troublesome is that patients with IC/BPS suffer considerable pain, psychological distress and disability, often with little medical relief, during the
most productive years of their life (Clemens, Joyce, Wise, & Payne, 2007). More specifically, women with IC/BPS are not a homogeneous group and differ in regards to clinical phenotype (i.e., symptoms, pain, and etiology) (Nickel, Shoskes, & Irvine-Bird, 2009). Although many treatments are available and frequently used, such as analgesics, anti-inflammatory drugs, electrical stimulation, oral/intravesical instillations and surgery (Rosamilia, 2005), no treatments are considered to be consistently effective (Clemens, Markossian, & Calhoun, 2009). Subsequently, women suffering from IC/BPS report poorer mental and physical QoL (Nickel et al., 2010).

IC/BPS is a condition that is associated with significant economic and personal consequences. From an economic viewpoint, disability can include costs to the medical system (e.g., inpatient / outpatient care, medications), costs to society (e.g., lost productivity, unemployment) as well as costs to self (e.g., opportunities not pursued, diminished relationships and poorer QoL) (Clemens et al., 2007). In an analysis of the direct medical costs, as recorded by 25 large employers’ medical and pharmacy claims in the US in 2002, the mean annual cost associated with IC/BPS was $8,420 (versus $4,169 for individuals without IC/BPS) (Clemens et al., 2007). A more recent analysis in the US found that approximately 80% of patients with IC/BPS reported direct medical costs in the preceding three months due to their condition (Clemens et al., 2009). While costs related to lost work productivity could not be quantified, one in five patients with IC/BPS reported lost wages in the preceding three months due to symptoms. The economic costs associated with IC/BPS are similar or greater to those associated with other chronic pain conditions, such as low back pain, fibromyalgia, rheumatoid arthritis and peripheral neuropathy (Clemens et al., 2009). In sum, IC/BPS is associated with significant personal, social and economic costs and requires complex conceptualization in order to account for the wide array of experiences, symptoms and consequences.
The Biopsychosocial Model in IC/BPS

Biomedical chronic pain models are focused solely on etiological or pathophysiological explanations and cannot account for the extent and range of pain-related disability and negative outcomes associated with syndromes such as IC/BPS. Moreover, as a biomedical understanding of IC/BPS is ambiguous and yet to be determined, it is not possible to evaluate a pure biomedical model and additional factors are necessary in order to conceptualize the experience of this disease. The biopsychosocial approach to understanding chronic pain is an advancement from biomedical approaches, due to its acknowledgement of important psychological factors in development and maintenance of chronic pain (Sauer, Burris, & Carlson, 2010). The biopsychosocial approach to understanding chronic pain represents an informative method of describing patient experience.

The Self-Regulation Model

The Self-Regulation Model (SRM) is a biopsychosocial approach that has been developed over the past several decades. The SRM of chronic illness incorporates theory and evidence from the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) as well as from the literature on general emotion regulation (Leventhal, Meyer, & Nerenz, 1980).

Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping was founded by Lazarus and Folkman (1984), and hypothesizes that the ways in which an individual appraises a stressful situation will strongly influence his/her coping process and emotional reaction. The theory suggests that individuals engage in two related types of appraisals: primary and secondary. Primary appraisals
are initial evaluations that categorize a situation as irrelevant, benign/positive, or stressful based on the significance to an individual’s well-being. An emotional response follows the primary appraisal. More specifically, stressful situations (evaluated as threats) involve potential harm or loss, and evoke fear, anxiety, and anger. In contrast, stressful situations (viewed as challenges) produce feelings of excitement and eagerness.

Following this primary appraisal, a secondary appraisal is produced in which the individual evaluates the coping options available, the likelihood of success of each coping option, and the likelihood that one can apply the coping strategy effectively. For example, an individual who suffers from a chronic pain condition (such as IC/BPS) and has a strong tendency to catastrophize, might evaluate a pain experience as a threatening stressful situation (primary appraisal). Furthermore, the individual might judge their likelihood of being able to effectively use more active wellness-focused coping strategies as unlikely (secondary appraisal). Consequently, the individual would decrease their use of wellness-focused coping strategies and instead increase their use of illness-focused coping strategies.

**Fear-Avoidance Model of Pain**

While the transactional model of stress and coping examines the relationship between appraisals (e.g., catastrophizing) and use of behavioural coping strategies, the fear-avoidance model of pain focuses on the effect of coping strategies on pain outcomes. According to fear-avoidance model of pain (Lethem, Slade, Troup, & Bentley, 1983), individuals vary in their degree of fear of pain and their coping response to this fear. Confrontation and avoidance are the two extreme responses to fear of pain or re-injury and these two responses lead to substantially different pain outcomes (Lethem et al., 1983). An individual suffering from chronic pain who adopts a confrontational coping style is more likely to engage in adaptive coping strategies, such
as undertaking an increasing range of their former physical and social activities, which would result in decreased pain. In contrast, individuals who adopt an avoidance-oriented coping style are more likely to avoid circumstances which can lead to re-exposure to pain and thus reduce their physical and social activities. This inactivity can have both physical and psychological sequelae, including increased pain perception and enhanced fear of pain. Thus, the fear-avoidance model is best viewed as a recursive model of fear, avoidance, increased pain, and increased fear.

**The Self-Regulation Model of Chronic Illness**

The SRM is a more comprehensive conceptualization of how individuals cope with chronic illness. The SRM identifies factors involved in the cognitive processing of information and subsequent coping by a patient regarding their disease/illness. Specifically, the SRM hypothesizes that individuals create conceptualizations of their illness based on information that is available to them. These cognitive processes are often referred to as illness perceptions, and act as an interpretive schema for the available sources of information about an illness, as well as guide action and coping in response to the threat of an illness. Leventhal (1980) originally posited that individuals obtain and process information about their illnesses from several sources. One source of information includes an individual’s understanding about their illness from social communication and cultural knowledge. A second source of information is from the external social environment from individuals such as significant others, family, friends and authoritative sources such as doctors and/or parents. A third source of information includes one’s own representation by taking into account their current personal experiences with illness and symptoms. Recent conceptualizations of the SRM of chronic illness demonstrate that illness stimuli or impairments lead to illness perceptions, coping and outcomes (Hagger & Orbell, 2003).

Self-regulation is defined as one’s capacity to manage impulses or modify responses,
including thoughts, emotions, desires, and performance tendencies in stress inducing situations (Baumeister, 2005). While the terms self-control and self-regulation are often used interchangeably, self-regulation will be regarded in terms of deliberate, conscious and effortful engagement (Baumeister, Vohs, & Tice, 2007). Self-regulatory capacity is associated with better patient adjustment within chronic pain samples (Agar-Wilson & Jackson, 2011; Ruiz-Aranda, Salguero, & Fernandez-Berrocal, 2010), and is considered crucial for well-being and successful adaptation to chronic pain (Solberg Nes, Carlson, Crofford, de Leeuw, & Segerstrom, 2010; Solberg Nes, Roach, & Segerstrom, 2009). An essential aspect in applying self-regulation theory to chronic pain is the capacity to change negative cognitive and behavioural responses to stress, which helps to maintain and/or restore calmness, allowing the physiological domains contributing to their pain condition to be less distressing (Sauer et al., 2010).

A simplified schematic diagram of the SRM of chronic illness is displayed in Figure 1. Understanding how a person perceives their illness as well as the extent and attribution of their symptoms is suggested to help health care providers tailor interventions specific to the client’s biological and psychosocial needs, and results in the adoption of efficacious self-care behaviours (Stuifbergen, Phillips, Voelmeck, & Browder, 2006).

![Figure 1. A Representation of the Self-Regulatory Model of Chronic Illness](image-url)
Importance of Modeling Procedures

Recently researchers have called for a paradigm shift in regards to the consolidation of the literature examining psychosocial factors and outcomes in chronic pain (Linton, 2007; Morley, Williams, & Eccleston, 2013). Morley and colleagues (2013) noted that there is a wealth of research examining a multitude of individual hypotheses and relationships. In order to make these results more meaningful, findings need to be examined more comprehensively and simultaneously. As such, the empirical evaluation of models is necessary to examine the relationships between symptoms, treatment procedures and the psychological changes leading to specified outcomes. Modeling numerous complex psychosocial relationships together within a comprehensive model is not only desirable but also warranted. For example, some researchers have posited that the literature is unclear as to the interconnected mechanisms by which pain and symptoms develop into chronic problems such as depression and disability. When issues do arise, we are unsure which strategies would be adaptive in treatment and rehabilitation of chronic pain (Linton, 2007). Moreover, researchers have suggested that treatment needs to guide particular techniques and outcomes based on both empirical findings as well as theoretical rationale (Morley et al., 2013).

Within the IC/BPS literature, new research evaluating disability models attempting to explain how pain and symptoms become disabling with the inclusion of psychosocial explanatory factors (Katz et al., 2013). Katz and colleagues were the first to apply and test a theoretical conceptualization of the factors contributing to disability in women suffering from IC/BPS. Results demonstrated that psychosocial factors (i.e., negative affect, catastrophizing) are the mechanisms by which pain and symptoms become disabling. These findings represent a significant contribution to the literature as understanding how pain and symptoms may lead to
disability through specified mechanisms can be applied to clinical interventions and can help advance patient treatment. However, this model needs to be expanded to include further theory, such as aspects of self-regulation, as well as other key empirically identified factors such as pain acceptance and emotion regulation strategies. The literature lacks a comprehensive self-regulatory model that delineates which strategies to encourage and target in clinical interventions for chronic pain, and more specifically within IC/BPS.

**Review of the Underlying Constructs**

As per the SRM, the model that will be evaluated contains underlying constructs that have linear relationships towards each other and initiates with impairments followed by illness perceptions, coping and outcomes (see Figure 2). The sections to follow will review the existing literature in regards to each of these underlying constructs within samples of chronic pain and IC/BPS, along with research that supports each of the specified pathways and hypotheses.
Impairments

As shown in Figure 1, the first construct that initiates the pathway within the model (i.e., when viewing the model from left to right) is impairments. Impairments are defined as problems in body function or structure as a significant deviation or loss, and are related to the function or structure of an organ or body part (World Health Organization, 2002). One of the issues in research in IC/BPS is a clear distinction as to what comprises impairments due to the subjective nature of the condition. In general in IC/BPS, pain, urinary urgency and urinary frequency are considered the initiating impairments and are characteristic of the symptom profile for this condition. Previous research using factor analysis demonstrated that impairments in women with IC/BPS consist of pain, IC/BPS symptoms and IC/BPS problems, and the factors were associated
with abnormalities as a result of disease-related pathology (Katz et al., 2013). Further research is necessary to confirm the results of the construction of the underlying construct of impairments, especially within the overall theoretical basis of the general SRM. Additionally, impairments within women with IC/BPS are associated with a number of cognitive and psychological outcomes. As per the general SRM, it is suggested that impairments lead to illness cognitions and perceptions. The section to follow will review the literature on illness perceptions.

**Illness Perceptions**

The general SRM hypothesizes that individuals create mental representations of their illness based on both concrete and abstract sources of information available to them in order to make sense of and manage disease-related issues (Hagger & Orbell, 2003). Illness perceptions have value in classification with the purpose of understanding one’s representation of an illness rather than labeling it with terms such as negative or positive (Walton, Lefebvre, & Reynolds, 2014). In general, illness perceptions are ordered into five dimensions: cause, consequences, identity, timeline and cure/controllability (Leventhal et al., 1980). These dimensions are seen to be the basic building blocks of illness perceptions and as having important implications for how patients conceptualize and cope with their condition (Lau & Hartman, 1983; Leventhal et al., 1980). The dimension of *cause* represents one’s beliefs regarding the factors that are responsible for causing the illness or disease. Some commonly reported causes are biological (e.g., germs, viruses), emotional/psychological (e.g., stress, depression) and environmental (e.g., chemicals). The *consequences* of the illness refer to beliefs regarding the impact of the illness on overall QoL, or how it may affect functional capacity (e.g., “How much has your IC/BPS affected your life?”). Illness *identity* refers to self-statements regarding beliefs about the illness label and knowledge about its symptoms (e.g., “How much do you experience symptoms from your IC/BPS?”).
Timeline refers to the individual’s beliefs about the course of the illness and time scale of illness symptoms (e.g., “How long do you think your IC/BPS will continue?”). The cure/controllability dimension refers to the sensation of empowerment regarding performance of coping behaviours (e.g., “How much control do you feel you have over your IC/BPS?”), or the efficacy of treatment (e.g., “How much do you think your treatment will help your IC/BPS?”).

Research has supported the discriminant validity of these dimensions of illness perceptions. For example, personal and treatment control perceptions and understanding of illness are higher in inpatients that have received a wealth of information regarding their condition, treatment and preventative health behaviours. Conversely, patients who have yet to receive a diagnosis report low understanding, short timeline perceptions, low treatment control beliefs and high identity. These patients also report a high emotional response and describe a greater fear response to an unknown health threat (Broadbent, Petrie, Main, & Weinman, 2006). The discriminant validity demonstrates differences in logical patterns of how patients conceptualize their illness and has clinical utility. Illness perceptions are a key variable of interest as understanding how individuals make sense of their condition can inform future psychological interventions to address common perceptions associated with poor outcomes.

Illness perceptions are an essential component of the theoretical basis of the general SRM, however, one of the major issues in research evaluating illness perceptions is the factor structure and composition of the items. The exact structure of the five dimensions of illness perceptions is unclear within the literature (Heijmans & de Ridder, 1998). On one hand, research has advocated that the dimensions of illness perceptions are distinct constructs and are not considered to be redundant (Heijmans & de Ridder, 1998, 1999). However, evidence suggests there are common trends in the way individuals organize their beliefs and appraisals about their
illness, and some researchers have argued in favour of data reduction strategies in order to arrive at the most parsimonious categories of illness perceptions (Hagger & Orbell, 2003; Heijmans & de Ridder, 1998, 1999). A study using a sample of patients with diabetes found the dimensions of timeline and consequences to be highly inter-correlated, and as such combined these two dimensions into one factor (Hampson, Glasgow, & Toobert, 1990). Similarly, in a sample of patients with Chronic Fatigue Syndrome and Addison’s Disease, the factor structure of illness perceptions was examined using factor analysis (Heijmans & de Ridder, 1998). Results showed that a common structure of illness perceptions was not found amongst the two patient populations, and the authors suggested that the dimensions form resulting factors according to specific illnesses and what issues are relevant within particular patient populations. For example, within the Chronic Fatigue Syndrome sample, a four-factor solution was found with the factors labeled as manageability (e.g., timeline and identity), seriousness (e.g., consequences), personal responsibility (e.g., cause and control over illness) and external cause. Conversely, within the Addison’s Disease sample, a different four-factor solution was identified with the factors labeled as seriousness (e.g., consequences and identity), cause, chronicity (e.g., timeline) and controllability. While these differences may be a limitation of Heijmans & de Ridder’s (1998) study (e.g., sampling effect, usage of exploratory factor analysis without confirmatory factor analysis), the literature is congruent in finding that various patient populations identify unique illness perceptions.

Different patient populations have unique concerns and perceptions about their illness, and it is necessary for the items and dimensions of illness perceptions to reflect that individuality. To date, only one study has evaluated illness perceptions in IC/BPS. Heyhoe and Lawton (2009) evaluated illness perceptions in a sample of women clinically diagnosed with IC/BPS attending a tertiary care hospital. Findings showed that the mean illness perceptions scores were comparable.
to other patient populations suffering from chronic illness. More specifically, IC/BPS patients who reported more symptoms also perceived their condition to have significant consequences, and that IC/BPS had a negative emotional impact on their lives. While this study points to important and key findings, the analyses assumed the dimensions and subscores of the illness perceptions and did not use statistical data reduction procedures to confirm the structure and composition of these factors. Understanding the factor structure within this sample of women with IC/BPS is necessary to determine the theoretical underpinnings of illness cognitions, and will help to build upon the general SRM by demonstrating the process of the kinds of associations impairment has with various illness perceptions within IC/BPS.

The association between impairments and illness cognitions has been examined in a variety of chronic illnesses. A higher number of symptoms are associated with more distressing emotional responses and more serious consequences in patients with fibromyalgia and diabetes (Lawson, Bundy, Belcher, & Harvey, 2010; Stuifbergen et al., 2006). Similarly, in patients with multiple sclerosis, the severity of symptoms and their unpredictability was suggested to be related to perceptions of serious life consequences and low perceived control (Vaughan, Morrison, & Miller, 2003). A recent study evaluated illness perceptions as mediators between symptoms and health-related QoL in a sample of IBS patients (De Gucht, 2015). Results showed that bowel symptom severity and the dimensions of health-related QoL were fully mediated by illness perceptions. More specifically, consequences mediated the relationship between IBS symptoms and dysphoria, interference with activities, food avoidance and social reaction; emotional representations mediated the relationship between IBS symptoms and dysphoria and social reaction; and identity mediated the relationship between IBS symptoms and sexuality. This study highlights the impact that illness perceptions can have on life functioning and overall outcomes.

Few studies have evaluated illness representations in IC/BPS. Heyhoe and Lawton (2009)
showed that patients reporting more symptoms also perceived their illness to have serious consequences and believed their IC/BPS to have a negative emotional impact. It is clear that greater symptom severity is associated with more negative illness perceptions across a variety of chronic illnesses such as fibromyalgia, multiple sclerosis, diabetes, irritable bowel syndrome (IBS) and IC/BPS (De Gucht, 2015; Hagger & Orbell, 2003; Heyhoe & Lawton, 2009; Stuifbergen et al., 2006; Vaughan et al., 2003). Within this dissertations’ adapted version of the general SRM (i.e., the IC-SRM), it was expected that higher reports of pain, urinary symptoms and bother would be positively associated with more negative illness perceptions (see Figure 2; hypothesis 1). Illness perceptions are a key variable of interest as understanding how individuals make sense of their condition can inform future psychological interventions to target cognitions and perceptions that are associated with poor coping and outcomes. The following section will review the literature on coping with chronic pain and chronic illness, along with the associations between coping and outcomes.

**Coping**

Illness perceptions have a direct impact on individual’s cognitive, behavioural and emotional coping strategies employed, according to the general SRM. The third column of the model in Figure 2 outlines constructs related to how individuals cope with impairments associated with IC/BPS, from a cognitive, behavioural and emotional perspective. It is well acknowledged that the treatment and management of chronic pain should target self-regulation strategies and responses. However, there is no consensus regarding specific approaches or skills that best reflect effective self-regulation (Jones, Rollman, White, Hill, & Brooke, 2003). Furthermore, labels such as adaptive and maladaptive are often not constructive in the multidisciplinary treatment of chronic pain. For example, some coping strategies may not be
maladaptive for all individuals. As such, the labels of illness-focused coping (IFC) and wellness-focused coping (WFC) are more useful as they help in identifying which strategies to target in intervention and treatment (Jensen, Turner, Romano, & Strom, 1995).

**Illness and Wellness-Focused Coping**

Cognitive-behavioural treatments and interventions aim to reduce the use of IFC strategies, and teach and encourage the use of WFC strategies. The improvement in patient functioning produced by such treatments is hypothesized to be due in part to treatment-related changes in behavioural coping responses (Jensen, Keefe, Lefebvre, Romano, & Turner, 2003). It has been assumed that an individual’s choice of coping strategies will determine his/her adjustment to chronic pain, and research has focused largely on identifying health-related strategies (Rodero et al., 2011). Various strategies are often encouraged in the multidisciplinary treatment of chronic pain (e.g., WFC: relaxation, task persistence, exercise and stretching), while some strategies are discouraged (e.g., IFC: pain-contingent resting, asking for assistance, and guarding a body part) (Jensen et al., 1995). Little research has investigated IFC and WFC in samples of women with IC/BPS. Within IC/BPS samples, certain strategies (such as guarding and resting) are described as illness-focused, whereas seeking social support has been noted to be adaptive and wellness-focused (Rothrock, Lutgendorf, & Kreder, 2003).

There is some debate in the literature as to which strategies comprise IFC versus WFC. Jensen and colleagues (1995) found that guarding a body part, pain-contingent resting and asking for assistance were considered IFC strategies, whereas relaxation, task persistence, exercise and stretching were considered to be WFC strategies. Of note, seeking social support was found to be neither illness nor wellness focused, and task persistence was the only strategy found to be
significantly related to better adjustment to pain. Hadjistavropoulos et al. (1999) investigated the employment of IFC and WFC in a large heterogeneous sample of chronic musculoskeletal patients using factor analysis. Results supported the structure and composition of eight factors (i.e., coping self-statements, exercise/stretching, task persistence, seeking social support, guarding, asking for assistance, resting, relaxing), but had inconsistent results as to which factors were considered IFC versus WFC. To note, a factor analytic study using a sample of chronic pain patients confirmed two main factors from the Chronic Pain Coping Inventory (Davidson, Tripp, Fabrigar, & Davidson, 2007). Davidson et al. (2007) found that coping variables were reduced into two constructs: positive coping (consisting of positive self-statements, relaxation, seeking social support and exercise/stretching) and negative coping (consisting of guarding and resting). Interestingly, task persistence did not strongly load on to either of the factors. Similarly, in a sample of patients with fibromyalgia, IFC consisted of guarding, resting and asking for assistance, and were associated with poorer outcomes (e.g., disability, QoL) (Garcia-Campayo, Pascual, Alda, & Ramirez, 2007), however, WFC strategies were incoherent as a group. Task persistence was found to correlate with IFC strategies, and seeking social support was weakly related to other items. The other WFC strategies (relaxation, coping self-statements and exercise) were correlated with each other and were associated with better outcomes such as QoL.

The literature is conflicting as to which strategies act as IFC versus WFC, and this has yet to be investigated in samples of women with IC/BPS. Understanding which behavioural strategies are considered to be illness versus wellness focused is important as they represent direct targets for future interventions in pain management and rehabilitation. Within the context of the general SRM, illness cognitions influence coping behaviours and strategies (Leventhal et al., 1980). More specifically, illness perceptions act as an interpretive schema for the available sources of information about an illness and guide action and coping in response to the threat of an illness.
Understanding how an individual with IC/BPS perceives their illness, as well as the association between one’s illness perceptions and employment of illness and wellness-focused coping behaviours can help health care providers tailor interventions specific to IC/BPS with the aim of teaching efficacious self-care and management behaviours.

Illness perceptions are suggested to mediate coping responses, and in accordance with the general SRM, engaging in certain coping strategies can attenuate the impact of illness perceptions or exacerbate them. In theory, perceptions about illness and treatment mediate coping responses to the health threat in terms of either controlling danger (e.g., planning and active coping) or controlling fear (e.g., emotion-based coping) (Witte & Allen, 2000). More specifically, when responding to a health threat appraisal, maladaptive behaviours are thought to be associated with an individual’s perceived severity of illness versus his/her reward of performing a maladaptive behaviour. Conversely, adaptive behaviours are suggested to be a function of the perceived cost of performing an adaptive behavioural response in relation to perceived self-efficacy and one’s ability to manage the stressor/threat (Witte & Allen, 2000). The relationship between illness perceptions and coping behaviours has been demonstrated in both cross-sectional and longitudinal data (Hagger & Orbell, 2003). In Hagger and Orbell’s (2003) review on the SRM across various chronic conditions, research has shown that viewing an illness as controllable is related to active and problem focused coping, while viewing an illness as uncontrollable, chronic and highly symptomatic is associated with denial and avoidant coping strategies.

A number of studies demonstrate that negative illness representations are associated with IFC strategies such as behavioural disengagement or avoidance (Heijmans, 1999; Moss-Morris, Petrie, & Weinman, 1996). More specifically, patients with greater self-reported illness cognitions report an increased use of behavioural avoidant coping strategies (Heijmans, 1999).
Patients who used more behavioural avoidant coping also had beliefs that their disease was more serious, presented with a negative perspective of the future, and perceived fewer possibilities for control. Similarly, in patients with chronic fatigue syndrome, those with greater negative illness cognitions (e.g., that the illness will last a long time and will have serious consequences) also reported higher rates of behavioural disengagement (Moss-Morris et al., 1996). This relationship has also been demonstrated using mediation analysis in patients with rheumatoid arthritis, in which avoidant coping was found to mediate the relationship between illness identity and disability (Carlisle, John, Fife-Schaw, & Lloyd, 2005). As such, negative illness perceptions appear to be associated with more passive, maladaptive and avoidant coping strategies, and IFC mediates the relationship between illness perceptions and outcomes such as QoL and disability. Thus, it was expected that negative illness perceptions would be associated with greater use of IFC (see Figure 2; hypothesis 2A).

Illness perceptions can also act as an interpretive schema about illness to help guide active and adaptive responses to the threat of illness (Hagger & Orbell, 2003). As with IFC, little research has examined specific WFC strategies in relation to illness perceptions. Lawson and colleagues examined the influence of illness representations and coping in newly diagnosed patients with diabetes (Lawson et al., 2010). Results demonstrated the importance of illness representations as a mediating pathway of coping behaviour, and positive illness representations were associated with more helpful coping strategies. Similar results have also been found in IBD patients, in which the negative impact of illness perceptions (i.e., identity and consequences) on QoL was decreased when patients did not decrease activity in order to cope with pain (van der Have et al., 2015). In other words, the impact of negative illness perceptions on QoL was ameliorated when patients continued to engage in activity despite experiencing pain.
Patients with greater illness coherence and stronger beliefs in personal and treatment control were more likely to use active problem-focused coping such as planning and seeking social support. Similarly, in patients with chronic fatigue syndrome, positive illness cognitions, such as a high internal locus of illness control/cure, were significantly related to active coping (e.g., actively trying to make one’s situation better, focusing on the current situation) as well as seeking social support (Moss-Morris et al., 1996). Based on the literature reviewed, it was expected that negative illness perceptions would be associated with a decreased use of WFC (see Figure 2; hypothesis 2B).

Understanding the relationship between illness perceptions and how they guide illness and wellness-focused strategies can help to further elucidate the conceptualization of coping with IC/BPS, and will further expand the general theoretical model of the SRM to a pelvic pain population. While behavioural coping has been well studied and established within the chronic pain literature, the inclusion of novel emotion regulation strategies (such as catastrophizing and acceptance) will further expand the general theory of the SRM, as well as increase the conceptual understanding of how individuals cope with IC/BPS. The following sections will review the literature on emotion regulation within chronic pain samples.

**Emotion Regulation**

Emotion regulation has been defined as the internal process of influencing which emotions are experienced, when they are experienced, and how they are expressed (Gross, 1998b). Gross (1998b) describes emotion regulation as a process model of emotion in which an individual evaluates emotional cues that influences one’s cognitive experience, behavioural expression and physiological arousal. Clinically, emotion regulation processes are central to
mental health and coping with physical illness. Chronic pain conditions present with a complex interaction of physical symptomology, pain, as well as a high cognitive, emotional, social and behavioural load in which self-regulatory ability is crucial (Solberg Nes et al., 2009). Because patients with chronic pain are often unable to find a cure or solve the problems associated with their conditions, they must find strategies in order to adapt to a long-term course of the disease and coping with the symptomology (Bussing, Ostermann, Neugebauer, & Heusser, 2010). Successful adaptation to chronic pain depends on an individual’s ability to exercise control or alter reactions and behaviours to stress and symptoms (Solberg Nes et al., 2010).

The general SRM suggests that emotion regulation strategies can modify one’s internal situation and alter the impact of emotional responses. In the case of chronic pain, the SRM posits that emotion regulation is an integral component of the self-regulation process, and that employing certain emotion regulation skills can help to manage the impact of negative emotions related to one’s condition (Karademas, Tsalikou, & Tallarou, 2010). The general SRM has traditionally focused on the impact of illness perceptions on behavioural coping strategies such as IFC and WFC, while the literature evaluating illness perceptions and emotion regulation strategies (i.e., catastrophizing, reappraisal, suppression and acceptance) is scarce. In general, findings support that the tight control of negative emotions (e.g., suppression) adversely affects physical health, whereas cognitive attempts to reappraise a situation are more beneficial (Gross, 1998a). In review of the literature, suppression and reappraisal are well-established factors in emotion regulation, and catastrophizing and pain acceptance are robust predictors of physical and mental health outcomes in chronic pain research, and more specifically in IC/BPS.

Suppression. Suppression is a maladaptive emotion regulation strategy that involves attempts to inhibit expressions of emotion (Gross, 1998a), and is an ineffective method of emotion regulation across psychopathology (Aldao, Nolen-Hoeksema, & Schweizer, 2010). In
the seminal research study by Gross (1998a), although suppression was found to be effective at decreasing expressive behaviour, it had no impact on the subjective experience of distress and led to increases in multiple indices of sympathetic nervous system activation. In regards to regulating chronic pain, suppression is an active strategy involving the inhibition of pain and emotions, and paradoxically acts to maintain the problem (Linton, 2007). For example, in order to maintain the suppression of emotion or pain, a patient would constantly need to self-monitor and control for its occurrence, thus increasing attention to the stimuli and potentially exacerbating the negative emotions and experience of pain. Researchers have explained this phenomenon in fibromyalgia patients, and noted that while minimization of negative emotional experiences may be desirable for some patients in acute situations, emotions need to be processed for resolution. When negative emotions are approached through acknowledging, expressing, and reappraising them, resolution may occur by development of insight and improved self-regulation. On the other hand, when individuals lack emotional awareness, suppress or otherwise avoid their emotions, repeated emotional intrusions and elevated physiological arousal occur, which may lead to heightened susceptibility to somatic disturbances and the experience of physical symptoms (van Middendorp et al., 2008).

Suppression has been associated with decreased ability to control the display of emotions (Muraven, Tice, & Baumeister, 1998), and it is suggested that thought intrusions during suppression interfere with coping (Sullivan, Rouse, Bishop, & Johnston, 1997). Coping with unwanted thoughts by deliberately attempting to not experience such cognitions is suggested to be an important predictor of poorer mental health (Rosenthal, 2005). Gross and John (2003) have argued that individuals who employ suppression to manage distress are less clear about what they are feeling, less successful at mood repair, and view their emotions in a less favourable or accepting light, ruminating about events that make them feel bad. More specifically, in the
chronic illness literature, the emotion regulation strategy of suppression of emotions was found to be significantly correlated with diminished mental well-being (Van Leeuwen et al., 2012).

Data on emotional suppression in samples of patients with chronic pain are limited. Masedo and Esteve (2007) evaluated suppression and acceptance during a cold presser task in a sample of undergraduate students. The suppression group demonstrated the shortest tolerance time, higher pain and distress ratings during the recovery period and slower recovery. The authors discussed suppression to be an avoidant coping strategy that was maladaptive in the case of coping with pain. Similar research has examined the effects of suppression in a chronic pain sample. In an experimental design study using a sample of chronic low-back pain patients, Burns and colleagues (2008) evaluated the effects of the emotional suppression of anger on pain behaviours. Results demonstrated that emotional suppression of anger increased pain intensity as well as displays of pain behaviours (e.g., grimacing, guarding, sighing) during a subsequent pain task. As such, the literature is in agreement that the emotion regulation strategy of suppression is illness-focused and impacts future pain experiences.

**Reappraisal.** Reappraisal is another cognitive strategy of emotional regulation as suggested by Gross (1998a), which can be defined as interpreting emotion evoking stimuli in non-emotional terms and re-evaluating its meaning. The process of reappraisal continuously occurs throughout an emotion-evoking situation, such as pain, thus altering responses and reactions as they occur. Gross’ (1998b) model of emotion regulation highlights reappraisal as a strategy that results in adaptive emotional and physical responses to pain. Reappraisal consists of changing the meaning of a situation so that the person reinterprets an emotionally relevant situation in more neutral or non-affective terms, and as such can shape patients’ interpretation of their disease and symptoms. Through the reappraisal of stressors, patients are able to alter their
goals, change aspects of life or behaviour, and perceive their stressful situation as an opportunity for personal growth or transformation (Bussing et al., 2010).

The emotion regulation strategy of reappraisal has been well established and researched in the general clinical psychology literature, but data within the chronic illness and pain literatures are limited. In a seminal study, reappraisal was found to lead to decreases in both behavioural and subjective displays of emotion, with no signs of elevated physiological responses, and it was concluded that reappraisal was an effective method of emotion regulation (Gross, 1998a). The literature is in agreement that cognitive reappraisal is an adaptive and wellness-focused emotion regulation strategy across psychopathology. Cognitive-behavioural theorists suggest that improvements in psychological well-being results from actively modifying the content of thinking (e.g., unrealistic or distorted beliefs) and/or the stressful circumstances that contribute to suffering (Aldao et al., 2010), and cognitive-behavioural therapies often focus on teaching reappraisal skills (Beck, Rush, Shaw, & Emery, 1979). Research has shown that reappraisal is an effective mechanism in the treatment in chronic pain patients. In a study examining cognition and metacognition in chronic pain patients, Yoshida and colleagues (2012) suggested that interventions that focus on cognitive reappraisal results in thoughts that are incompatible with negative mood and a pessimistic outlook. As such, cognitive reappraisal was suggested to be an effective psychological intervention.

The research evaluating the relationship between illness perceptions and emotion regulation strategies, such as suppression and reappraisal, is limited but enlightening. Research has established the associations between pain and suppression (Keefe et al., 2001; Sullivan et al., 1997), and suppression and psychological outcomes (Muraven et al., 1998; Rosenthal, Cheavens, Compton, Thorp, & Lynch, 2005; Van Leeuwen et al., 2012). Few studies have directly evaluated
the link between suppression and illness representations. Karademas and colleagues (2010) evaluated the impact of various coping strategies and emotion regulation in cardiac patients. Results support the theoretical framework of the general SRM and demonstrate that the relationship between emotional illness representations and emotional well-being was mediated by both suppression and reappraisal. Wenninger and colleagues (2013) found similar results in evaluating distress and emotional coping of childhood cancer survivors 7+ years post-diagnosis. Correlations showed that suppression of negative thoughts was significantly associated with illness representations such as consequences, emotional representations and illness coherence, while no association was found between suppression and personal and treatment control perceptions.

Although few studies have evaluated the effects of reappraisal on illness representations, Bussing and colleagues examined the influence of adaptive and maladaptive coping on patient life satisfaction in several chronic pain conditions (Bussing et al., 2010). Illness experience was associated with greater life satisfaction, and the authors suggested that this was due to the association between cognitive reappraisals and the related positive interpretations of disease. Similarly, in a sample of cancer survivors, positive disease interpretations correlated solely with adaptive coping strategies such as reappraisal (Bussing & Fischer, 2009). Reappraisal is demonstrated to be an adaptive cognitive strategy in relation to coping with pain and disease-related symptoms, and suppression is shown to be a maladaptive emotion regulation strategy. Similar to suppression, pain catastrophizing has been shown to be a maladaptive appraisal process within the context of chronic pain samples.

*Pain Catastrophizing.* Pain catastrophizing has been conceptualized as a coping mechanism in various ways. Some research has suggested that patients who catastrophize are
actively communicating their distress and inability to manage their pain, and describe

catastrophizing to be a communal coping mechanism (Keefe, Lefebvre, & Smith, 1999; Sullivan, 2012). Other researchers have conceptualized catastrophizing to be more of an emotion regulation strategy, and more specifically as a maladaptive belief or cognitive appraisal of their pain experience (Jones et al., 2003; Sullivan, Bishop, & Pivik, 1995). In line with the emotion regulation theorists, catastrophizing has been defined as an appraisal process such as “an exaggerated negative mental set brought to bear during an actual or anticipated painful experience” (Sullivan et al., 1995). The individual with high levels of catastrophizing has the tendency to magnify or exaggerate the threat value of pain sensations and feel hopeless about their situation (Quartana, Campbell, & Edwards, 2009; Sullivan et al., 2001). Catastrophizing and repetitive negative thinking are suggested to be emotionally dysregulating, and are involved in a process where thoughts, emotions and behaviour are intertwined (Linton, 2007). In the context of chronic pain, catastrophizing serves as an impetus that deregulates patients’ emotions, pain, and coping, serving almost as a counter function to emotion regulation strategies such as reappraisal.

Jones and colleagues (2003) assert that catastrophizing is a coping strategy in their study investigating mechanisms of catastrophizing in a chronic pain sample (Jones et al., 2003). Using items that assess for ways in which patients experience and regulate emotions, catastrophizing was noted to be a complex construct that incorporates emotional responses as well as the cognitive and behavioural aspects of coping with chronic pain. The authors suggest that the mechanism of catastrophizing involves the combination of the perception of lack of control, lack of reality-focused coping abilities (e.g., poor goal-directed coping behaviours and increased use of maladaptive behaviours to cope such as substance abuse, dissociation and self-mutilation), lack of positive affect and the presence of intense negative affect.
Research has found pain catastrophizing to be one of the strongest psychological predictors of pain-related outcomes (Nickel et al., 2007; Sullivan et al., 2001; Sullivan, Thorn, Rodgers, & Ward, 2004; Tripp et al., 2009; Tripp et al., 2006). In women with IC/BPS, pain catastrophizing is noted as a prominent factor that is associated with greater impairments in pain, mental and physical health, depressive symptoms and social functioning; catastrophizing significantly impacts patient outcomes (Nickel et al., 2010). These findings have directed clinical assessment and management of psychosocial factors for improved patient care in women with IC/BPS, and catastrophizing is used to help in identifying patients with IC/BPS who are part of the psychosocial domain of the phenotyping classification system (Nickel et al., 2009). In review of the literature, catastrophizing is noted to be a key variable of interest in IC/BPS, and it is suggested that clinical research, assessment and interventions should include the construct as it represents an obstacle to patient recovery and rehabilitation (Sullivan, 2012).

There is little research evaluating the relationship between illness perceptions and catastrophizing. One study investigating illness perceptions in patients with fibromyalgia found that the dimensions of illness representations had a significant relationship with catastrophizing. More specifically, catastrophizing was related to a low understanding of the symptoms of fibromyalgia and positively related to the more cyclical nature of the condition (van Wilgen, van Ittersum, Kaptein, & van Wijhe, 2008). Similar results were also found in samples of patients with chronic pain and Sjogren’s syndrome, in which catastrophizing had a negative association with identity, timeline, consequences and emotional representations, and a positive association with personal control, treatment control and coherence (Gillanders, Ferreira, Bose, & Esrich, 2012; Segal et al., 2014). These initial results demonstrate that catastrophizing is a maladaptive coping mechanism that is associated with negative illness perceptions, and that more can be learned about these relationships, especially in other chronic pain conditions such as IC/BPS.
Understanding the connection between illness perceptions and coping will help to advance the theory of the general SRM by adding a robust predictor of pain-related outcomes within the theoretical model’s framework. Pain acceptance is also an adaptive and robust predictor of pain-related outcomes.

*Pain Acceptance.* Pain acceptance is a well-established wellness-focused coping strategy in the pain literature. Approaches related to acceptance emphasize changes in one’s relationship to the current experience. Rather than actively modifying distressing emotions and/or circumstances that contribute to them, “mindful” emotion regulation involves practicing increased awareness of one’s feelings, non-reactivity, tolerance and acceptance of negative emotion (Chambers, Gullone, & Allen, 2009; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Acceptance, in the case of chronic pain, requires acknowledging that one has pain, giving up unproductive attempts to control pain, behaviourally acting as if pain does not necessarily imply disability, and being able to commit one’s efforts toward living a satisfying life despite pain (Hayes, Jacobson, Follette, & Dougher, 1994). McCracken (1998) conceptualized acceptance of chronic pain as “...a willingness to experience continuing pain without needing to reduce, avoid or otherwise change it”.

Acceptance has been shown to be efficacious in treating a number of physical conditions including chronic pain, and is a robust predictor of patient outcomes including decreased patient reports of pain intensity, pain-related anxiety, avoidance, depression and physical/psychosocial disability, increased daily uptime, and improved work status (McCracken, 1998; Wright et al., 2011). Additionally, in cross-sectional analysis examining the behavioural dimensions of adjusting to chronic pain, acceptance of pain was found to be the lone predictor of dysfunctional
group membership (e.g., those who reported that their pain affected a broad range of functioning) (McCracken, Spertus, Janeck, Sinclair, & Wetzel, 1999).

The literature is limited in regards to evaluating the relationship between illness representations and pain acceptance. In an evaluation of an adaptation of the SRM in patients with Parkinson’s Disease, illness representations (i.e., consequences, personal and treatment control, and emotional representations) were associated with acceptance (Evans & Norman, 2009), and acceptance was also found to mediate the relationship between illness representations and psychological distress. Similar results were found in a chronic pain sample, in which higher levels of symptoms and negative emotional/life consequences were associated with lower pain acceptance (Gillanders et al., 2012).

One of the major methodological issues in the evolution of the theory of self-regulation in the context of chronic illness is the lack of a parsimonious factor structure for the construct of emotion regulation. For example, while the constructs of suppression, reappraisal, catastrophizing and acceptance have been established independently within the literature, to date, no research has evaluated all of these factors together as emotion regulation strategies in a pain sample to examine whether or not they act as distinct constructs or as one unifying factor. Based on the literature reviewed above, it was expected that negative illness perceptions would be positively associated with maladaptive emotion regulation strategies such as catastrophizing and suppression, and negatively associated with adaptive emotion regulation strategies such as reappraisal and acceptance (see Figure 2; hypothesis 2C). The next section to follow will examine the literature on mental and physical outcomes within the context of the SRM and within the chronic pain literature.
Physical and Mental Health Outcomes

The final column of Figure 1 is the evaluation of psychological and physical patient outcomes. IC/BPS is a debilitating condition in which individuals experience severe pain and urinary symptoms. These impairments are associated with disruptions in daily activities and poor mental health outcomes (Rabin, O'Leary, Neighbors, & Whitmore, 2000). Reflecting these findings, the proposed model considers two levels of outcomes: mental health well-being and physical disability. A large body of research has examined the relationships between coping and mental and physical health outcomes, however it is important to evaluate these relationships in a parsimonious manner within an overall modeling process (Morley et al., 2013). In accordance with the general theory of the SRM, coping mechanisms would be predictive of both mental health outcomes (i.e., psychological well-being and emotional distress) as well as physical outcomes (i.e., perceived disability/loss of role-functioning) (Hagger & Orbell, 2003). The following sections will review the literature on the specific relationships amongst coping (i.e., IFC, WFC, emotion regulation) with physical outcomes (i.e., disability) and mental health outcomes (i.e., affect, depression, satisfaction with life, optimism and pessimism).

Physical Disability

Disability is the physical health outcome of the present study model as shown in Figure 2, and refers to the inability to carry out daily activities in order to function in everyday life (World Health Organization, 2002). IC/BPS is a condition that is associated with significant disability. In comparison to controls, women with IC/BPS reported significantly more pain, sleep dysfunction, depression, anxiety, stress, catastrophizing, sexual dysfunction and lower perceived social support (Nickel et al., 2010). As such, it is not surprising that IC/BPS significantly impacts an
individual’s daily life functioning. Rothrock and colleagues (2002) suggested that women with IC/BPS experience poorer QoL and the inability to perform normal role activities due to physical difficulties, emotion regulation strain and decreased energy level. IC/BPS has a significant effect on various areas of life such as occupation, social and recreational activities, family and home responsibilities and sexual functioning (Katz et al., 2013; Rabin et al., 2000). In sum, disability is a major concern in the assessment and treatment in women with IC/BPS.

The IC/BPS literature on pain-related disability is scarce, and little is known about how the condition specifically impacts components of individuals’ daily activities and functioning. Disability has been represented in a variety of different ways in recent research. Ginting et al. represented IC/BPS related disability using a total score from the items of the Pain Disability Index (Ginting, Tripp, Nickel, Fitzgerald, & Mayer, 2011). A recent study by Katz and colleagues (2013) was the first to apply and test a theoretical conceptualization of disability in women with IC/BPS using both exploratory and confirmatory factor analyses. Based on theory adapted from the disablement process, results showed that functional disability was best represented by the following indicators: family/home responsibilities, social activities, recreation, occupation, sexual behaviour, life-support and self-care, pain as well as physical health-related QoL.

The relationship between coping and disability has been evaluated within the chronic pain literature over the past several decades and in general, IFC is consistently associated with more disability. In a sample of chronic pain patients, guarding, resting and asking for assistance (i.e., IFC) were significantly associated with more disability (Misterska, Jankowski, & Glowacki, 2013). Similarly, in a study evaluating behavioural coping in fibromyalgia patients, guarding and asking for assistance were associated with disability (Karsdorp & Vlaeyen, 2009). The association between IFC and disability has also been shown using longitudinal data. In a sample of low-back pain patients, time 1 and 2 (6 months post-baseline) disability were significantly
predicted by guarding, resting, and asking for assistance. Based on the literature reviewed, it was hypothesized that greater use of IFC would be associated with increased levels of patient-reported disability (see Figure 2, hypothesis 3A).

The literature is consistent in reporting the association between physical disability and IFC strategies, however wellness-focused strategies have shown mixed results in predicting disability. For example, in a sample of chronic pain patients, most of the WFC strategies, such as relaxation, seeking social support and coping self-statements, were associated with less disability (Misterska et al., 2013). Interestingly, task persistence was not significantly related to disability in several studies (Karsdorp & Vlaeyen, 2009; Misterska et al., 2013). The associations between WFC and disability have also been shown using longitudinal data. In a sample of low-back pain patients, time 1 and 2 (6 months post baseline) disability were significantly predicted by relaxation and coping self-statements, but not by exercising/stretching and task persistence (Truchon & Cote, 2005). The literature provides some support for the relationship between WFC and disability, and it was expected that greater use of WFC would be associated with lower reports of patient-disability (see Figure 2; hypothesis 3C).

Research in the chronic pain literature over the past several decades has focused primarily on patient coping and behavioural adjustment to pain in relation to disability. However, more recently, emotion regulation strategies, such as catastrophizing and pain acceptance, have been emphasized as important predictors of patient adjustment in chronic pain (McCracken & Eccleston, 2003). There is strong support that catastrophizing is associated with greater levels of disability, while pain acceptance is associated with better functioning and engagement in life activities. However, research evaluating the connection between reappraisal, suppression and physical disability is scarce.
The research evaluating the relationship between emotion regulation skills, such as reappraisal, suppression, and disability in the chronic pain literature is very limited, however, emotion regulation skills have been examined in relation to disability in other domains of literature. For example, a recent trans-diagnostic study interviewed inpatients (e.g., anxiety disorders, affective disorders, somatoform disorders) on admission and discharge to assess skills and areas of daily living (Hofmann, Fehlinger, Stenzel, & Rief, 2015), and found that change in emotion regulation skills significantly predicted disability. The evaluation of this connection is very limited within the chronic pain literature, and some research supports that this relationship is in fact not significant and that other factors may be more important in influencing physical disability (Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007). For example, one study did not demonstrate emotion regulation to be a significant predictor of pain-related disability, and the authors posited that this lack of significance might have been due to the method in which they measured disability (e.g., lifting, standing, walking) rather than impaired life functioning (Agar-Wilson & Jackson, 2011). A meta-analysis further supports this notion with findings that emotion regulation skills have weaker relations with domains of physical functioning than those tapping into emotional status (Schutte et al., 2007). The authors concluded that future research must further elucidate the relationship between emotion regulation skills and disability in order to fully understand the conceptualization and mechanisms. While further research is needed in order to better understand the relationship between emotion regulation and disability, the association between catastrophizing, pain acceptance and disability is well established.

Greater levels of catastrophizing have been consistently associated with higher overall disability (Hanley, Raichle, Jensen, & Cardenas, 2008; Jensen, Moore, Bockow, Ehde, & Engel, 2011; Jones et al., 2003; Katz et al., 2013; Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998; Sullivan et al., 2001; Tripp et al., 2006). In patients with soft tissue injuries following work/motor
vehicle accidents, greater levels of catastrophizing were associated with higher ratings of occupational disability, and a greater likelihood of unemployment (Sullivan et al., 1998). Moreover, catastrophizing predicted ratings of occupational dysfunction even after controlling for patients’ level of pain.

Catastrophizing is also acknowledged to be a robust predictor of disability within samples of patients with urogenital chronic pelvic pain. In a sample of men with chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS), catastrophizing was shown to be significantly and strongly associated with greater pain-related disability (Tripp et al., 2006). Catastrophizing has also been evaluated in IC/BPS. In women with IC/BPS, catastrophizing was associated with disability in a variety of domains including social functioning and vitality (Rothrock et al., 2003). Katz and colleagues (2013) evaluated the influence of psychosocial factors on the relationship between pain/symptoms and patient-disability in an international sample of IC/BPS patients, and results showed catastrophizing to be a significant mediator. The authors suggested that catastrophizing is an important mechanism by which pain and symptoms may become disabling, and understanding this relationship is important in the advancement of IC/BPS focused treatment. The present study will further elucidate this relationship using more complex modeling, and by adding empirically relevant factors, such as pain acceptance.

Pain acceptance has demonstrated to be an important variable of interest in explaining variance in pain-related disability (Esteve, Ramirez-Maestre, & Lopez-Martinez, 2007; Ramirez-Maestre, Esteve, & Lopez-Martinez, 2014; Wright et al., 2011). In a sample of chronic pain patients, greater acceptance of pain was associated with less disability, higher daily uptime and better work status (McCracken & Eccleston, 2003). Similarly, a study examining adjustment in patients with chronic musculoskeletal pain found that pain acceptance was significantly and
independently associated with pain-related disability (Wright et al., 2011). Results demonstrated that individuals with higher pain acceptance also reported high levels of functional status and less functional impairment (e.g., household activities, autonomy behaviours, leisure and social relationships). The authors further suggest that acceptance accounts for important variance over and above other positive psychological constructs (e.g., optimism and hope), and emphasized its importance in treatment models. Pain acceptance has also been modeled onto disability using SEM procedures in a chronic pain sample (Esteve et al., 2007). While these results are meaningful in helping to understand this relationship, the study constructed a model that was empirically driven, rather than using a model that was rooted in theory. Follow-up research by this group conducted a study on a large sample of patients with chronic spinal pain, and results showed that pain acceptance was significantly associated with lower reports of limitations in daily activities and in role functioning (e.g., household, autonomous behaviour, leisure and social relationships) (Ramirez-Maestre et al., 2014). The authors concluded that the results highlight the importance of studying positive characteristics, such as acceptance, that help individuals cope well and adapt to the adversity of chronic pain.

The relationship between acceptance of pain and disability has also been shown longitudinally in research. A recent randomized control feasibility trial evaluated the efficacy of acceptance and commitment therapy in a sample of chronic pain patients (McCracken, Sato, & Taylor, 2013). While there were no influences on disability immediately following treatment, participants in the ACT group demonstrated higher pain acceptance and lower disability in comparison to the treatment-as-usual group. This study provides some evidence for the efficacy and feasibility of acceptance therapy in pain management. However, the authors suggest that further research needs to examine the differences between which participants complete treatment, and how to improve participant engagement.
In review of the literature, emotion regulation strategies represent important coping targets that influence patient-related disability. It was expected that adaptive emotion regulation (i.e., increased reappraisal and acceptance and decreased catastrophizing and suppression) would be associated with less disability (see Figure 2; hypothesis 3E). The section to follow will review the literature on mental health outcomes.

**Mental Health Outcomes**

The general SRM strongly supports links between behavioural coping/emotion regulation and mental health outcomes. A psychological model of chronic pain suggests that patients with chronic pain suffer poor outcomes (i.e., psychological distress, disability) from the overwhelming influences of distressing thoughts and emotions (McCra...ken, 2005). Indeed, some individuals with chronic pain become overly focused on their pain, think in negative terms about their situation, and suffer emotionally from both their thoughts and events outside their thoughts (McCracken 2007). Self-regulatory coping strategies have been shown to impact psychological responses and well-being (Gross & John, 2003), and contribute to the ability to modify psychological negative states such as anxiety and depression (Ruiz-Aranda et al., 2010; Solberg Nes et al., 2009).

Research evaluating the general theory of the SRM suggests that the impact of emotions and emotion regulation on patients’ subjective health is ‘bonded’ to the overall self-regulation process (Karademas et al., 2010). For example, maladaptive self-regulation processes can exacerbate the impact of illness perceptions and emotion regulation on mental health, whereas adaptive self-regulation processes can ameliorate the impact of symptoms and pain and transform impairments into a more positive experience. Research on the general SRM efficacy shows that
emotion regulation is significant in predicting outcomes such as QoL and negative affect, beyond factors such as pain management and coping (Agar-Wilson & Jackson, 2011). Researchers have also suggested that managing one’s emotional states is related to a “down regulation” of negative emotions, in which the process not only allows individuals to manage negative emotions but also allows them to appreciate positive experiences in their life (Agar-Wilson & Jackson, 2011; Zautra et al., 2005).

The SRM framework is useful in understanding the self-regulatory process in coping with chronic illness and can help elucidate the impact of certain coping and emotion regulation strategies on mental health outcomes within this modeling framework. In general, the chronic pain and illness literature has focused on negative mental health outcomes such as depression and negative affect. Research has begun to evaluate positive psychological outcomes such as positive affect, satisfaction with life and optimism. The following sections will review the literature focusing on both negative (depression, negative affect and pessimism) as well as positive psychological outcomes (positive affect, satisfaction with life and optimism) in relation to the general SRM.

*Affective Responses.* The psychological model of chronic pain suggests that patients suffer diminished mental health, in comparison to healthy controls, from the overwhelming influences of distressing thoughts and emotions (McCracken, 2005). In general, high arousal of negative affective responses to pain is presumed to be adaptive and to serve a protective function in order to motivate an individual to escape a particular threat (Finan & Garland, 2015). When pain is experienced over the long-term it creates a state of chronic negative affect and behavioural styles that predispose an individual to depression and other mood disorders (Banks & Kerns, 1996). The role of negative affect in chronic pain has been well established in the literature. In an integrative review, results show that negative affect is associated with poorer patient outcomes,
and that when negative affect is decreased via psychosocial interventions pain-related outcomes improve (Finan & Garland, 2015).

Depression and negative affect are a significant issue in women diagnosed with IC/BPS (Clemens, Brown, & Calhoun, 2008). Using conservative cutoff scores for depression, Rabin and colleagues (2000) found that over 50% of their sample from a tertiary care IC/BPS clinic indicated a diagnosis of a depressive disorder using self-report questionnaires (Centre for Epidemiologic Studies – Depression Scale). A similar study showed that approximately 20% of women with IC/BPS reported moderate to severe depressive symptoms, which was significantly higher than a control group (Rothrock, Lutgendorf, Hoffman, & Kreder, 2002). More recently, in a nation-wide population based study in Taiwan patients with IC/BPS had a higher incidence rate of depression than controls, even after adjusting for the effects of age, sex and common comorbidities (Chuang, Weng, Hsu, Huang, & Wu, 2015). These studies show that negative affect and depression are significant issues and are a commonly reported occurrence in women with IC/BPS.

Less research has examined positive affect in chronic pain samples, which has only become an area of interest within the past decade. Finan and Garland (2015) recently conducted a review on positive affect within the chronic pain literature, and defined positive affect as a term that describes positive moods, which can vary from a mild pleasant feeling state of contentment to overwhelming joy. In general, evidence supports that positive affect attenuates the negative experience of pain, and the absence of positive affect exposes patients to poor pain related outcomes. In a study by Zautra and colleagues (2005), patients with fibromyalgia reported lower levels positive affect, but not negative affect, in comparison to patients with osteoarthritis. Moreover, results showed that during weeks of increased interpersonal stress, the fibromyalgia...
patients showed a steeper decline in positive affect. The authors suggested that these patients have more difficulty regulating positive affect and emotions, especially during stressful events. In a recent review, positive affect has been associated with positive social engagement, healthy relationships and was found to buffer the negative experience of pain and the impact of pain-related disability (Finan & Garland, 2015). The authors also suggested that although positive affect is negatively associated with pain, its mechanisms vary as a function of diagnosis. For example, in the study comparing patients with fibromyalgia and osteoarthritis, positive affect was found to account for the greatest amount of variance between the groups (Zautra et al., 2005).

In relation to coping variables, IFC strategies are consistently associated with more distress and poorer overall mental health functioning (Jensen et al., 2011; Jensen et al., 1995; Ramirez-Maestre, Esteve, & Lopez, 2012; Rodero et al., 2011). Rodero (2011) suggested that strategies aimed at reducing symptoms (e.g., resting) or illness impact (e.g., guarding), are generally associated with poorer general functioning. In validating the Chronic Pain Coping Inventory in a sample of chronic pain patients, the IFC strategies of guarding, resting, and asking for assistance were all positively associated with greater depression and pain-related distress (Jensen et al., 1995). These findings have been replicated across several studies and patient populations. For example, IFC was associated with poorer psychological functioning and increased depressive symptoms in patients with chronic pain and fibromyalgia (Garcia-Campayo et al., 2007; Jensen et al., 2011; Rodero et al., 2011), and the relationship between pain and mental QoL was mediated by IFC in men with chronic prostatitis / chronic pelvic pain (Krsmanovic et al., 2014).

Unlike IFC coping, wellness-focused strategies are often found to be adaptive in treatment, and are associated with more positive outcomes such as lower distress and depression (Hadjistavropoulos, MacLeod, & Asmundson, 1999; Jensen et al., 2011; Ramirez-Maestre et al., 2011;
Cognitive-behavioural theorists suggest that behaviourally modifying stressful circumstances that contribute to suffering can lead to improvements in psychological well-being (Aldao et al., 2010). WFC strategies are commonly found to be associated with more adaptive and positive affective responses and serve an important function in the self-regulation process. A review of psychosocial factors and adjustment to chronic pain found that the use of behavioural activities, task persistence, exercise and stretching was associated with better psychological functioning (Jensen et al., 2011). Similarly, in a study that evaluated coping in women with fibromyalgia, task persistence was predictive of less depressive symptoms (Rodero et al., 2011).

In contrast, some studies have found inconsistent results in regards to the impact of WFC on emotional responses. For example, in a sample of women with fibromyalgia, only relaxation, exercise and stretching were associated with better QoL, while task persistence was positively correlated with depression and seeking social support was not correlated with any mental health outcome variables (Garcia-Campayo et al., 2007).

Emotion regulation strategies, such as suppression and reappraisal, have also been linked to poor psychological outcomes, such as negative affect and depression. Suppression is a robust predictor of negative mood (Gross & John, 2003), and thought suppression has been associated with decreased ability to control the display of emotions (Muraven et al., 1998). Coping with unwanted thoughts by deliberately attempting to not experience such cognitions is suggested to be an important predictor of outcomes of depression (Rosenthal, 2005). Gross and John (2003) have argued that individuals who employ suppression to manage distress are less clear about what they are feeling, less successful at mood repair, and view their emotions in a less favourable or accepting light, ruminating about events that make them feel bad. Moreover, individuals who use suppression report less positive affect and more negative emotions. In the chronic illness literature, the emotion regulation strategy of emotional suppression was found to be significantly
correlated with diminished mental well-being (Van Leeuwen et al., 2012). Similarly, in a sample of women with fibromyalgia, emotionally avoidant strategies (such as suppression) were associated with higher levels of negative affect, in which the authors suggested that avoiding emotional processing and expression leads to negative affect (van Middendorp et al., 2008).

Catastrophizing is another maladaptive emotion regulation variable that is associated with worse mental health outcomes such as negative affect and depression. While catastrophizing has been implicated as a robust predictor of pain-related outcomes (Sullivan et al., 2001; Sullivan et al., 2004; Tripp et al., 2009; Tripp et al., 2006), there has been some debate over whether catastrophizing is an independent construct when depression is considered. Research on the constructs of catastrophizing and depression has been reviewed: with prospective studies showing that catastrophizing predicts future depression, even when accounting for initial levels of depression (Sullivan, et al., 2001). Furthermore, Sullivan and colleagues report that cross-sectional studies demonstrate catastrophizing to predict pain-related outcomes, even when controlling for depression. It was concluded that while catastrophizing is correlated with various indices of emotional distress, the variable appears to contribute unique variance to the prediction of pain-related outcomes. Similarly, in a sample of women diagnosed with IC/BPS, pain catastrophizing was found to be distinct yet significantly related to negative affect within a biopsychosocial disablement process model (Katz et al., 2013).

In contrast to suppression and catastrophizing, the use of cognitive reappraisal and acceptance as emotion regulation strategies is associated with a number of positive outcomes including success in social interactions, greater well-being and life satisfaction, and less depression (Gross & John, 2003; Perez & Jose, 2011). In terms of affect, Gross and John (2003) have suggested that individuals who use the strategy of cognitive reappraisal experience and
express more positive emotion and less negative emotion than those who reappraise less frequently. Acceptance is associated with positive psychological outcomes (Gross & John, 2003; McCracken, Gauntlett-Gilbert, & Vowles, 2007). While cognitive-behavioural theorists assume improvements in psychological well-being result from actively modifying the content of thinking (e.g., from reappraisal techniques) (Aldao et al., 2010), acceptance involves the willingness to experience continuing pain without needing to reduce, avoid or otherwise change it (McCracken, 1998). Like reappraisal, acceptance has been posited to be a secondary coping process and not an emotional reaction (Wolgast, Lundh, & Viborg, 2011). Results from a study comparing the two emotion regulation strategies suggested that both acceptance and cognitive reappraisal both intervene early in the emotion generating process, which results in a reduced negative emotional response. Empirically, pain acceptance is associated with lower rates of depression (McCracken, 1998; McCracken & Eccleston, 2003; Ramirez-Maestre et al., 2014), and this relationship has also been validated using longitudinal interventional studies (McCracken et al., 2013). When comparing an ACT group to treatment-as-usual in a sample of chronic pain patients, acceptance was associated with improvements in depression post-treatment and at three-months follow-up. The section to follow will review the literature on the construct of satisfaction with life, and the associations between coping strategies such as IFC, WFC and emotion regulation and life satisfaction.

*Satisfaction with Life.* Satisfaction with life is an individual’s subjective appraisal about their overall functioning and circumstances. It is a dimensional measure of positive well-being, not simply the absence of negative factors (Diener, 1984). While satisfaction with life may be conceptually linked to health-related QoL, the two constructs are distinct factors. Health-related QoL refers to the biopsychosocial conceptualization of health and includes physical, mental and social contributing factors as defined by the World Health Organization (World Health
Organization, 1997). Conversely, satisfaction with life includes concepts such as subjective well-being and happiness (Diener, 1984). The construct of life satisfaction has been well established within the rehabilitation and disability literature, however, its study has been limited among patients with chronic pain (Boonstra, Reneman, Stewart, Post, & Schiphorst Preuper, 2013).

Boonstra and colleagues (2013) evaluated life satisfaction in patients with chronic musculoskeletal pain in comparison to the general population, and life satisfaction (i.e., with “life as a whole”) was found to be significantly lower in the chronic pain patients in comparison to the general public. Similarly, in a cross-sectional study using data from a general health survey from the national registry in Iceland in 2007, individuals with a current chronic pain condition (e.g., chronic back pain, fibromyalgia…etc.) had a higher odds ratio of dissatisfaction with life (Bjornsdottir, Jonsson, & Valdimarsdottir, 2014).

Life satisfaction is an important factor to investigate, as it is often a target and outcome measure for pain management and rehabilitation programs (Silvemark, Kallmen, & Molander, 2014). Silvemark and colleagues (2014) evaluated if a five-week rehabilitation program for patients with chronic pain would improve life satisfaction over time. The results showed that the rehabilitation improved all areas of life satisfaction, including satisfaction with ‘life as a whole’. The authors concluded that chronic pain patients experience lasting improvements in functioning and well-being by participating in pain management rehabilitation programs.

Few studies have examined the effects of behavioural coping strategies on positive psychological outcomes such as life satisfaction. A two-year prospective study evaluated outcomes among post-operative patients with lumbar spinal stenosis and results showed that life satisfaction was associated with poorer coping capacity throughout time (Sinikallio et al., 2011). This study highlights the importance of life satisfaction as an outcome variable as it may be associated with poorer functioning and coping prospectively. Modeling processes have also
demonstrated the effects of negative coping on self-worth and subjective well-being in patients with spinal cord injuries (Smedema, Catalano, & Ebener, 2010), in which negative coping directly influenced subjective well-being (e.g., satisfaction with life). The authors discuss the importance that coping strategies play in the psychosocial adjustment in individuals with disabilities and emphasize the clinical implications of these findings. While this study provides some insight into a set of relationships that have been scarcely studied, the proposed measurement model was created based on a large body of various sources of information, and not one parsimonious and theoretical conceptualization.

In contrary to illness-focused strategies, active and adaptive coping is associated with greater life satisfaction in various patient populations such as chronic pain, rheumatoid arthritis, as well as spinal cord injuries (Anke, Damsgard, & Roe, 2013; Bussing et al., 2010; Smedema et al., 2010; Treharne, Lyons, Booth, & Kitas, 2007). In a sample of musculoskeletal chronic pain patients, satisfaction with life as a whole was significantly predicted by the coping variables of self-efficacy of pain and self-coherence (Anke et al., 2013). The authors suggested that a decrease in chronic pain patients’ ability to cope was associated with life dissatisfaction. Similarly, life satisfaction was associated with adaptive behavioural coping strategies in patients with various chronic pain conditions (Bussing et al., 2010).

Citing the transactional model of stress and coping (Lazarus & Folkman, 1984), in rheumatoid arthritis patients, Treharne and colleagues (2007) examined coping resources as buffers to perceived stress. In general, the impact of stress on well-being was buffered by both behavioural and cognitive coping, and these effects occurred over and above the effects of demographics, medical and physical factors. More specifically, life satisfaction was significantly predicted by active behavioural coping at baseline and at six months. Results also demonstrated that stress interacted with both active cognitive and behavioural coping to impact well-being. For
patients reporting greater stress, engaging in active cognitive coping was associated with greater life satisfaction after six months time. This study highlights the importance that coping can have on outcomes such as life satisfaction when dealing with symptoms, pain and chronic illness.

With the increasing attention to the influence of positive psychological variables, the link between emotion regulation strategies and life satisfaction has also begun to be evaluated recently. Treharne and colleagues (2007) found a significant interaction between reappraisal and satisfaction with life in a longitudinal study in patients with rheumatoid arthritis. Although active cognitive coping was not a significant predictor of life satisfaction on its own, it was found to significantly interact with stress. More specifically, among patients with higher stress, engaging in active cognitive coping was related to greater life satisfaction at a six-month follow-up. It appears that the ability to use reappraisal as a coping strategy, especially during times of great stress, can lead to satisfaction with life and greater well-being in patients with rheumatoid arthritis over time. Although few studies have directly examined the relationship between catastrophizing and satisfaction with life, catastrophizing has been shown to be a prominent factor contributing to decreased well-being in patients with chronic whiplash and spinal cord injuries (Peolsson & Gerdle, 2004; Smedema et al., 2010). In regards to psychological interventions, recent research suggests that reappraisal techniques such as cognitive restructuring, de-catastrophizing and reframing can be effective in influencing self-esteem and well-being among individuals with a disability, and using these strategies can be helpful in rehabilitation in order to improve QoL and life satisfaction (Smedema et al., 2010).

Acceptance is also an important component of life satisfaction in chronic pain patients. Viane and colleagues (2003) describe the acceptance of chronic pain by engagement in normal life activity despite pain, and posits that acceptance involves the recognition that a cure is unlikely and to search for a cure is only to avoid engagement in normal role activities. As such,
one has to accept their pain in order to obtain satisfaction with life. Research has also provided evidence for this in which acceptance was found to predict mental well-being beyond pain severity and pain catastrophizing in a chronic pain sample (Viane et al., 2003). Longitudinal and intervention data also support this notion. A six-week randomized wait-list control study design evaluated the efficacy of an ACT-based intervention for individuals with chronic pain. Results showed that in comparison to controls, participants in the intervention groups showed significant improvements in satisfaction with life (Johnson, Foster, Shennan, Starkey, & Johnson, 2010). Another study compared the clinical efficacy of a coping approach versus an acceptance approach of intervention in a chronic pain sample (Thorsell et al., 2011). Results showed that the acceptance approach was associated with a significant interaction effect regarding satisfaction with life in comparison to the coping approach. Acceptance appears to be an important predictor of life satisfaction in rehabilitation populations as well as chronic pain. The following section will review the constructs of optimism and pessimism as mental health outcomes within the context of the general SRM and within chronic pain samples.

**Optimism and Pessimism.** Optimism is the generally held expectation of good or meaningful experiences happening more often than bad experiences in one’s life, while pessimism is the tendency to expect negative outcomes in the future (Carver, Scheier, & Segerstrom, 2010). In general, higher levels of optimism have been linked to emotional well-being, increased satisfaction in interpersonal relationships, effective coping and adaptive physical health outcomes (Carver et al., 2010). Coping mechanisms relate to general outlooks and expectations, and it is suggested that individuals who have more confident and positive outlooks about the future continue to engage in activities and exert effort, even when facing adversity (Rasmussen, Wrosch, Scheier, & Carver, 2006). Individuals who have outlooks that are more doubtful and pessimistic about the future tend to withdraw effort and disengage from activities:
tending to try to escape adversity using avoidance, wishful thinking and distractions. An outlook that is more pessimistic is ultimately not beneficial in solving problem solving, and may even result in an individual giving up altogether. Further evidence for this finding is found in a study examining QoL and mental adjustment in women who were diagnosed and treated for breast cancer. Results showed that coping with a ‘fighting spirit’ was associated with greater levels of optimism, which had a positive effect on QoL, whereas coping with a sense of ‘hopelessness/helplessness’ was associated with greater levels of pessimism, which had a negative impact on QoL (Schou, Ekeberg, & Ruland, 2005).

A large body of research supports that optimism has beneficial effects on individual’s well-being, QoL and coping with chronic illnesses (Allison, Guichard, & Gilain, 2000; Scheier, Carver, & Bridges, 2001; Wright et al., 2011), along with lower patient-reports of pain and better adjustment to treatment (Bargiel-Matusiewicz & Krzyszkowska, 2009; Boselie, Vancleef, Smeets, & Peters, 2014; Goodin & Bulls, 2013). Wight and colleagues (2011) investigated the effects of optimism on outcomes such as psychological distress and disability in a sample of individuals with chronic musculoskeletal pain. Results demonstrated that psychological distress was significantly related to levels of optimism, and the authors highlighted the importance of assessing for optimism, suggesting that it is an important personal resource that impacts an individual’s adjustment to pain. Similarly, in a study at a rehabilitation centre with chronic pain patients (e.g., arthritis, back pain, neuropathy), increased levels of optimism were associated with greater internal pain control (e.g., the internal feeling of being in control) suggesting that dispositional optimism is an adaptive component of coping with chronic pain (Bargiel-Matusiewicz & Krzyszkowska, 2009).

It has been suggested that individuals with higher levels of optimism have better chronic
pain outcomes because they are less attentive to pain stimuli and thus better able to adjust to life with a pain condition (Goodin & Bulls, 2013). More specifically, coping with the demands of chronic pain can diminish one’s self-regulatory capacity and ability to function in various tasks as well as daily life. An experimental study evaluated the impact of optimism and task performance during a cold pressor pain task (Boselie et al., 2014). The 2 (optimism/no optimism) by 2 (pain/no pain) between subjects design explored whether experimentally induced pain from the cold pressor task led to decreased executive task performance. Additionally, the study examined whether an optimism induction could counteract the deterioration of pain on executive task performance. Within this study, optimism was induced using the technique of Best Possible Self, which is a positive future thinking technique that has proven to be effective in increasing positive expectancies. Results showed that although induced pain was associated with poorer task performance, this effect was abolished in the optimism condition. This study highlighted the significance of optimism as an important factor in coping with chronic pain, which has key implications for the current conceptualizations of treatment and pain management. Boselie and colleagues (2014) research also emphasizes that optimism is a factor that can be induced and should be encouraged as part of coping and treatment in chronic pain. A meta-analytic review suggested that better adjustment to a diversity of stressors may be due to optimism’s effects on coping strategies (Solberg Nes & Segerstrom, 2006). Optimism was positively associated with approach-focused coping strategies aimed at eliminating, reducing and managing stress and emotions, which is associated with better psychological adjustment.

Less research has focused on the mechanisms of pessimism in coping with chronic pain. In general, higher levels of pessimism are associated with passive coping and poorer pain-related outcomes (Carver et al., 2010; Ramirez-Maestre et al., 2012). Pessimism was shown to impact physical functioning in a sample of older adults with knee pain (Brenes, Rapp, Rejeski, & Miller,
More specifically, higher levels of pessimism were significantly related to performance on tasks such as walking, lifting an object, climbing stairs and getting into and out of a car.

Pessimism also has effects on individuals’ pain perceptions. In a diary study in a sample of patients with rheumatoid arthritis, patients with high levels of pessimism over-predicted their level of pain (Finan, Zautra, & Tennen, 2008). Ramirez-Maestre and colleagues (2012) also found that pessimism was significantly related to coping and adjustment in chronic pain patients. Passive coping (i.e., giving control over pain to another person, allowing pain to adversely affect areas of life) was associated with greater levels of pessimism and lower levels of optimism. Similarly, in a meta-analytic review, lower levels of optimism were associated with avoidance-focused coping strategies aimed at ignoring, avoiding or withdrawing from a stressor or emotion (Solberg Nes & Segerstrom, 2006).

Unlike the literature on behavioural coping, few studies have directly examined the relationship between optimism/pessimism and emotion regulation strategies. Gross and John (2003) evaluated individual differences of emotion regulation strategies and their impact on personal well-being. Results supported initial theory and showed that reappraisal was correlated with every indicator of positive functioning, including higher levels of optimism. Conversely, suppression was negatively associated with well-being and associated with lower levels of optimism. Similarly, in an undergraduate sample, initial data showed that reappraisal was a significant predictor of optimism (Zawadzki, 2015). Results demonstrated that once emotion regulation strategies (e.g., reappraisal, suppression) were included in the regression model, chronic stress was no longer a predictor of psychological health outcomes such as self-esteem, optimism and sleep. While the research is limited in establishing this relationship, evidence supports that the emotion regulation strategy of reappraisal would be associated with greater levels of optimism, while suppression would be associated with greater levels of pessimism.
Optimism and pessimism have also been associated with pain catastrophizing. It has been suggested that catastrophic worrying represents an internal dialogue that includes components of pessimism, and is the result of an active but thwarted problem solving process (Davey & Levy, 1999). Empirically, pain catastrophizing has been shown to be negatively associated with optimism and positively associated with pessimism in various pain populations (Bargiel-Matusiewicz & Krzyszowska, 2009; Sinclair, 2001). Researchers have noted that greater optimism supports better pain-related functioning and less engagement in maladaptive cognitive mechanisms such as catastrophizing (Bargiel-Matusiewicz & Krzyszowska, 2009; Goodin & Bulls, 2013). Sinclair (2001) suggested that strategies that promote realistic optimism and address negative explanatory styles (such as catastrophizing) that build on the strengths of an individual, and can help to encourage an individual to adopt more positive and adaptive coping.

Research has shown that coping tendencies differ in individuals who report being optimistic versus pessimistic, with particular attention to the difference between acceptance and denial (Solberg Nes & Segerstrom, 2006). In general, acceptance and active coping are associated with greater optimism, while avoidance and denial is associated with greater pessimism (Schou et al., 2005). While, acceptance implies restructuring one's perceptions to come to grips with the situation, it does not imply giving up, and instead acts to keep an individual engaged in one’s life and goals (Carver et al., 2010). The relationship between optimism, pessimism and pain acceptance has also been empirically demonstrated across various patient populations. The adaptive function of acceptance was highlighted in a study that evaluated coping with chronic illness (i.e., rheumatoid arthritis and multiple sclerosis) (Evers et al., 2001). Results showed that acceptance was a significant predictor of all indicators of psychological health, including optimism, and was related to perceived benefits for the long-term physical and psychological functioning of patients with chronic disease. Similarly, in a sample of chronic musculoskeletal
pain patients, greater levels of optimism were associated with more pain acceptance (Wright et al., 2011). The authors suggest that an ability to accept pain and optimism are important in understanding pain-related distress and adjustment.

In conclusion, the general SRM posits that coping and emotion regulation have direct pathways to a variety of mental health outcomes including psychological and emotional distress as well as psychological well-being (Hagger & Orbell, 2003). Based on the literature reviewed above, it was expected that decreased IFC (see Figure 2, hypothesis 3B), increased WFC (hypothesis 3D) and adaptive emotion regulation (i.e., increased reappraisal and acceptance and decreased catastrophizing and suppression; hypothesis 3F) would be associated with better mental health functioning (i.e., decreased negative affect, depression, pessimism, and increased positive affect, optimism and satisfaction with life).

**Present Study**

This study was the first to construct and evaluate a model that includes impairments and illness representations, their relation to cognitive/behavioural coping and emotion regulation strategies, and their impact on mental and physical health outcomes. Many of these variables have yet to be investigated in IC/BPS, and identifying their relationships within the theoretical orientation of the general SRM will be a significant contribution to the treatment of women with this condition. Understanding how illness is internally represented within this patient population can identify key variables in order to better comprehend the impact of this illness as well as for the development of future clinical interventions. Further, examining how various cognitive, emotional and behavioural coping mechanisms function within this model can ascertain which strategies may be helpful for women with this condition. This model is focused on combining
various domains of research (i.e., general pain, IC/BPS, stress and coping, self-regulation) and will expand on the general SRM by adding important constructs as empirically demonstrated (e.g., catastrophizing, pain acceptance). The section to follow will review the hypotheses as suggested by the literature reviewed above, followed by a section for methods and results. A discussion will examine the results, as well as consider final interpretations of this dissertation, study limitations, theoretical/clinical implications as well as offer areas for future research.
Hypotheses

The following is a summary of the proposed hypotheses as supported by the literature reviewed (see Figure 2).

H1: Greater impairments will be associated with more negative illness perceptions.
H2A: Negative illness perceptions will be associated with greater use of IFC.
H2B: Negative illness perceptions will be associated with decreased use of WFC.
H2C: Negative illness perceptions will be associated with poor emotion regulation.
H3A: Greater use of IFC will be associated with increased disability.
H3B: Greater use of IFC will be associated with poorer mental health.
H3C: Greater use of WFC will be associated with less disability.
H3D: Greater use of WFC will be associated with better mental health.
H3E: Adaptive emotion regulation will be associated with less disability.
H3F: Adaptive emotion regulation will be associated with better mental health.
Chapter 2

Methods

Procedure

Institutional ethics approved this study. Female participants attending outpatient urology clinics for IC/BPS were identified from attending physicians as being eligible during their clinic appointment. This study employed consecutive sampling procedures, in which all eligible participants were approached about the possibility of participating in this study. Inclusion criteria were: being female, having a physician diagnosis of IC/BPS, being able to read and write in English and being 18 years of age or older. Only female participants were included due to the IC/BPS prevalence ratio of 9:1 (in women to men) for the purposes of generalizability (Clemens et al., 2007). Exclusion criteria were: being male, not having a physician diagnosis of IC/BPS, not being able to read and write in English and being under the age of 18. Participants were briefed about the study (either during their clinic appointment, or by phone/email), and upon consenting were given a questionnaire package. Participants had the option of completing the survey by paper (with a stamped envelope for return) or online. The questionnaires were piloted as taking 35-40 minutes to complete. The Canadian sites of recruitment were at the Kingston General Hospital, Kingston, Ontario (Dr. Curtis J. Nickel) and the Sunnybrook Health Sciences Centre, Toronto, Ontario (Dr. Leslie K. Carr). Participants in the US were recruited from the clinic at the University of Rochester Medical Center, Rochester, NY (Dr. Robert Mayer) and at the Smith Institute of Urology, New Hyde Park, NY (Dr. Robert Moldwin).
Measures

Impairments Construct

Pain. The Short Form - McGill Pain Questionnaire (SF-MPQ; Melzack, 1987) was used to assess the experience of pain (see Appendix A). The SF-MPQ consists of 15 descriptors (11 sensory and 4 affective) of pain experiences in which participants were asked to rate the severity of each descriptor on a 4-point Likert scale from 0 (None) to 3 (Severe). Sensory descriptors included words such as “stabbing” and “throbbing,” and affective descriptors included words such as “fearful” and “punishing-cruel.” The Cronbach’s alphas for affective and sensory pain were 0.88 and 0.85, respectively.

IC/BPS Symptoms and Problems. To evaluate disease-specific symptoms and problems, the Interstitial Cystitis Symptom Index (ICSI) and the Interstitial Cystitis Problem Index (ICPI) were used (O’Leary et al., 1997; see Appendix B). The ICSI assessed the severity of IC/BPS symptoms experienced with 4 items that were rated on a six point Likert scale from 0 (Not at All) to 5 (Almost Always). The items asked the patient about urinary urgency, urinary frequency, nocturia and pain with urination. Similarly, the ICPI assessed the degree of bother that patients experienced due to IC/BPS symptoms (urinary urgency/frequency, nocturia and pain) with 4 items on a 5-point Likert scale from 0 (No Problem) to 4 (Big Problem). The ICSI total score was calculated by totaling all of the four items and ranged from 0 - 20. Similarly, the ICPI total score was calculated by totaling all 4 items and ranges from 0 - 16. The Cronbach’s alpha for ICSI and ICPI were 0.63 and 0.77, respectively, and was 0.85 for the total IC score. The Cronbach’s alpha value for the ICSI scale (based on four items) was lower than suggested, while the alpha value for the IC total score (based on eight items) was within the appropriate range of scores. The
Cronbach’s alpha value is one of the most common methods of measuring internal consistency within a scale; however, interpreting values is often associated with statistical biases. As the number of items within a scale increases, as does the reliability and Cronbach’s alpha value, even though the correlation between the items remain the same. For this reason, it is expected for scales with few items to have lower than usual Cronbach’s alpha values (Streiner & Norman, 1989; Warner, 2013). Caution was further taken in using the ICSI subscale within the follow-up analyses (EFAs, CFAs and SEM) to ensure that the ICSI scale was performing appropriately.

**Illness Perceptions Construct**

Illness representations were assessed using the Brief – Illness Perceptions Questionnaire (B-IPQ; Broadbent et al., 2006; see Appendix C). The B-IPQ used 9 items to assess the cognitive and emotional representations of illness. Participants were asked to answer the 9 items with regards to their IC/BPS, as suggested by the designers of the questionnaire. The B-IPQ assessed for (1) the consequences of the disease; (2) whether the timeline was acute or chronic; (3) the degree of personal control over IC/BPS; (4) the extent to which treatment controlled or cured the disease; (5) the identity of the disease; (6) concern about IC/BPS; (7) illness coherence (the degree to which patients believe they understand their illness); and (8) the emotional representation of the disease (negative emotions experienced due to IC/BPS). The B-IPQ has shown good reliability and validity across various medical samples (Broadbent et al., 2006). The Cronbach’s alpha for all the items in the B-IPQ was 0.74.
Coping Constructs

Illness and Wellness-Focused Coping. The Chronic Pain Coping Inventory (CPCI) was used to measure behavioural coping in this study (Romano, Jensen, & Turner, 2003; see Appendix D). The CPCI consisted of 16 items, which asked participants to rate the frequency of use of behavioural and cognitive coping strategies over the previous week. The items are grouped into the following eight subscales: guarding, resting, asking for assistance, relaxation, task persistence, exercising/stretching, seeking social support and coping self-statements. The frequency of these coping strategies were measured by the total number of days that the strategy was used in the past week (0-7 days). Previous studies have demonstrated that the CPCI has good internal consistency, test-retest reliability and significant correlations in the expected direction with measures of patient functioning (Hanley et al., 2008). The Cronbach’s alpha for the items of the CPCI was 0.74.

Pain Catastrophizing. Catastrophizing was assessed using the Pain Catastrophizing Scale (PCS; Sullivan et al., 1995; see Appendix E). The PCS is a measure that contains self-report items used to assess three components of catastrophizing: magnification, rumination and helplessness. The PCS asked participants to rate 13 statements describing different thoughts and feelings that may be associated with pain, with all items beginning with the phrase, “When I’m in pain...” Examples of items include “I worry all the time about whether the pain will end,” “I think of other painful experiences,” and “I keep thinking about how much it hurts.” Each item was scored on a Likert scale ranging from 0 (Not at all) to 4 (All the time), with higher scores indicating higher levels of pain catastrophizing (Sullivan et al., 1995). The Cronbach’s alpha for the total pain catastrophizing scale was 0.96.

Suppression and Reappraisal. Cognitive suppression and reappraisal were assessed using
the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; see Appendix F). The ERQ consisted of 10 items, rated on a scale from 1 (Strongly disagree) to 7 (Strongly agree). The reappraisal subscale was calculated from 6 items and assessed the ability to achieve or maintain a positive mood [e.g., “When I want to feel less negative emotion (such as sadness or anger), I change what I’m thinking about.”] The suppression subscale was calculated from 4 items and measured the tendency to inhibit one's emotions (e.g., “I control my emotions by not expressing them.”) Gross and John (2003) demonstrated adequate internal reliability, 3-month test–retest reliability, and adequate convergent and discriminant validity. The Cronbach’s alpha values for the subscales of suppression and reappraisal scores were 0.74 and 0.86, respectively.

Pain Acceptance. The Chronic Pain Acceptance Questionnaire (CPAQ; see Appendix G) is a 20-item inventory designed to measure the acceptance of pain (McCracken, Vowles, & Eccleston, 2004). There are two principal factors measured by this questionnaire: activities engagement and pain willingness. All items were rated on a scale from 0 (Never true) to 6 (Always true) with 9 items measuring pain willingness, and 11 items measuring activities engagement. Higher scores were indicative of better pain acceptance. The CPAQ is widely used for chronic pain populations and has shown good evidence of internal consistency and validity (McCracken et al., 2004). The Cronbach’s alphas for activities engagement and pain willingness were 0.90 and 0.85, respectively.

Physical and Mental Health Outcomes Constructs

Positive and Negative Affect. The Positive and Negative Affect Schedule (PANAS; see Appendix H) is a 20-item scale that includes descriptors of both positive (e.g., strong, enthusiastic, proud) and negative (e.g., scared, irritable nervous) affect (Watson, Clark, &
Tellegen, 1988). Participants indicated the degree to which they experienced a given descriptor that day using a response scale of 1 (Very slightly or Not at all) to 5 (Extremely). Both positive and negative affect factors were computed from the 20-descriptor items. The PANAS measures two relatively independent factors and has been found to be a reliable, valid measure of affective experiences in medical samples (Ostir, Smith, Smith, & Ottenbacher, 2005). The Cronbach’s alpha for positive affect and negative affect were both 0.91.

**Depressive symptoms.** Depressive symptoms were assessed using the Patient Health Questionnaire 9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001; see Appendix I). The PHQ-9 is a self-report questionnaire that uses 9-items to assess for depression from the full PHQ (which assesses diagnoses corresponding to the DSM-IV). Major depression can be diagnosed if 5 or more of the 9 depressive symptom criteria have been present at least “more than half the days” in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. Other depression is diagnosed if 2, 3, or 4 depressive symptoms have been present at least “more than half the days” in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. One of the 9 symptom criteria (“thoughts that you would be better off dead or of hurting yourself in some way”) counts if present at all, regardless of duration. The PHQ-9 is a reliable and valid measurement of depression severity in clinical samples (Kroenke et al., 2001). The Cronbach’s alpha for the items on the PHQ-9 was 0.91.

**Life Satisfaction.** The 5-item self-report Satisfaction with Life Scale (SWLS; see Appendix J) was used to measure satisfaction with life (Diener, Emmons, Larsen, & Griffin, 1985). Items were rated on a 7-point Likert scale from 1 (Strongly disagree) to 7 (Strongly disagree), and responses were added together to compute a global satisfaction factor. The SWLS has been shown to have good psychometric properties (Pavot, Diener, Colvin, & Sandvik, 1991),
and has been used in other chronic pain populations (Wicksell, Olsson, & Melin, 2009). The Cronbach’s alpha for the items on the SWLS was 0.90.

Optimism and Pessimism. The Life Orientation Test - Revised (LOT-R; see Appendix K) was used to assess levels of optimism and pessimism within this study (Scheier, Carver, & Bridges, 1994). The scale consisted of 10 statements, rated on a scale from 0 (Strongly Disagree) to 4 (Strongly Agree), that assessed the general level of optimism or pessimism with which one approaches different life situations (e.g., “I’m always optimistic about my future,” and “I rarely count on good things happening to me.”) Two factors were calculated from the LOT-R items to form an index for optimism and an index for pessimism. The LOT-R has shown high internal consistency, strong test-retest reliability (Scheier et al., 1994), and has been used in other chronic pain populations (Smith & Zautra, 2008). The Cronbach’s alphas for optimism and pessimism are 0.76 were 0.88, respectively.

Physical Disability. Disability was assessed using the Pain Disability Index (PDI; Pollard, 1984; see Appendix L). The PDI is a 7-item measure that assesses a patient’s degree of disability within 7 life domains (i.e., family/home responsibilities, recreation, social activity, occupation, sexual behaviour, self-care, life-support activity). Patients indicated their level of pain-related disability from 0 to 10, where 0 represented no disability and 10 indicated total disability (Tait & Chibnall, 2005; Tait, Chibnall, & Krause, 1990). The PDI has demonstrated good internal consistency and validity within chronic pain populations (Tait et al., 1990), and within sample of women with IC/BPS (Ginting et al., 2011; Katz et al., 2013). The Cronbach’s alpha for these items were 0.89.
Data Analysis

Initial Data Analyses

Univariate normality was assessed using boxplots, and multivariate normality was examined using Mahalanobis Distance. Attention was also given to missing data such that participants missing more than 25% on a particular measure were removed from the dataset (Tabachnick & Fidell, 2007). Participants who were missing less than 25% of a particular measure had the missing values imputed using means replacement, which is considered to be a conservative data management approach (Tabachnick & Fidell, 2007). Means of the missing variables were calculated from the available data and were used to replace the missing values. In general, a sample size of 200 is suggested for SEM analyses (Kline, 2005), which indicated that this study was sufficiently powered by analysis with the sample collected (N=217).

Steps of Building a Model

Model building methodology involves four steps, and provides a systematic framework from which hypotheses can be tested (Mulaik & Millsap, 2000). Step 1 was executed to determine the structure and composition of common factors through exploratory analyses followed by confirmatory analyses (step 2). These analyses provided the measurement model of the overall model to be evaluated. Within these steps, both exploratory and confirmatory approaches work together to empirically reduce a large amount of data and items into a smaller number of constructs. Step 3 was used to construct the overall specified model (i.e., structural model) using the results from steps 1 and 2, and then to evaluate individual hypotheses. The pathways as specified by the structural model were suggested to be both empirically and theoretically driven by the literature. The final and fourth step was to evaluate potential
alternative models and hypotheses for best fit. The following sections will review each of the steps in greater depth.

**Factor Analyses and Modeling**

There are a wide variety of statistical methodologies that are employed to reduce a number of items into meaningful factors. Researchers have to decide which fitting procedure to use (e.g., principal factor analysis, maximum-likelihood, principal axis factoring), the type of rotation (e.g., oblique versus orthogonal) as well as whether or not to use other methodologies such as the examination of the scree plot and eigenvalues greater than 1. It is beneficial for researchers to rely on multiple criteria to determine the appropriate number of factors (Fabrigar, Wegener, MacCallum, & Strathan, 1999). For the most methodologically rigorous approach, it is suggested to use exploratory factor analysis followed up by the use of confirmatory factor analysis using structural equation modeling. This study used both exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) to examine and confirm the structure and composition of the constructs within the model. To follow, step 1 will more specifically outline the procedures associated with the EFAs, and step 2 will describe the methodology associated with the CFAs. Step 3 employed structural equation modeling (SEM) to examine the model fit as well as the specified hypotheses within the overall model, and step 4 evaluated several alternative models.

**Step 1: Exploratory Factor Analyses**

The first step determined, through exploratory methods, the structure and composition of the common factors underlying the measured variables for impairments, illness perceptions,
coping and outcomes. To accomplish this, iterative maximum likelihood EFAs were run in SPSS 21 (IBM, 2010). The cutoff criteria for determining the number of factors within the model was an eigenvalue of one or greater, as well as inspection of the scree plot. The factor loadings were observed to examine the extent to which the items measured (from the questionnaire data) were related to the proposed factors, and greater factor loading values suggested that an item loaded strongly onto a specified construct. In contrast, items that had a factor loading of 0.32 or below on a specified factor were subsequently removed from analyses according to standard factor analytic procedures (Tabachnick & Fidell, 2007). The items were also examined on a conceptual basis to ensure that the factors were conceptually/theoretically grounded. In order to improve the interpretation of the factor loadings, an oblique rotation was applied. Rather than applying an orthogonal rotation, an oblique rotation accounted for the constructs being somewhat correlated (Tabachnick & Fidell, 2007). The extracted and rotated factor loadings were then interpreted and the constructs were named.

**Step 2: Confirmatory Factor Analyses**

The second step confirmed the results and evaluated the measurement models of the constructs developed in step one. This was accomplished by running CFAs using SEM in the program Mplus version 7 (Muthén & Muthén, 2014). Model fit indices and parameter estimates were inspected to evaluate the performance of the measurement models. In reviewing the parameter estimates there were three criteria of interest: a) the standardized pathway coefficients, b) the standard error values, and c) the statistical significance of the parameter estimates (Byrne, 2010).
The first criterion was the standardized path coefficient, which functioned as regression coefficients or factor loadings. The standardized path coefficient examined the extent to which the items measured (from the questionnaire data) were related to the latent proposed constructs. In this manner, higher standardized path coefficients suggested that the data had close fit and loaded strongly onto the specified construct. The second criterion was examining the standard errors, which reflected the precision with which a parameter (or path coefficient) had been estimated. More specifically, smaller standardized error values suggested accurate model estimation and ranged between 0 and 1 (Byrne, 2010), although no definitive criteria have been established (Joreskog & Sorbom, 1989). In general, a standard error value above 1 or equivalent to 0 is indicative of model misspecification. The final criterion was to examine statistical significance, which was measured at the probability level of 0.05 (Byrne, 2010).

Model fit was also examined using several indices. It is important to evaluate several different indices as various indices define fit in different ways, and it can be instructive to compare the performance of a model across these indices (Lei, 2007). It has been suggested that researchers rely on small set of indices of fit, and these indices should be selected on the basis of their performance in detecting errors in model specification and in terms of their conceptual properties. To determine the performance of the model in terms of model fit, the Chi-square index, as well as one absolute fit index and one incremental fit index were evaluated.

The chi-square statistic is a likelihood ratio that compares the fitted model with a saturated model that fits the data perfectly. According to the chi-square statistic, a good fitting model will have a small chi-square value and a non-significant probability value. While the chi-square statistic of model fit is widely used, it is also sensitive to statistical issues. Due to the chi-square statistic being sensitive to sample size, in large samples it is difficult to find any
parsimonious model that passes the criteria of the test. More specifically, finding a well-fitting hypothesized model using the chi-square statistic is unrealistic in most SEM empirical research (Byrne, 2010). In light of this sensitivity, absolute and incremental fit indices were also evaluated and the chi-square statistic was interpreted with caution.

Absolute fit indices attempt to quantify the discrepancy between the model and the data without any reference to a comparison point. Conversely, incremental fit indices quantify the discrepancy between a proposed model and the data relative to a comparison model. The comparison model is the null model in which all of the measured variables have variances but there are no covariances amongst these measured variables, indicating no structure underlying the data (Byrne, 2010). The Root Mean Square Error of Approximation (RMSEA), including the Confidence Intervals (CI) and significance value, was used as an index of absolute fit. The RMSEA index has been recognized as one of the most informative criteria in SEM as it is sensitive to model misspecifications and can yield appropriate conclusions regarding model quality (Hu & Bentler, 1998; MacCallum & Austin, 2000). More specifically, the RMSEA index ranges from zero to one with values less than 0.050 indicating close fit, from 0.051 to 0.080 indicating acceptable fit, from 0.081 to 0.100 indicating mediocre fit and values greater than 0.100 indicating unacceptable fit. These defined ranges were used to describe model fit throughout this dissertation. Furthermore, the 90% confidence intervals were reported along with the RMSEA significance value. The null hypothesis is that the RMSEA value will be 0.05 indicating a close-fitting model, thus if the significance value was less than 0.05, it was concluded that the fit of the model was close (Byrne, 2010; Kenny, 2010).

The Comparative Fit Index (CFI) was used to assess the incremental model fit. While there are numerous incremental fit indices that have been developed, some argue that the CFI
should be the index of choice as it takes sample size into account (Bentler, 1990). The CFI ranges from zero to one, with a value between 0.90 and 0.95 indicating acceptable fit, and a value above 0.95 indicating a good fitting model (Byrne, 2010; Kenny, 2010).

After the model fit indices had been evaluated, the modification indices were reviewed, and any changes that were made to the model were based on a theoretical rationale. Modification indices are a statistic that estimates the potential improvement in data-model fit if a previously fixed parameter were to be estimated (Mueller & Hancock, 2007). For example, the modification indices can be conceptualized as a chi-square statistic with one degree of freedom. The modification indices specify the value of the expected overall drop in chi-square if the parameter were to be freely estimated (Tabachnick & Fidell, 2007). More specifically, if all of the parameters were allowed to be freely estimated, the modification indices would have a value of 0 (Byrne, 2010).

One of the potential modifications to the post-hoc model fitting procedure was the correlation of error terms. Variance within the model that is not explained by the specified constructs may covary across two measures. Such covariance is referred to as correlated error. Although correlating error terms may lead to model over-fitting in some situations, it can make strong substantive sense, especially in psychological research where the measures are often correlated and non-orthogonal, and therefore should be included in the model (Byrne, 2010; Joreskog & Sorbom, 1989). After applying such modifications to the model, the model fit indices were once again evaluated. A model was considered to be better fitting to the data as the model fit indices improved [i.e., as the chi-square statistic decreases significantly (as calculated by the chi-square difference test), the CFI approximated 1.0 and the RMSEA approximated 0.0].
**Step 3: Structural Equation Modeling**

Step 3 of the data analysis section was based on the results of the measurement models (i.e., the EFAs from step 1 and the CFAs from step 2). The model was constructed to allow for a saturated model in which the constructs had linear pathways moving from left to right as suggested by the general SRM of chronic illness. Using the same SEM procedures as in step 2, the model’s performance was evaluated according to model fit indices (chi-square, CFI and RMSEA) and parameter estimates (standardized path coefficients, standard errors and significance values). After the model fit indices were evaluated, the modification indices were reviewed. After any modifications, the model fit indices were once again evaluated (as stated in the procedures of step 2). The final set of analyses was to evaluate each of the previously specified pathways as based on empirical and theoretical rationale.

**Step 4: Alternative Models**

A final step of model building was to evaluate several potential alternative models. Analyzing several competing models and comparing the results can increase the methodological reliability and demonstrate the robustness of the originally proposed model (Byrne, 2010). Although the original model may fit the data well, there might be competing models based on alternative theories and hypotheses that might better explain the observed relationships and should be examined. The chi-square difference test was unrealistic to use as a method of evaluating alternative models due its statistical biases. As such, a more practical method was the CFI difference approach (Byrne, 2010). If the change in CFI does not exceed the value of 0.001, the two models being compared were not considered to be significantly different. In other words, the two models were considered to be empirically invariant of each other in regards to factor
loadings, structural paths, factor covariances, factor residual variances and measurement error variances. A positive change greater than 0.001 in the CFI value was indicative of a better fitting model, while a negative change greater than 0.001 was indicative of a worse fitting model.
Chapter 3

Results

Participants

Overall, 293 patients were approached to participate in the study, in which 262 consented to participate. Twenty-three participants did not return questionnaire packages, and 17 participants were considered attrition for reasons such as no confirmation of IC/BPS diagnosis, further medical complications, or the participants did not think the questionnaires fit with their experiences. Of the 222 participants, 5 were excluded due to greater than 25% missing data. The final dataset consisted of 217 participants.

Table 1 includes sample demographics for this study. The data were consistent with other North American samples of women diagnosed with IC/BPS in relation to demographic variables such as age (mean = 49.52 ± 15.53 years), partner status (62.7%) and length of diagnosis (mean = 8.09 ± 8.27 years) (Clemens et al., 2008; Nickel et al., 2010; Tripp et al., 2009). The data were also comparable to other published clinical North American IC/BPS samples in regards to ratings of disease activity (Clemens et al., 2008; Nickel et al., 2010; Tripp et al., 2009). In this study, the sample reported symptoms and bother consistent with patients experiencing active disease, qualified when total scores are above 6.0, IC/BPS symptoms (ICSI: mean = 12.66 ± 4.19), IC/BPS bother (ICPI: mean = 10.72 ± 3.67) (O’Leary, Sant, Fowler, Whitmore, & Spolarich-Kroll, 1997). The pain ratings reported by this sample (total MPQ score: mean = 17.12 ± 11.13) were comparable to post-herpetic neuralgia, musculoskeletal and spinal cord injury pain populations according to total MPQ scores (Katz & Melzack, 2011).
Preliminary analyses were employed to evaluate whether the demographic factors were significant as key variables or as potential covariates within the overall model. Chi-square cross-tabulations were employed to determine if the categorical demographic variables had an effect on total pain, IC symptoms and IC problems. Results demonstrated that employment status did not have an effect on total pain ($\chi^2 = 196.14, p = 0.07$), IC symptoms ($\chi^2 = 73.45, p = 0.43$) or IC problems ($\chi^2 = 67.15, p = 0.37$). Similarly, education did not have an effect on total pain ($\chi^2 = 188.88, p = 0.13$), IC symptoms ($\chi^2 = 92.77, p = 0.07$) or IC problems ($\chi^2 = 63.41, p = 0.50$).

Three regression analyses were employed to examine if age and length of diagnosis were predictive of total pain, IC symptoms and IC problems. Results demonstrated that age ($\beta = -0.25, p < 0.01$) was a significant predictor of total pain, while length of diagnosis ($\beta = 0.02, p = 0.81$) was not ($F = 0.24, p = 0.05$). Regressions predicting IC symptoms ($F = 1.83, p = 0.16$) and IC problems ($F = 1.97, p = 0.14$) did not demonstrate age and length of diagnosis to be significant predictors. In sum, out of all of the preliminary analyses that were employed to examine the demographic variables as potential covariates, only one analysis was significant (where $p = 0.05$). More specifically, age was only found to be predictive of total pain, and not IC symptoms and IC problems (the other two indicators that comprise the construct of impairments). As such, no demographic variables were considered as potential covariates within the overall model.
Table 1

*Sample demographics*

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (N = 217)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>49.52 ± 15.53</td>
</tr>
<tr>
<td>Range</td>
<td>20.00 – 85.00</td>
</tr>
<tr>
<td><strong>Ethnicity N (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>207 (95.4%)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (4.6%)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>42 (19.4%)</td>
</tr>
<tr>
<td>University / College</td>
<td>127 (58.5%)</td>
</tr>
<tr>
<td>Graduate / Professional</td>
<td>45 (20.7%)</td>
</tr>
<tr>
<td><strong>Married N (%)</strong></td>
<td>136 (62.7%)</td>
</tr>
<tr>
<td><strong>Employment N (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>95 (43.8%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>24 (11.1%)</td>
</tr>
<tr>
<td>Retired</td>
<td>50 (23.0%)</td>
</tr>
<tr>
<td>Disabled</td>
<td>39 (18.0%)</td>
</tr>
<tr>
<td>Student</td>
<td>7 (3.2%)</td>
</tr>
<tr>
<td><strong>Time since diagnosis (years)</strong></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>8.09 ± 8.27</td>
</tr>
<tr>
<td>Range</td>
<td>0 – 60.00</td>
</tr>
</tbody>
</table>
Initial Data Cleaning

Of the 222 participants, 5 were excluded due to greater than 25% missing data in which analyses revealed that the data was found to be missing at random. Overall, the dataset consisted of 217 participants. The data were examined with attention to missing data as well as univariate and multivariate outliers. Boxplots were evaluated to assess univariate normality. One case for IC symptoms was found to be a significant outlier, and as such the value was replaced with the mean. As discussed in the data analysis section, means replacement was employed as it is considered to be a conservative data management approach to missing values and outliers that does not require data transformations, especially given that only one value was replaced (Tabachnick & Fidell, 2007). Furthermore, this value was the only value out of range considered to be a statistical outlier for this case. Timeline perceptions had 9 outliers, but in reviewing the data points this was assumed to be meaningful and reflective of individual’s responses about their perceptions and as such those values were not replaced (Tabachnick & Fidell, 2007). No other items or subscores were found to have any statistical outliers or univariate normality. Multivariate normality was also assessed using Mahalonobis Distance, in which no statistical multivariate outliers were found (Tabachnick & Fidell, 2007).

Composition of the Underlying Constructs

Impairments

Step 1: Exploratory Factor Analysis of Impairments

A maximum-likelihood – EFA was employed to examine the measures distinctiveness for IC/BPS symptoms, problems, and patient pain. Results yielded a one-factor model for
impairments explaining 70.56% of the total variance, $\chi^2 (2, N = 217) = 114.76, p < 0.01$, as did the scree plot. The factor included symptoms associated with IC/BPS (ICSI), bother associated with IC/BPS (ICPI), sensory pain (MPQ) and affective pain (MPQ), and the factor loading values ranged from 0.92 – 0.59 (see Table 2). The factor name of impairments was supported by the fact that pain, symptoms and bother are considered to be the initiating indicators and are characteristic of the symptom profile in IC/BPS.

<table>
<thead>
<tr>
<th>Impairments</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC symptoms</td>
<td>0.92</td>
</tr>
<tr>
<td>IC problems</td>
<td>0.89</td>
</tr>
<tr>
<td>Sensory pain</td>
<td>0.62</td>
</tr>
<tr>
<td>Affective pain</td>
<td>0.59</td>
</tr>
</tbody>
</table>

**Step 2: Confirmatory Factor Analysis of Impairments**

Confirmatory factor analysis was employed to confirm the measurement model of the construct of impairments using SEM. Initially the one-factor solution had acceptable fit to the data according to the fit indices, $\chi^2 (2, N = 217) = 116.82, p < 0.01; CFI = 0.78; RMSEA = 0.51$ (90% CI: 0.44, 0.60, $p < 0.01$). After inspection of the modification indices, the error terms for
IC/BPS symptoms and IC/BPS problems were correlated (Joreskog & Sorbom, 1989). An examination of the remaining modification indices indicated that correlating the error terms between affective and sensory pain would also improve the model, however given the number of parameters available within the model, this would lead to an over-specified model. As such, the error terms for IC/BPS symptoms and problems were correlated as that would lead to the greatest increase in model fit. With this modification the measurement model for impairments provided an improved fit to the data, $\chi^2(1, N = 217) = 0.51, p = 0.50$; CFI = 1.00; RMSEA < 0.01 (90% CI: 0.00, 0.02, $p = 0.58$). This was determined according to the following changes in model fit: a significant chi-square difference test, $\chi^2(1, N = 217) = 116.31, p < 0.01$, an increased CFI and a decreased RMSEA. The standardized path coefficients, standard errors, significance values and the correlated error term for the measurement model of impairments are recorded in Table 3, and displayed in Figure 3. The construction of this factor indicated that the higher the score the more impairment as reported by the patient.
Table 3

Measurement Model of Impairments – Confirmatory Factor Analysis Standardized Parameter Estimates and Values

<table>
<thead>
<tr>
<th>Direct pathways between indicators and impairments</th>
<th>Standardized Path Coefficient</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSI</td>
<td>0.94</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>ICPI</td>
<td>0.89</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Sensory pain</td>
<td>0.57</td>
<td>0.05</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Affective pain</td>
<td>0.55</td>
<td>0.05</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

| Correlation between error variances                |                               |                |       |
| Sensory pain with affective pain                   | 0.66                          | 0.04           | < 0.01|

Note. ICSI – Interstitial Cystitis Symptom Index; ICPI – Interstitial Cystitis Problem Index

![Diagram of Impairments]

Figure 3. Measurement Model of Impairments

Note. ** p < 0.01
Illness Perceptions

Step 1: Exploratory Factor Analysis of Illness Perceptions

In preliminary analyses and review of the correlations between the items within the B-IPQ, the item for illness comprehension did not fit with the other items of the scale. More specifically, illness comprehension was not significantly correlated with the other items (correlation values ranging from < 0.01 to 0.22), and was descriptively lower than the means of the other items. As such, the item for illness comprehension was excluded from the remaining factor reduction processes.

A Maximum Likelihood – EFA was run on the remaining items from the B-IPQ to determine the structure and composition of illness representations. Results yielded a 2-factor solution explaining 63.62% of the total variance, $\chi^2 (8, N = 217) = 21.50, p < 0.01$, as did the scree plot. In review of the factor loadings, the value for timeline was below the cut-off criteria of 0.32 on both factors 1 (0.29) and 2 (0.20) (Tabachnick & Fidell, 2007). As such, this item was removed and the factor analysis was rerun. Results yielded a 2-factor solution explaining 72.20% of the total variance, $\chi^2 (4, N = 217) = 15.67, p < 0.01$. The first factor consisted of the items for consequences, concern, identity and emotions, and was named cognitive-emotional perceptions. In this factor, the factor loadings ranged from 0.90 – 0.73 (see Table 4). The second factor consisted of the indicators treatment control and personal control (with factor loadings ranging from 0.83 – 0.54), and was named control perceptions (see Table 4). The factors of control perceptions and cognitive-emotional perceptions were correlated with each other at the level of $r = -0.34$. 

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Table 4

*Estimated Factor Loadings for the Measured Variables Associated with Illness Perceptions from the Exploratory Factor Analysis*

<table>
<thead>
<tr>
<th>Cognitive-emotional perceptions</th>
<th>Control perceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>0.90</td>
</tr>
<tr>
<td>Concern</td>
<td>0.77</td>
</tr>
<tr>
<td>Identity</td>
<td>0.73</td>
</tr>
<tr>
<td>Emotions</td>
<td>0.77</td>
</tr>
<tr>
<td>Treatment control</td>
<td>-0.18</td>
</tr>
<tr>
<td>Personal control</td>
<td>-0.32</td>
</tr>
</tbody>
</table>

**Step 2: Confirmatory Factor Analysis of Illness Perceptions**

The second step was to employ CFA to confirm the measurement model of the construct of illness perceptions using SEM. The two-factor solution produced a good/acceptable fit according to the fit indices, $\chi^2 (8, N = 217) = 18.80, p = 0.02; \text{CFI} = 0.98; \text{RMSEA} = 0.07$ (90% CI: 0.03, 0.12, $p = 0.13$). No further modifications were suggested according to the modification indices. The standardized path coefficients, standard errors and significance values for the measurement model of impairments are described in Table 5, and the measurement model is displayed in Figure 4. The construction of the control perception factor indicated that the higher the score the more control an individual perceived over their illness. Conversely, a greater cognitive-emotional score indicated more negative cognitive and emotional perceptions about one’s illness.
Table 5

*Measurement Model of Illness Perceptions – Confirmatory Factor Analysis Standardized Parameter Estimates and Values*

<table>
<thead>
<tr>
<th></th>
<th>Standardized Path Coefficients</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct pathways between indicators and control perceptions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal control</td>
<td>0.86</td>
<td>0.14</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Treatment control</td>
<td>0.51</td>
<td>0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td><strong>Direct pathways between indicators and cognitive-emotional perceptions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consequences</td>
<td>0.90</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Identity</td>
<td>0.75</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Concern</td>
<td>0.75</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Emotions</td>
<td>0.77</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td><strong>Correlation between constructs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control perceptions and cognitive-emotional perceptions</td>
<td>-0.37</td>
<td>0.09</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>
Figure 4. Measurement Model of Illness Perceptions

Note. ** p < 0.01

Coping

Step 1: Exploratory Factor Analysis of Coping Variables

A Maximum Likelihood – EFA was employed to determine the structure and composition of the illness and wellness-focused coping from the items on the CPCI. The EFA yielded a 2-factor model explaining 54.56% of the total variance, \( \chi^2 (13, N = 217) = 25.96, p = 0.02 \), and a scree-plot also confirmed this 2-factor solution. In review of the factor loadings, the values for task persistence were below the cutoff criteria of 0.32 on both factors 1 (0.21) and 2 (0.29) (Tabachnick & Fidell, 2007). The item for task persistence was removed, and the EFA was rerun. Results yielded a 2-factor solution explaining 59.31% of the total variance, \( \chi^2 (8, N = 217) = 20.11, p = 0.01 \). Once again, review of the factor loadings demonstrated the item of seeking social support to be below the cutoff criteria of 0.32 on both factors 1 (0.28) and 2 (0.18).
(Tabachnick & Fidell, 2007). As such, the item for seeking social support was removed, and the EFA was rerun. Results yielded a 2-factor solution explaining 65.70% of the total variance, $\chi^2(4, N = 217) = 1.72, p = 0.79$, along with appropriate factor loading values.

The first factor consisted of the indicators guarding, resting and asking for assistance, and produced factor loadings that ranged from 0.97 – 0.61 (see Table 6). All of these items reflected an individual’s behaviourally passive attempt to cope with illness and pain, this factor was named illness-focused coping (IFC). The second factor produced factor loadings that ranged from 0.63 – 0.33, and consisted of the indicators: exercising/stretching, relaxation and coping self-statements. This factor was named wellness-focused coping (WFC) due to the items reflecting an individual’s active attempts to adaptively cope with pain and symptoms (see Table 6). IFC and WFC were correlated at the $r = 0.30$ level.

<table>
<thead>
<tr>
<th>Illness-Focused Coping</th>
<th>Wellness-Focused Coping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guarding</td>
<td>0.97</td>
</tr>
<tr>
<td>Resting</td>
<td>0.80</td>
</tr>
<tr>
<td>Asking for assistance</td>
<td>0.61</td>
</tr>
<tr>
<td>Exercising/stretching</td>
<td>-0.16</td>
</tr>
<tr>
<td>Relaxing</td>
<td>0.23</td>
</tr>
<tr>
<td>Coping self-statements</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Table 6

*Estimated Factor Loadings for the Measured Variables Associated with Illness and Wellness-Focused Coping from the Exploratory Factor Analysis*
A Maximum Likelihood – EFA was also run to determine the structure and composition of the factors underlying processes for emotion regulation. The EFA yielded a one-factor solution explaining 45.93% of the total variance, $\chi^2 (5, N = 217) = 4.71, p = 0.45$. A scree-plot also confirmed this one-factor model. In review of the factor loadings, the value for suppression (0.21) was below the cut-off value of 0.32 (Tabachnick & Fidell, 2007). As such, this item was removed and the factor analysis was rerun. Results yielded a 1-factor solution explaining 56.09% of the total variance, $\chi^2 (2, N = 217) = 2.00, p = 0.37$. The factor included the indicators catastrophizing (PCS), reappraisal (ERQ), activities engagement (CPAQ) and pain willingness (CPAQ), and the factor loadings ranged from 0.77 – 0.35 (see Table 7). This factor was named emotion regulation as the indicators represent empirically defined strategies that individuals use as emotion regulation skills to cope with chronic illness.

Table 7

*Estimated Factor Loadings for the Measured Variables Associated underlying Emotion Regulation from the Exploratory Factor Analysis*

<table>
<thead>
<tr>
<th>Emotion Regulation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophizing</td>
<td>-0.77</td>
</tr>
<tr>
<td>Pain willingness</td>
<td>0.72</td>
</tr>
<tr>
<td>Activities engagement</td>
<td>0.72</td>
</tr>
<tr>
<td>Reappraisal</td>
<td>0.35</td>
</tr>
</tbody>
</table>
**Step 2: Confirmatory Factor Analysis of Coping Variables**

Confirmatory Factor Analysis was employed to confirm the measurement model of IFC, WFC and emotion regulation using SEM. Initially, the solution produced a model that had good/mediocre fit to the data, $\chi^2(31, N = 217) = 92.16, p < 0.01; \text{CFI} = 0.91; \text{RMSEA} = 0.09$ (90% CI: 0.07, 0.12, $p < 0.01$). In review of the model parameter estimates and modification indices, relaxing was found to have a similar relationship to both WFC and emotion regulation. When two indicators are found to have similar factor loadings onto two constructs, they are often allowed to have the associated variance freely vary between such constructs if it is theoretically justifiable (Allison, 2014). It is reasonable that relaxation is adaptive in treatment and may be conceptualized both as a behavioural wellness-focused strategy as well as an emotion regulation strategy. For example, relaxation might be a helpful behavioural strategy in pain management, however when relaxation is overused, it might be conceptualized as a sedentary and avoidant strategy consistent with poor emotion regulation. Thus, relaxation was allowed to co-vary between WFC and emotion regulation. In review of the modification indices, several error terms were correlated (see Table 8; Joreskog & Sorbom, 1989). These modifications produced a solution with close/acceptable fit to the data, $\chi^2(28, N = 217) = 54.32, p < 0.01; \text{CFI} = 0.96; \text{RMSEA} = 0.06$ (90% CI: 0.03, 0.09, $p = 0.32$). The modifications also produced significant changes in the model fit from the previous step: a significant chi-square difference test, $\chi^2(2, N = 217) = 37.84, p < 0.01$, an increased CFI and a decreased RMSEA. No further modifications were suggested according to the modification indices. See Table 8 for more detailed standardized path coefficients, standard errors and significance values, and Figure 5 for a depiction of the measurement model. The correlated error variances are listed in Table 8, and displayed within Figure 5.

The construction of IFC indicated that the higher the score, the more maladaptive
behavioural strategies an individual engaged in. Similarly, the construction of WFC indicated that the higher the score, the more adaptive behavioural strategies an individual engaged in. Lastly, the construction of the emotion regulation factor indicated that the higher the score, the more maladaptive emotion regulation strategies an individual employed.
<table>
<thead>
<tr>
<th></th>
<th>Standardized Path Coefficients</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct pathways between indicators and IFC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guarding</td>
<td>0.90</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Resting</td>
<td>0.84</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Asking for assistance</td>
<td>0.65</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td><strong>Direct pathways between indicators and WFC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxing</td>
<td>0.84</td>
<td>0.11</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Exercising/stretching</td>
<td>0.47</td>
<td>0.08</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Coping self-statements</td>
<td>0.32</td>
<td>0.08</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td><strong>Direct pathways between indicators and emotion regulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>0.73</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Activities engagement</td>
<td>-0.75</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Pain willingness</td>
<td>-0.74</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Reappraisal</td>
<td>-0.35</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Relaxing</td>
<td>0.40</td>
<td>0.12</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

**Correlation between constructs**

<table>
<thead>
<tr>
<th></th>
<th>Standardized Path Coefficients</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFC and IFC</td>
<td>0.19</td>
<td>0.11</td>
<td>0.09</td>
</tr>
<tr>
<td>Emotion regulation and IFC</td>
<td>0.53</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Emotion regulation and WFC</td>
<td>-0.17</td>
<td>0.15</td>
<td>0.24</td>
</tr>
</tbody>
</table>

**Correlation between error variances**

<table>
<thead>
<tr>
<th></th>
<th>Standardized Path Coefficients</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reappraisal with coping self-statements</td>
<td>-0.27</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Activity engagement with coping self-statements</td>
<td>0.28</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

*Note. IFC: Illness-focused coping; WFC: Wellness-focused coping*
Outcomes

Step 1: Exploratory Factor Analysis of Outcome Variables

A Maximum Likelihood – EFA to determine the structure and composition of the outcome variables yielded a 2-factor solution explaining 63.61% of the total variance, $\chi^2 (53, N = 216) = 137.47, p < 0.01$. Inspection of the scree plot also suggested a 2-factor solution. The first factor consisted of the indicators family/home responsibilities, recreational activities, occupation, social activities, self-care, sexual behaviour and life support activities (all from the PDI). This factor was named physical disability, as it measured the physical and behavioural disengagement from various life roles, and the factor loadings that ranged from 0.97 – 0.34 (see Table 9). The
second factor was named mental health outcomes as it consisted of the indicators optimism (LOT-R), negative affect (PANAS), pessimism (LOT-R), depression (PHQ-9), positive affect (PANAS) and satisfaction with life (SWLS). Mental health outcomes had factor loadings that ranged from 0.88 – 0.65 (see Table 9). The factors of mental health and physical disability were correlated at $r = -0.55$.

Table 9
*Estimated Factor Loadings for the Measured Variables Associated underlying Outcome Variables from the Exploratory Factor Analysis*

<table>
<thead>
<tr>
<th></th>
<th>Physical Disability</th>
<th>Mental Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family/home responsibilities</td>
<td>0.97</td>
<td>0.11</td>
</tr>
<tr>
<td>Recreation</td>
<td>0.95</td>
<td>0.06</td>
</tr>
<tr>
<td>Occupation</td>
<td>0.91</td>
<td>0.03</td>
</tr>
<tr>
<td>Social activities</td>
<td>0.88</td>
<td>-0.02</td>
</tr>
<tr>
<td>Self-care</td>
<td>0.56</td>
<td>-0.11</td>
</tr>
<tr>
<td>Sexual behaviour</td>
<td>0.39</td>
<td>-0.04</td>
</tr>
<tr>
<td>Life-support</td>
<td>0.34</td>
<td>-0.20</td>
</tr>
<tr>
<td>Optimism</td>
<td>0.16</td>
<td>0.88</td>
</tr>
<tr>
<td>Negative affect</td>
<td>0.04</td>
<td>-0.74</td>
</tr>
<tr>
<td>Pessimism</td>
<td>0.01</td>
<td>-0.74</td>
</tr>
<tr>
<td>Depression</td>
<td>0.22</td>
<td>-0.73</td>
</tr>
<tr>
<td>Positive affect</td>
<td>-0.02</td>
<td>0.70</td>
</tr>
<tr>
<td>Satisfaction with life</td>
<td>-0.09</td>
<td>0.65</td>
</tr>
</tbody>
</table>
Step 2: Confirmatory Factor Analysis of Outcome Variables

A CFA was employed to confirm the measurement model of the outcome constructs using SEM. Initially the 2-factor solution produced a mediocre fit to the data, $\chi^2 (64, N = 216) = 187.79, p < 0.01$; CFI = 0.93; RMSEA = 0.10 (90% CI: 0.08, 0.11, $p < 0.01$). In review of the model parameter estimates and modification indices, depression was allowed to vary freely between both mental health and physical disability (Allison, 2014), and improved the model fit, $\chi^2 (63, N = 216) = 169.86, p < 0.01$; CFI = 0.94; RMSEA = 0.09 (90% CI: 0.07, 0.11, $p < 0.01$). This was determined according to the following changes in model fit: a significant chi-square difference test, $\chi^2 (1, N = 217) = 17.93, p < 0.01$, an increased CFI and a decreased RMSEA.

After inspection of the modification indices, several error terms were allowed to correlate (see Table 10; Joreskog & Sorbom, 1989). With these modifications, the measurement model for mental health and physical disability had good fit to the data, $\chi^2 (58, N = 216) = 77.28, p = 0.05$; CFI = 0.99; RMSEA = 0.04 (90% CI: <0.01, 0.06, $p = 0.78$). These model changes significantly improved the model fit in comparison to the previous step, and this was determined according to the following changes: a significant chi-square difference test, $\chi^2 (5, N = 217) = 92.58, p < 0.01$, an increased CFI and a decreased RMSEA. An examination of the remaining modification indices indicated that even though further modifications would continue to slightly improve fit, none of the suggested modifications were theoretically justifiable. Thus, no further modifications to the measurement model were completed.

The parameter estimates for the measurement model of outcomes are displayed in Figure 6. See Table 10 for a more detailed description of the model estimates and values (standardized pathway coefficients, standard errors and significance values). The correlated error variances are listed in Table 10, and displayed within Figure 6. The construction of mental health outcomes

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indicated that a higher score was representative of better mental health and well-being.

Conversely, a higher physical disability outcome score was representative of greater reports of physical disability.
Table 10
Measurement Model of Outcomes – Confirmatory Factor Analysis Standardized Parameter Estimates and Values

<table>
<thead>
<tr>
<th></th>
<th>Standardized Path Coefficients</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct pathways between indicators and disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family/home responsibilities</td>
<td>0.91</td>
<td>0.02</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Recreation</td>
<td>0.92</td>
<td>0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Social</td>
<td>0.92</td>
<td>0.02</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Occupation</td>
<td>0.87</td>
<td>0.02</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Sexual behaviour</td>
<td>0.43</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Self-care</td>
<td>0.62</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Life support</td>
<td>0.45</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Depression</td>
<td>0.21</td>
<td>0.05</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Direct pathways between indicators and mental health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimism</td>
<td>0.74</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Pessimism</td>
<td>-0.71</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.71</td>
<td>0.05</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Satisfaction with life</td>
<td>0.73</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Negative affect</td>
<td>-0.73</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Positive affect</td>
<td>0.72</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Correlation between constructs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental health and disability</td>
<td>-0.53</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Correlation between error variances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pessimism with optimism</td>
<td>-0.38</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Negative affect with depression</td>
<td>0.37</td>
<td>0.08</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Life support with self-care</td>
<td>0.34</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Social with family/home responsiblities</td>
<td>-0.35</td>
<td>0.14</td>
<td>0.01</td>
</tr>
<tr>
<td>Occupation with family/home responsiblities</td>
<td>0.23</td>
<td>0.10</td>
<td>0.03</td>
</tr>
</tbody>
</table>
Step 3: Structural Equation Modeling

The third step was to employ SEM to construct and evaluate the model based on the results from steps 1 and 2. The initial model had acceptable fit to the data, $\chi^2 (469, N = 216) = 1004.94, p < 0.01; \text{CFI} = 0.88; \text{RMSEA} = 0.07 \ (90\% \ CI: 0.06, 0.07, p < 0.01)$. In reviewing the parameter estimates, catastrophizing had similar variance towards both emotion regulation and cognitive-emotional perceptions, and was allowed to co-vary between the constructs (Allison, 2014), which improved the model fit, $\chi^2 (468, N = 216) = 974.66, p < 0.01; \text{CFI} = 0.89; \text{RMSEA}$
= 0.07 (90% CI: 0.06, 0.07, \( p < 0.01 \)). This model change significantly improved the model fit, determined according to the following: a significant chi-square difference test, \( \chi^2 (1, N = 216) = 30.28, p < 0.01 \), and an increased CFI, although the RMSEA remained the same. After inspection of the modification indices, error variances were allowed to correlate (see Table 11; Joreskog & Sorbom, 1989), and with these modifications, the proposed IC-SRM model had close fit to the data, \( \chi^2 (456, N = 216) = 717.32, p < 0.01 \); CFI = 0.94; RMSEA = 0.05 (90% CI: 0.04, 0.06, \( p = 0.36 \)). This modified model change significantly improved the model fit, determined according to the following: a significant chi-square difference test, \( \chi^2 (12, N = 217) = 257.34, p < 0.01 \), an increased CFI and a decreased RMSEA. An examination of the remaining modification indices indicated that even though further modifications would continue to slightly improve fit, none of the suggested modifications were theoretically justifiable. Thus, no further modifications to the measurement model were completed. The parameter estimates (standardized path coefficients, standard errors and significance values) for the final structural model of the IC-SRM are displayed in Figure 7, and detailed in Table 11.
Table 11

Structured Model of the Self-Regulatory Model of Coping with IC/BPS – Standardized Parameter Estimates and Values

<table>
<thead>
<tr>
<th>Direct pathways between constructs</th>
<th>Standardized Path Coefficient</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control perceptions on impairments</td>
<td>-0.42</td>
<td>0.08</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Cognitive-emotional perceptions on impairments</td>
<td>0.86</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>WFC on control perceptions</td>
<td>0.40</td>
<td>0.12</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>WFC ON cognitive-emotional perceptions</td>
<td>0.22</td>
<td>0.11</td>
<td>0.05</td>
</tr>
<tr>
<td>IFC on control perceptions</td>
<td>0.07</td>
<td>0.09</td>
<td>0.46</td>
</tr>
<tr>
<td>IFC on cognitive-emotional perceptions</td>
<td>0.45</td>
<td>0.08</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Emotion regulation on control perceptions</td>
<td>0.04</td>
<td>0.08</td>
<td>0.46</td>
</tr>
<tr>
<td>Emotion regulation on cognitive-emotional perceptions</td>
<td>0.70</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Disability on WFC</td>
<td>-0.06</td>
<td>0.06</td>
<td>0.31</td>
</tr>
<tr>
<td>Disability on IFC</td>
<td>0.28</td>
<td>0.09</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Disability on emotion regulation</td>
<td>0.68</td>
<td>0.12</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Mental health on WFC</td>
<td>0.42</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Mental health on IFC</td>
<td>-0.05</td>
<td>0.09</td>
<td>0.54</td>
</tr>
<tr>
<td>Mental health on emotion regulation</td>
<td>-0.64</td>
<td>0.09</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Correlation between endogenous variables

| Mental health and disability                                           | -0.19                         | 0.07           | 0.01    |

Correlations between error variances

<p>| Reappraisal with WFC                                                   | 0.63                          | 0.09           | &lt; 0.01  |
| Activities engagement with WFC                                         | 0.64                          | 0.14           | &lt; 0.01  |
| Negative affect with impairments                                       | 0.50                          | 0.07           | &lt; 0.01  |
| Consequences with disability                                           | 0.42                          | 0.08           | &lt; 0.01  |
| Emotion regulation with IFC                                            | 0.47                          | 0.08           | &lt; 0.01  |
| Disability with emotion regulation                                     | -0.38                         | 0.12           | &lt; 0.01  |
| Depression with impairments                                            | 0.49                          | 0.08           | &lt; 0.01  |
| Sensory pain with affective pain                                       | 0.56                          | 0.06           | &lt; 0.01  |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pessimism with optimism</td>
<td>-0.39</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Negative affect with depression</td>
<td>0.43</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Negative affect with catastrophizing</td>
<td>0.16</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Social activities with family/home responsibilities</td>
<td>-0.36</td>
<td>0.12</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Occupation with family/home responsibilities</td>
<td>0.22</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>IC symptoms with IC problems</td>
<td>0.71</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Emotions and identity</td>
<td>-0.19</td>
<td>0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>Exercising/stretching with relax</td>
<td>0.33</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Catastrophizing with emotions</td>
<td>0.19</td>
<td>0.08</td>
<td>0.03</td>
</tr>
<tr>
<td>Life support with self-care</td>
<td>0.34</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Identity with IC symptoms</td>
<td>0.48</td>
<td>0.06</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Identity with IC problems</td>
<td>0.34</td>
<td>0.07</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>
Figure 7. Structural Model of the Self-Regulatory Model of Coping with IC/BPS

Note. Cog-Emo: Cognitive-Emotional; IFC: Illness-Focused Coping; WFC: Wellness-Focused Coping; ** p < 0.01, ** p < 0.05

Step 4: Alternative Models

Several alternative models to the originally constructed IC-SRM (see Figure 11) were suggested based on hypotheses from theoretical conceptualizations of coping with chronic illness and pain. The first alternative model evaluated fit to the data with the specified pathways run in reverse in order to evaluate the directionality of the relationships according to the general SRM of chronic illness. The second alternative model included a feedback loop between mental health and impairments, as suggested by the general SRM of chronic illness. The third alternative model included a feedback loop between physical disability and impairments, as suggested by the fear-avoidance model of pain. The fourth alternative model represented the best fitting model, and only included specified pathways that were found to be significant for the purpose of parsimony. The model fit indices are listed in Table 12 for the comparison of the models.
### Table 12

*Comparison of Model Fit Indices for Alternative Models*

<table>
<thead>
<tr>
<th>Model</th>
<th>CFI</th>
<th>CFI Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original IC-SRM</td>
<td>0.922</td>
<td>---</td>
</tr>
<tr>
<td>Alternative Model 1</td>
<td>0.914</td>
<td>-0.008*</td>
</tr>
<tr>
<td>Alternative Model 2</td>
<td>0.922</td>
<td>0</td>
</tr>
<tr>
<td>Alternative Model 3</td>
<td>0.926</td>
<td>0.004*</td>
</tr>
<tr>
<td>Alternative Model 4</td>
<td>0.926</td>
<td>0.004*</td>
</tr>
</tbody>
</table>

*Note. CFI Difference represents the difference test between the Alternative Model and the Original IC-SRM Model; * indicates a significant difference of CFI > 0.001*

---

**Alternative Model 1**

The first alternative model examined the model fit with the pathways of the IC-SRM in reverse (see Figure 8 for the pathway diagram of Alternative Model 1, and Table 12 for the model fit indices). Running a model with the pathways in reverse is a method that is frequently employed as a way of testing the specificity of direction of the pathways according to a proposed theory. More specifically, the SRM of chronic illness delineates that the relationship between the constructs is from impairments to perceptions, coping and outcomes. Results demonstrated that this alternative model showed significant pathways between physical disability and IFC, WFC and emotion regulation; between mental health and WFC and emotion regulation; between WFC and cognitive-emotional perceptions; between IFC and cognitive-emotional perceptions; between emotion regulation and cognitive-emotional and control perceptions; and between cognitive-
emotional perceptions and impairments. In contrast to the original IC-SRM with the pathway run from left-to-right, control perceptions were unrelated to impairments and WFC. Empirically, according to the change in CFI, this model displayed poorer fit to the data, and did not better explain the pathways and relationships in comparison to the originally proposed IC-SRM.

Figure 8. Alternative Model 1 – IC-SRM with the pathways in reverse

Note. - Cog-Emo Perceptions: Negative Cognitive-Emotional Perceptions; Illness FC: Illness-Focused Coping; Wellness FC: Wellness-Focused Coping; - Emotion Regulation: Negative Emotion Regulation
**Alternative Model 2**

The second alternative model included a feedback loop between mental health functioning and impairments as per the general theory of the SRM of chronic illness (Hagger & Orbell, 2003). The direct pathway between mental health functioning and impairments was not significant (see Figure 9). Furthermore, as can be seen in Table 12, the feedback loop between mental health functioning and impairments did not produce a significant change in CFI. It can be concluded that the two models had equivalent model statistics (e.g., factor loadings, structural paths, factor covariances, factor residual variances and measurement error variances) and were not considered to be significantly different from each other. Thus, the suggested feedback loop between mental health and impairments did not produce a significant pathway and did not significantly improve the model.

![Figure 9. Alternative Model 2 – IC-SRM including a feedback loop from mental health to impairments](image)

*Note. - Cog-Emo Perceptions: Negative Cognitive-Emotional Perceptions; Illness FC: Illness-Focused Coping; Wellness FC: Wellness-Focused Coping; - Emotion Regulation: Negative Emotion Regulation*
**Alternative Model 3**

The third alternative model included a feedback loop between physical disability and impairments as suggested by the theory of fear-avoidance model of pain (Lethem et al., 1983). The direct pathway between disability and impairments was significant and demonstrated that increased disability was associated with greater pain and urinary symptoms in women with IC/BPS (see Figure 10). As can be seen in Table 12, a feedback loop between physical disability and impairments was associated with a significant positive change in CFI, and significantly improved the model fit of the IC-SRM.

**Figure 10.** Alternative Model 3 – IC-SRM including a feedback loop from physical disability to impairments

*Note. - Cog-Emo Perceptions: Negative Cognitive-Emotional Perceptions; Illness FC: Illness-Focused Coping; Wellness FC: Wellness-Focused Coping; - Emotion Regulation: Negative Emotion Regulation*
Alternative Model 4

The final alternative model included only the significant pathways of the best fitting IC-SRM (i.e., with the feedback loop between physical disability and impairments; see Figure 11). For the purposes of statistical parsimony, non-significant pathways are considered unimportant to the model and as such were deleted for the sake of clarity (Byrne, 2010). As can be seen in Table 12, Alternative Model 4 was associated with a significant positive change in CFI, and significantly improved the model fit of the IC-SRM. Alternative Model 4 did not improve the model fit over and above the Alternative Model 3, however it displayed only the significant pathways that explain variance and provided a final parsimonious model. This model provided empirically the best fit to the data, and incorporated both theories of self-regulation along with the fear-avoidance model of chronic pain. As such, this version of the model was selected as the final and best fitting IC-SRM.

Figure 11. Alternative Model 4 – IC-SRM including only significant pathways

Note. - Cog-Emo Perceptions: Negative Cognitive-Emotional Perceptions; Illness FC: Illness-Focused Coping; Wellness FC: Wellness-Focused Coping; - Emotion Regulation: Negative Emotion Regulation
Chapter 4

Discussion

This dissertation demonstrates novel findings from the development of the IC-SRM that can inform and influence future treatment for women with IC/BPS. Through the stages of model building, empirically developed constructs for patient impairments, perceptions, coping and outcomes were constructed and adapted to the framework of the general SRM of chronic illness using SEM. Hypotheses evaluated specified relationships as suggested by theory and the literature, and lastly alternative models were examined for best fit. The following sections will discuss the results from the underlying constructs within the IC-SRM along with the association between the constructs, as specified by the hypotheses. The results are discussed in comparison to the literature, along with theoretical and clinical implications, areas for future research and study limitations.

Underlying Constructs and Associations within the IC-SRM

Impairments in IC/BPS

The construct of impairments includes issues related to a body structure that is associated with a significant deviation or loss of functioning (World Health Organization, 2002). Previous research has shown that impairments in women with IC/BPS consist of pain, IC/BPS symptoms and IC/BPS bother (Katz et al., 2013). The current study replicated findings from previous research with results from both the EFA and CFA. In this study, impairments associated with IC/BPS included pain, urological symptoms (such as urgency, frequency and nocturia) as well as
perceived bother from these symptoms. These issues are significant in impairing a wide range of issues in women with IC/BPS, and are associated with poorer outcomes in several areas of functioning. Impairments in women with IC/BPS are an important predictor of a number of factors, such as maladaptive coping, sexual dysfunction and decreased mental and physical QoL in comparison to healthy controls (Nickel et al., 2010; Tripp et al., 2009). In congruence with the general SRM, impairments in this study were also associated with illness perceptions.

**Illness Perceptions in IC/BPS**

Illness perceptions are a patient’s representations about their illness and help individuals make sense of and manage their disease-related issues (Hagger & Orbell, 2003). Illness perceptions are an essential component of the general SRM, however, one of the major issues in research evaluating illness perceptions is the factor structure and composition of the items. In this study, initial data cleaning procedures found that the item for illness comprehension was poorly associated with the other items in the scale, and thus it was removed for further analyses. Moreover, the item for timeline was found to be poorly associated with the other items in the EFA and was removed as well. Other studies have also removed items due to poor inter-item associations from the B-IPQ in analyses. For example, in a sample of patients with neck pain, the illness comprehension item was removed when examining the psychometric properties of the B-IPQ due to its lack of discriminatory ability (Walton et al., 2014). In relation to the nature of IC/BPS (i.e., the unknown cause of the condition, the unpredictable nature of its treatment, symptoms and long-term prognosis) is linked to patients’ poor understanding of the condition (Heyhoe & Lawton, 2009). As such, the low level of illness comprehension and variability in timeline in this sample is congruent with the nature of IC/BPS.

The results of an EFA and CFA of the B-IPQ found two underlying constructs: control
perceptions (personal and treatment control) and cognitive-emotional perceptions (consequences, concern, identity, emotions and timeline). The composition of these two factors is incongruent with the original subscales of cognitive perceptions and emotional perceptions (Broadbent et al., 2006). Broadbent and colleagues suggested that cognitive factors include consequences, timeline, identity, personal control and treatment control, while emotional perceptions include concern and emotions. Other studies have also found varied factor structures of illness perceptions and suggest that different patient populations have unique illness concerns and perceptions (Hampson et al., 1990; Heijmans & de Ridder, 1998, 1999). It is possible that the construction and composition of the illness perception factors in this study differs from other research due to the unique concerns and perceptions in women with IC/BPS. For example, the nature of the condition of IC/BPS might be more strongly associated with perceptions of personal and treatment control due to the idiopathic and unpredictable nature of the disease, and as such these items combine to form their own underlying construct, rather than the originally proposed factor structure. It may also be a reflection of the sample collected within this study, which will be discussed in the limitations section. Only one study has evaluated illness perceptions in IC/BPS (Heyhoe & Lawton, 2009), but this previous study assumed the original dimensions and subscores of the B-IPQ and did not use statistical data reduction procedures (e.g., EFA and CFA) to confirm the structure and composition of these factors. The current study is the first to find a unique factor structure for illness perceptions in women with IC/BPS, and is a novel contribution to the literature.

Control perceptions have been conceptually regarded as a proxy for self-efficacy (Broadbent et al., 2006). The present data support this notion as the two factors of control and cognitive-emotional perceptions are negatively associated with each other. In other words, patients with IC/BPS with higher personal and treatment perceptions of control have less negative cognitive-emotional perceptions about their illness. The original psychometric validation study of
the B-IPQ also found the subscales of personal and treatment control to have a low correlation in related to other items. Further, it was suggested that in social cognitive theory, control perceptions are measured by the construct of self-efficacy, which is an individual’s belief that they can successfully perform or accomplish a task. Results showed that the control items from the B-IPQ were significantly correlated with measures of self-efficacy in patients with diabetes and asthma. This notion is consistent with the empirical and theoretical factor structure that was found in this study.

Understanding the factor structure within this sample of women with IC/BPS is necessary to determine the theoretical underpinnings of illness cognitions, and will help to build upon the general SRM by demonstrating the process of the kinds of associations impairments have with various illness perceptions within IC/BPS. The association between impairments and illness cognitions has been examined in a variety of chronic illnesses, and this study supports the pathway between impairments and illness perceptions (hypothesis 1). More specifically, in women with IC/BPS, greater impairments were associated with more negative cognitive-emotional illness perceptions. This relationship has been demonstrated in a number of conditions including fibromyalgia, multiple sclerosis, diabetes, IBS and IC/BPS (De Gucht, 2015; Hagger & Orbell, 2003; Heyhoe & Lawton, 2009; Stuifbergen et al., 2006; Vaughan et al., 2003). Within this study, IC/BPS-related pain and urinary symptoms were associated with individuals perceiving their illness to have greater consequences in their life, a longer timeline, identifying more with their illness, being more concerned about their illness and being more emotionally affected by their illness. This relationship has also been modeled in IBS patients, in which the relationship between bowel symptom severity and QoL was mediated by illness perceptions (De Gucht, 2015). To date, only one study has evaluated illness perceptions in IC/BPS, in which increased symptoms were related to greater illness perceptions of serious consequences and
negative emotional impact (Heyhoe & Lawton, 2009). This study confirms these results in samples of IC/BPS, in which greater pain and urinary symptoms (frequency, urgency, nocturia and bother from symptoms) were associated with more negative perceptions about one’s illness.

In this study, IC/BPS-related impairments were negatively associated with perceptions of control. More specifically, less impairments was associated with more positive perceptions of one’s ability to control their IC/BPS, and more positive perceptions about the efficacy of treatment to help one’s IC/BPS, and this has been shown in other studies as well (Vaughan et al., 2003). Within this model, control perceptions can also represent a more adaptive and positive framework for thinking about one’s IC/BPS such that higher control perceptions indicate that an individual has the belief that they have control over their illness, and that treatment will be effective in helping their illness. The IC-SRM supports that impairments initiate the self-regulation process of coping with chronic illness and lead to negative illness perceptions as well as positive perceptions of control.

Illness perceptions are a key variable of interest as understanding how individuals make sense of their IC/BPS can inform future psychological interventions to address common perceptions associated with poor outcomes. For example, changes in patients’ illness perceptions have been shown to improve recovery following myocardial infarction (Petrie, Cameron, Ellis, Buick, & Weinman, 2002) and in IBS patients (Chilcot & Moss-Morris, 2013), and this has yet to be examined in IC/BPS. The general SRM outlines that coping and emotion regulation has the capacity to mediate illness perceptions and overall outcomes.
Coping with IC/BPS

Coping is a complex behavioural, cognitive, psychological and emotional task. In chronic pain, the ability to self-regulate and cope is crucial, and successful adaptation involves an individual’s conscious ability to exercise control and alter personal reactions and behaviours to stress and symptoms (Solberg Nes et al., 2010; Solberg Nes et al., 2009). Coping can include behavioural strategies such as resting, asking for assistance and exercising, as well as cognitive and emotional strategies such as acceptance, reappraisal and suppression. To date, no research has evaluated all of these factors in aggregate as self-regulation strategies in a pain or IC/BPS sample to see whether or not they act as distinct constructs or as several smaller unified factors. The results of this study demonstrated coping to consist of three factors: IFC (consisting of guarding, resting, and asking for assistance), WFC (consisting of exercising/stretching, positive self-talk and relaxing) and emotion regulation (consisting of activity engagement, pain willingness, reappraisal and pain catastrophizing).

Illness and Wellness-Focused Coping

The literature is conflicting as to the exact structure and composition of IFC and WFC, and this is the first study to investigate these constructs within IC/BPS. Understanding which behavioural strategies are considered illness versus wellness focused is important as they represent direct targets for interventions in pain management and rehabilitation for women with IC/BPS. This study’s results are congruent with the literature in regards to the composition of IFC. While the literature may have mixed results as to some of the factors of the CPCI, guarding a body part, pain-contingent resting and asking for assistance are considered to be illness-focused and maladaptive in the rehabilitation and treatment of chronic pain, and in this study in IC/BPS (Davidson et al., 2007; Garcia-Campayo et al., 2007; Jensen et al., 1995; Truchon, Cote, &
Patients with chronic pain who engage in passive and assistance-seeking coping strategies tend to be less socially active, have decreased mental health and greater pain-related disability (Jensen et al., 1995).

Research has shown the factor structure of WFC to be somewhat ambiguous. This study is generally congruent with the literature as to the structure of WFC, and the results support that wellness-focused strategies consist of exercising/stretching, positive self-talk and relaxation, and are adaptive behavioural strategies in the treatment of IC/BPS (Davidson et al., 2007; Garcia-Campayo et al., 2007). The literature is unclear as to whether the item for seeking social support is illness or wellness-focused (Garcia-Campayo et al., 2007; Jensen et al., 1995; Truchon et al., 2006). More specifically, seeking social support is suggested to be neither IFC nor WFC due to its weak association with measures of health status and disease outcomes, and as such is neither encouraged nor discouraged in treatment (Garcia-Campayo et al., 2007). In this study, the item for seeking social support was found to load below the cutoff criteria onto both the factors for IFC and WFC and was thus removed from further analyses. Similarly, the item for task persistence had factor loadings below the cutoff criteria for both the factors of IFC and WFC. This is consistent with other research, which has also found task persistence to have inconsistent factor loadings onto the constructs of WFC and IFC (Davidson et al., 2007; Garcia-Campayo et al., 2007; Truchon et al., 2006).

In accordance with the general SRM, illness cognitions guide and influence the coping behaviours and strategies that one employs (Leventhal et al., 1980), and results from this study support this notion demonstrating that illness perceptions are related to various coping strategies in women with IC/BPS. More specifically, the present results are consistent with the literature, which shows that negative illness representations are associated with IFC strategies such as behavioural disengagement or avoidance (hypothesis 2A; Heijmans, 1999; Moss-Morris et al.,...
Avoidant coping has also been shown to mediate the relationship between negative illness perceptions and increased disability (Carlisle et al., 2005). The present study shows that in women with IC/BPS, negative illness perceptions are associated with more passive, maladaptive and avoidant coping strategies (e.g., increased use of guarding a body part, resting and asking for assistance). This research is the first study to demonstrate that the use of these coping strategies in IC/BPS may be maladaptive and should be discussed or potentially discouraged as part of treatment.

Illness perceptions of control can also guide and influence adaptive coping behaviours. Results demonstrate that perceptions of control are positively associated with WFC in this sample of women with IC/BPS, but not with IFC (hypothesis 2B). More specifically, higher perceptions about control over one’s IC/BPS and treatment are associated with more adaptive and wellness-focused strategies, such as exercising/stretching, relaxing and coping self-statements. This finding is consistent with the original hypothesis that perceptions of higher illness self-efficacy would be associated with greater engagement in adaptive and wellness-focused strategies, and is also congruent with the literature. Diabetic patients with stronger beliefs in personal and treatment control were more likely to use active problem-focused coping such as planning and seeking social support (Lawson et al., 2010). Similarly, a high internal locus of illness control/cure was significantly related to active coping (e.g., actively trying to make one’s situation better, focusing on the current situation) in patients with chronic fatigue syndrome (Moss-Morris et al., 1996). This is the first study to evaluate illness perceptions of control in IC/BPS, and results support that illness self-efficacy (e.g., having the positive belief that one can control their illness and that treatment will be effective) was associated with more active and adaptive coping, and as such should be emphasized within treatment, while negative illness perceptions were associated with more sedentary and passive coping and should be discouraged in treatment.
The positive pathway between negative cognitive-emotional perceptions and WFC is in contrast to the original hypothesis. However, these results are compatible when evaluated in the overall model, or in mediation analyses. Similar results were found in IBD patients, in which the negative impact of illness perceptions (i.e., identity and consequences) on QoL was decreased when patients did not decrease activity in order to cope with pain (van der Have et al., 2015). This finding suggests that the impact of negative illness perceptions on QoL was ameliorated when patients continued to engage in activity. In the current study, WFC appears to disrupt the relationship between negative cognitive-emotional illness perceptions and poorer mental health outcomes. As such, this study supports that WFC strategies (e.g., relaxing, exercising/stretching and coping self-statements) are important in treatment of IC/BPS, and have the ability to interrupt the process of negative illness cognitions leading to worsened mental health outcomes. While behavioural coping has been well studied and established within the chronic pain literature, the inclusion of novel emotion regulation strategies (such as catastrophizing and acceptance) further expands the general SRM and our understanding of coping with IC/BPS.

**Emotion Regulation**

Strategies of emotion regulation are essential in patients with chronic pain and IC/BPS due to the uncertainty of the condition, the experience of pain and the inability to find a cure or solve problems associated with the condition; patients must find strategies in order to adapt to a long-term course of the disease and coping with the symptomology (Bussing et al., 2010; Heyhoe & Lawton, 2009). The emotion regulation literature has well established the strategies of reappraisal, and pain catastrophizing and acceptance have been well studied in the chronic pain literature. However, no study has examined these strategies in aggregate in a pain sample to determine if they are better represented by a smaller number of factors. In this study, one unified
construct of emotion regulation was found, and the results indicate that emotion regulation in women with IC/BPS is comprised of the components of pain catastrophizing, pain acceptance and reappraisal.

This study also supports the pathway between illness perceptions and emotion regulation (hypothesis 2C). The literature supporting this relationship is scarce, and as such this finding is a significant contribution to understanding how illness cognitions can impact the process of emotion regulation. In general, the IC-SRM supports that more negative cognitive-emotional illness perceptions are associated with more maladaptive emotion regulation in women with IC/BPS, and this is consistent with the literature. Negative illness perceptions have been associated with greater levels of catastrophizing in patients with fibromyalgia, chronic pain and Sjögren’s syndrome (Gillanders et al., 2012; Segal et al., 2014; van Wilgen et al., 2008). Consistent with the general SRM framework, reappraisal was shown to mediate the relationship between emotional illness representations and emotional well-being in cardiac patients (Karademas et al., 2010). Similarly, negative illness representations were associated with lower pain acceptance in both patients with Parkinson’s Disease and chronic pain, and more specifically, pain acceptance was shown to mediate the relationship between illness representations and psychological distress (Evans & Norman, 2009; Gillanders et al., 2012). The model in this study demonstrates that illness perceptions impact the emotion regulation strategies that women with IC/BPS employ. For example, negative illness perceptions are associated with greater usage of catastrophizing, whereas less negative illness perceptions are associated with more positive emotion regulation strategies such as reappraisal and acceptance.

Emotion regulation strategies are an important component of the general SRM as they are thought to mediate the impact of illness perceptions on overall outcomes, and thus can exacerbate or interrupt the effects of illness cognitions. Data from this study support that IC/BPS treatment
should encourage emotion regulation strategies, such as reappraisal and pain acceptance, while catastrophizing should be discouraged. Interestingly, negative illness perceptions appear to be associated with all coping and emotion regulation strategies in this sample of women with IC/BPS. It is possible that an increase in negative illness perceptions may be activating for individuals, such that the distress leads to an increase in the employment of all possible coping strategies (e.g., IFC, WFC and emotion regulation strategies).

**Physical and Mental Health Outcomes in IC/BPS**

IC/BPS is a debilitating condition which impacts individuals’ daily life functioning, and is associated with poorer physical and mental health in comparison to controls (Nickel et al., 2010; Rabin et al., 2000). Understanding how a person perceives their illness and the extent and attribution of their symptoms can help health care providers tailor interventions specific to the patient’s needs, and result in the adoption of efficacious self-care behaviours that promote mental health well-being and decreased patient disability (Stuifbergen et al., 2006). To date, this is the first study to examine an array of positive and negative mental and physical health outcomes in IC/BPS in aggregate. Furthermore, this is the first study to examine outcomes such as optimism, positive affect and satisfaction with life in IC/BPS. Results from this study support a two-factor solution. The first factor represented mental health outcomes, and consisted of negative affect, positive affect, depression, satisfaction with life, optimism and pessimism. The second factor represented physical disability and consisted of the inability to engage in the following areas of life due to pain: family/home responsibilities, recreation, social activities, occupation, sexual behaviour, life-support activities and self-care.

In this study, depression had a significant relationship to both mental health outcomes as well as disability, and as such was allowed to freely vary between the two constructs. Although
this relationship wasn’t originally proposed, the literature has well established the link between depression and disability in a number of patient populations (Adams et al., 2008; Hirsh, Waxenberg, Atchison, Gremillion, & Robinson, 2006; Katz et al., 2013). Hirsh et al. (2006) evaluated the mediation effects of negative affect on the relationship between pain and disability in a sample of women and men with various chronic pain conditions (i.e., low back, myofascial, neck, arthritis and fibromyalgia; Hirsh et al., 2006). In women, negative affect was significantly related to both voluntary disability indices (i.e., family/home responsibilities, social activities, recreational activities, occupation and sexual behaviour) and obligatory disability indices (i.e., life support activities and self-care). Similarly, depressive symptoms were associated with pain-related disability in patients with chronic musculoskeletal pain, as well as with IC/BPS (Adams et al., 2008; Katz et al., 2013). The authors suggested that pain and symptoms might become disabling through the cognitive mechanisms of depression. The results of this study expand on previous research by evaluating a more complex model of pain and disability in IC/BPS, and the results and discussion of such modeling processes are discussed further in the upcoming sections.

**Physical Disability**

IC/BPS is a condition that is associated with significant disability and impairments in role activities and assessing for physical health outcomes is essential (Nickel et al., 2010; Rothrock et al., 2002). Research on physical disability is limited in IC/BPS. In this study, the use of IFC strategies in women with IC/BPS was associated with increased disability (hypothesis 3A). This finding is consistent with the literature, such that IFC strategies are associated with significantly higher reports of disability in patient populations such as chronic pain and fibromyalgia (Karsdorp & Vlaeyen, 2009; Misterska et al., 2013). This relationship is further supported by longitudinal data that demonstrates that passive strategies such as guarding, resting and asking for
assistance, were significant predictors of disability in low-back pain patients over time (Truchon & Cote, 2005).

In contrast, this study did not find a significant pathway between WFC and physical disability (hypothesis 3C). WFC strategies have inconsistent results in predicting disability within the literature. For example, in a sample of chronic pain patients, disability was significantly predicted by relaxation, coping self-statements and seeking social support, but not by task persistence or exercising/stretching (Misterska et al., 2013). Similarly, none of the WFC strategies were significantly associated with disability in patients with fibromyalgia (Karsdorp & Vlaeyen, 2009). Further research is necessary to better understand the relationship between the use of behavioural wellness-focused strategies and physical disability.

The results of this study support the pathway between emotion regulation and physical disability in women with IC/BPS (hypothesis 3E). While the literature has established the link between catastrophizing and acceptance and physical health outcomes, this is the first study to empirically include reappraisal as an emotion regulation strategy within a chronic pain sample. Poor emotion regulation is a maladaptive process for coping with chronic illness and the emotions and experience of pain.

**Mental Health Outcomes**

The IC-SRM demonstrates the importance of coping and emotion regulation strategies as they influence mental health outcomes in women with IC/BPS. Wellness-focused strategies have consistently been associated with more positive mental health outcomes in the literature, which is congruent with the findings of this study. More specifically, the use of WFC has been associated with lower distress and depression and better psychological functioning (Hadjistavropoulos et al., 1999; Jensen et al., 2011; Ramirez-Maestre et al., 2012). Adaptive and active coping strategies
have also been associated with greater life satisfaction (Bussing et al., 2010; Treharne et al., 2007), as well as greater levels of optimism (Solberg Nes & Segerstrom, 2006). In this study, the IC-SRM suggested that WFC strategies are helpful in improving mental health outcomes and well-being in women with IC/BPS (hypothesis 3D). Strategies such as exercising, stretching, relaxation and coping-self-statements should be encouraged within the treatment of IC/BPS in order to improve mental health and well-being.

In contrast, the data do not support the relationship between IFC and mental health outcomes in women with IC/BPS (hypothesis 3B). This finding is inconsistent with studies in the literature. For example, IFC was associated with poorer psychological functioning and increased depressive symptoms in patients with chronic pain and fibromyalgia (Garcia-Campayo et al., 2007; Jensen et al., 2011; Rodero et al., 2011). Although the research is limited, some studies have shown that passive coping and IFC is associated with dissatisfaction with life, poorer well-being, and greater levels pessimism (Ramirez-Maestre et al., 2012; Rasmussen et al., 2006; Sinikallio et al., 2011; Smedema et al., 2010). It is possible that in this study, the variance of IFC was better predicted and accounted for in relation to physical variables such as disability, and not the factor representing mental health and well-being ($r_{IFC\ and\ disability} = 0.68, r_{IFC\ and\ mental\ health} = -0.34$).

This study’s methodologies employed modeling processes in order to determine a specified model’s best fit to the data. The illness-focused strategies that were specified and indicated within the construct constitute passive and sedentary behavioural methods of coping with the experience of pain, and thus may be better related to the disengagement of various areas of life. The IC-SRM suggests that IFC strategies are related to physical disability, but do not directly influence mental health outcomes. In sum, IFC strategies should be discouraged in the treatment of IC/BPS in order to improve patient related disability and re-engage patients back into important life roles.
The IC-SRM supports the pathway between emotion regulation and mental health outcomes. More specifically, poor emotion regulation skills were negatively associated with positive mental health well-being in women with IC/BPS (hypothesis 3F). This finding is consistent with the literature, in which emotion regulation skills have been shown to impact psychological responses and well-being, as well as modify negative psychological states such as depression (Gross & John, 2003; Ruiz-Aranda et al., 2010; Solberg Nes et al., 2009). Adaptive strategies such as reappraisal and acceptance have been associated with success in social interactions, greater well-being, optimism and life satisfaction, and decreased depression (Gross & John, 2003; Perez & Jose, 2011). Conversely, poor emotion regulation strategies (such as suppression and catastrophizing) have been associated with depression, negative affect, pessimism and diminished mental well-being (Gross & John, 2003; Smedema et al., 2010; Van Leeuwen et al., 2012; van Middendorp et al., 2008). Poor emotion regulation is a maladaptive process for coping with chronic illness and the emotions and experience of pain, and as such adaptive emotion regulation skills training should be emphasized in treatment for women with IC/BPS.

**Alternative Models and Theoretical Implications**

Several alternative models were evaluated in order to contrast competing theoretical conceptualizations of coping with IC/BPS. Overall, the best fitting model was alternative model 4, which included a feedback loop between physical disability and impairments, and displayed only significant pathways. This model was the most parsimonious, had the best fit to the data, and incorporated theories of self-regulation and the fear-avoidance model of chronic pain. More specifically, this model depicted the process of coping with IC/BPS through the associations between the constructs of impairments, illness perceptions, coping/emotion regulation and
physical and mental health outcomes in congruence with the general SRM of chronic illness (Hagger & Orbell, 2003; Leventhal et al., 1980). Alternative model 4 also combined theory from the fear-avoidance model of pain, as evidenced of the feedback loop, that suggested that increased disability was associated with greater impairments, leading to a vicious cycle of avoidant behaviour, disuse and eventually more disability and pain (Karsdorp & Vlaeyen, 2009; Lethem et al., 1983). The findings from this model have important theoretical and clinical implications that can help to inform future therapies for women with IC/BPS. The IC-SRM demonstrates that positive mental health and wellbeing can be modeled through illness perceptions of self-efficacy, WFC and adaptive emotion regulation (e.g., reappraisal, pain acceptance). In contrast, poorer mental health outcomes can be modeled through negative cognitive-emotional perceptions about one’s illness as well as negative emotion regulation strategies, such as catastrophizing. In regards to physical outcomes, disability can be modeled through negative cognitive-emotional illness perceptions, IFC and maladaptive emotion regulation strategies. Moreover, the feedback loop suggests that this model is recursive such that increased physical disability is associated with greater levels of impairments. The section to follow will further discuss the clinical implications of this dissertation.
Clinical Implications

The findings from this study have important clinical implications in the treatment of women with IC/BPS. While several psychotherapeutic treatments exist, no study has examined what cognitions, coping and emotion regulation strategies are associated with specific mental and physical health outcomes. The model in this sample of women with IC/BPS indicates that better mental well-being and functioning can be modeled through perceptions of illness self-efficacy (e.g., “treatment can help to control my illness”) as well as wellness-focused cognitive and behavioural strategies. Conversely, worse mental health functioning as well as physical disability can be modeled through negative cognitive-emotional illness perceptions and poor emotion regulation strategies. Moreover, illness-focused behavioural coping strategies have a direct link to physical disability in women with IC/BPS. The model also supports that wellness-focused strategies can interfere with the pathway of negative cognitive-emotional illness perceptions leading to poor mental health outcomes, and instead lead to better mental health well-being. It is important to note that the IC-SRM describes a general understanding of how women experience impairments, perceptions, coping and outcomes associated with IC/BPS based on average responses from a large sample. However, the focus of clinical interventions can be adapted from the IC-SRM to be individualized and based on individual’s experiences and needs.

Cognitive Behavioural Therapy (CBT) is established to be an effective intervention for chronic pain that demonstrates significant reductions in disability, anxiety and depression (Eccleston, Williams, & Morley, 2009; Jensen, Turner, & Romano, 2001; Morley, 2011). Treatment associated changes, as demonstrated in randomized controlled trials, indicate that CBT is effective in chronic pain samples across five domains, including physical functioning, pain behaviour, experience of pain, emotional functioning and cognitive coping and appraisal (Morley, 2011). In pain management interventions, CBT often consists of three components: helping
patients understand how cognitions, emotions and behaviour affect the experience of pain, teaching patients concrete cognitive and behavioural skills to cope with pain, and reinforcing patients to apply and use the learned skills (Keefe, 1996). CBT also involves behavioural strategies, behavioural experiments and exposure in order to increase physical and functional activities (Sauer et al., 2010).

The IC-SRM mirrors the traditional five-part model, which is a major component of CBT. A five-part model provides a clear structure that delineates and breaks down difficulties and issues that arise when an individual experiences distress (Wright, Williams, & Garland, 2002). The components of a five-part model link the connections between a specific life situation, cognitions, feelings, physiological sensations and altered behaviours/activities. The ability to assess and conceptualize one’s distress using clear components has multiple benefits. For one, it can benefit both the patient and the practitioner as it can help to identify clinical issues and goals for psychotherapy. It can also help patients gain insight into better understanding their distress and experiences. This common understanding helps engage both the patient and the practitioner in therapy and in collaborative case conceptualization, and aids in building a therapeutic alliance (Beck, 2011).

In congruence with the five-part model, the IC-SRM has the potential to inform and guide treatment protocols in women with IC/BPS. For example, it has the potential to identify what kinds of impairments are triggering, and what kinds of cognitions are associated with those impairments. Moreover, the IC-SRM can help patients and therapists identify what kinds of cognitive, behavioural and emotional coping strategies one uses, and whether or not those are associated with better or worse mental well-being and disability. The IC-SRM has the potential to help IC/BPS patients gain insight into their experiences and distress, set goals for improvement, and cope in a more adaptive manner to increase their mental well-being and re-engage into
important life roles. From this study’s results and using the five-part CBT model conceptualization of the IC-SRM, several areas of psychotherapeutic intervention are suggested, which are discussed below.

The IC-SRM outlines that treatment in women with IC/BPS should work with illness related cognitions in order to build illness self-efficacy and challenge negative cognitive-emotional illness perceptions. CBT works with patients’ maladaptive thoughts and cognitions, and the basis of this originated within ‘Cognitive Therapy of Depression’ (Beck et al., 1979). In general, cognitive therapy has several goals: to monitor and gain insight into personal automatic thoughts and cognitions, to gain awareness of the connections between cognitions, emotions and behaviour, to examine evidence for or against one’s automatic thoughts and to learn to identify and challenge maladaptive and dysfunctional cognitive patterns. A variety of psychotherapeutic activities can be used in order to meet these goals, including thought records and behavioural experiments (Bennett-Levy, 2003).

Automatic thought records are an activity in which patients record, monitor, evaluate and respond to automatic thoughts in an objective and written form (Beck et al., 1979). Thought records build personal insight into one’s cognitive style that may be associated with negative emotions and maladaptive behaviours leading to poorer outcomes. Interventions with thought records challenge negative thinking and replace maladaptive thoughts with more balanced and realistic thinking. For example, a patient might have negative cognitive-emotional perceptions such as “my IC/BPS will last forever, and I will never feel better” which might lead to poor coping (e.g., catastrophizing, illness-focused behaviours), worse mental well-being (e.g., depression, pessimism, dissatisfaction with life) and disability (e.g., disengagement from family/home responsibilities and social activities). Automatic thought records would help patients identify which situations would trigger this kind of thinking, what emotions are associated with
this thought, the behavioural consequences of coping this way, as well as outcomes. Steps would also be taken to evaluate evidence for and against this automatic thought to put the negative cognitive-emotional perception into perspective. It would work to challenge this negative cognitive-emotional cognition and produce a more balanced and realistic thought such as, “although I feel badly now, I know that this is just a flare-up and my pain and symptoms will decrease soon.” This type of thought is less likely to be associated with negative emotions and is more likely to lead to more adaptive coping and better outcomes.

Behavioural experiments are another important component of cognitive therapy in which patients engage in “experiments” to test out thoughts and beliefs in order to discover the validity of these thoughts (Beck et al., 1979). In the case of the IC-SRM, behavioural experiments may involve tracking the length and severity of their flare-ups in order to provide evidence to themselves that their illness does in fact not last forever, and is only acutely severely impairing. Padesky and Greenberger (1995) suggested that thought records and behavioural experiments go hand-in-hand within treatment (Padesky & Greenberger, 1995). Whereas thought records may be akin to thinking in a new language, behavioural experiments will help an individual test out this new language and prove that it’s believable and effective. Moreover, the most effective way to challenge and adapt one’s thinking patterns is to try it out firsthand, and begin to use it within one’s everyday life.

Research has shown that both thought records and behavioural experiments are effective tools of psychotherapy (Bennett-Levy, 2003). More specifically, both thought records and behavioural experiments were found to be useful as tools to gain insight for patients to become aware of internal processes such as thoughts and emotions. Moreover, behavioural experiments were found to be effective in promoting behaviour and belief change. Thought records and behavioural experiments are suggested to target different modes of processing, with thought
records using slow, rational and self-as-object processing, while behavioural experiments are associated with processing involving emotionality, behavioural implementation of change and the self-as-agent perceptive. In sum, both thought records and behavioural experiments are important components of the therapeutic process that help patients gain insight of internal processes and work towards implementing change, which is important in pain management programs and would be helpful in the treatment of IC/BPS.

Recent research has shown that CBT to be effective in the treatment for chronic pain and illnesses (Eccleston et al., 2009; Jensen et al., 2001). A recent study evaluated the efficacy of a CBT internet intervention for patients with IBS (Hunt, Moshier, & Milonova, 2009). Within the intervention, one module focused on the use of thought records to encourage patients to look for patterns in their thinking and emotional responses. A second module focused on disease specific catastrophic thinking and encouraged patients to identify their catastrophic cognitions about IBS and learn to apply the five-part CBT model. The intervention also included a module focusing on behavioural experiments, in which patients were asked to test out some of their cognitions and beliefs about the consequences of IBS (Hunt et al., 2009). For example, some patients avoided going to the movies because they had cognitions that going to the bathroom in the middle of a movie would be embarrassing and an annoyance to others, and as such caused high anxiety and emotional distress. The behavioural experiments within this study focused on going to a movie and counting the number of people who got up to go to the bathroom, as well as focusing on the reactions of others during these incidents. These types of behavioural experiments would be beneficial in the treatment of IC/BPS and would help re-engage patients back into various areas of their life. Results from this intervention demonstrated that the treatment had a positive impact on IBS symptom severity as well as QoL in comparison to the wait-list control group. More specifically, the results showed that intervention was successful in reducing catastrophic thinking
about IBS, and that de-catastrophizing was partially responsible for the positive treatment effect. This study highlights the importance of including these kinds of techniques as part of an intervention as a way to manage illness-focused cognitions and catastrophizing.

CBT has also been shown to be effective in chronic pelvic pain conditions. A feasibility trial in men with CP/CPPS employed CBT techniques to manage pain and symptoms and improve psychosocial risk factors (Tripp, Nickel, & Katz, 2011). One of the primary components of this therapy included using “Reaction Records,” a tool that helped patients self-identify and modify illness-focused and catastrophic cognitions that were associated with sedentary behaviour and disability. Results showed that the program was associated with significant reductions in pain, symptoms, disability and pain catastrophizing, and these findings suggest that psychosocial pain management programs that include cognitive therapy are empirically supported as a method of reducing psychosocial risk factors associated with poorer outcomes. Preliminary evidence supports the use of CBT in chronic pain conditions, however this has yet to be investigated in women with IC/BPS. The use of CBT techniques, including thought records and behavioural experiments, would be helpful in a variety of ways identified by the IC-SRM. Cognitive therapy could be used to help patients build positive cognitions of illness self-efficacy, challenge negative thinking about one’s illness, de-catastrophize and more generally to learn and improve cognitive reappraisal skills.

CBT also includes behavioural components of intervention including behavioural activation, exposure and behavioural experiments, as previously mentioned. According to the IC-SRM, discouraging the use of illness-focused behavioural strategies can help patients re-engage in various areas of their life and decrease physical disability. For example, behavioural activation and behavioural experiments can be used to help patients decrease the use of sedentary and passive coping behaviours and initiate engaging in more active and adaptive coping behaviours.
The CBT internet intervention in IBS patients also included several behavioural modules (Hunt et al., 2009). One of the modules encouraged patients to identify things that they avoided and gradually expose themselves to it. This stems from the generalized fear-avoidance model in chronic pain, which states that individuals experiencing chronic pain will begin to avoid certain activities, thus leading to disability and disengagement from life roles. For example, using data from the IC-SRM and theory from the fear-avoidance model, a patient with IC/BPS may experience pain and increased symptoms when engaging in family/household responsibilities, such as vacuuming. The patient’s response might be to rest or ask for assistance on tasks that would cause pain. The fear-avoidance model suggests that over time an individual would build up fear, negative emotions and catastrophic cognitions when thinking about engaging in family/household responsibilities due to the experience of pain, and as such would disengage and avoid such activities. Behavioural exposure therapy would initially test the validity of patient’s appraisals by slowly starting to engage in some of the activities that they avoid through graduated activities.

The IC-SRM also indicates that pain acceptance is an important psychotherapeutic target to improve mental well-being and decrease physical disability. ACT is a psychotherapeutic orientation that is rooted in cognitive and behavioural theory along with the use of mindfulness and acceptance (Hayes et al., 2006). ACT aims to increase psychological flexibility, which is conceptualized as a positive psychological strategy, and not merely as a method of avoiding psychopathology. Acceptance is taught as an alternative to experiential avoidance, and involves techniques such as cognitive defusion (i.e., altering one’s thoughts by creating contexts in which the unhelpful functions are diminished), being present (i.e., non-judgmental awareness with one’s psychological, physiological and environmental self), self as context (i.e., being aware of one’s experiences without attachment to them), values (i.e., choosing values based on purposeful action
that can never be obtained as an object, but can be instantiated moment by moment), and committed action (i.e., development of larger patterns of effective action linked to chosen values). Research has shown that ACT is effective in the treatment of chronic pain (Hayes et al., 2006; Johnson et al., 2010; Kohl, Rief, & Glombiewski, 2012), and the literature suggests that including techniques and components of ACT within an intervention in women with IC/BPS would be effective in improving patient outcomes.

Overall, the clinical implications from the IC-SRM as well as the literature reviewed would suggest a combined orientation intervention for women with IC/BPS with components of CBT and ACT. CBT techniques might include five-part models (based on the diagram of the IC-SRM), thought records and behavioural experiments to help challenge negative illness cognitions and catastrophizing and to encourage more adaptive illness self-efficacy and reappraisal skills. Behavioural interventions might include behavioural activation, behavioural experiments and exposure to decrease guarding, resting and asking for assistance, and to increase exercising, stretching and coping self-statements. Components of ACT would help to increase patient pain acceptance and relaxation practices. The section to follow will discuss areas of future research, and more specifically will propose several future studies that will extend the results from this dissertation.
Future Research

As previously discussed, the findings from this study have important clinical implications and can advance treatment in women with IC/BPS. The clinical implications section discusses several psychotherapeutic orientations and activities that are supported and would be helpful in an intervention for women with IC/BPS. The main area of future research would be to evaluate the efficacy of the suggested therapeutic advances, which could be investigated in a variety of ways discussed below.

One of the major limitations of this dissertation is the use of cross-sectional data. The pathways specify relationships captured within a snapshot, and are not able to elaborate on the directionality or causation of the variables over time. One area of future research would be to evaluate the proposed IC-SRM longitudinally. The results from this dissertation used baseline data, and our research group is currently undergoing this process and is collecting follow-up data (at six months and twelve months) from the study participants. The follow-up proposed study from this line of work would be to test the proposed model across the time points and to determine if the relationships and hypotheses change over time. Future research could also include biomedical data to better understand the influence of biological factors within this biopsychosocial model. For example, biomedical considerations could involve aspects of the microbiome research that is currently ongoing in the US NIH-DDDK funded program.

Another limitation lends to extensions of this study for future research. Although the IC-SRM examined numerous intrapersonal variables associated with coping with IC/BPS, there are additional contextual variables that have not been assessed by the present study. For example, this study only evaluated the emotion regulation variables of reappraisal and suppression. There are multiple other emotion regulation variables that might be important in coping with IC/BPS and should be examined in future research. Moreover, future research could examine the impact of
interpersonal factors as moderators on the IC-SRM. Some potential interpersonal factors of interest might be perceived social support, or responses to patient pain behaviours, which are known predictors of mental and physical health outcomes in women with IC/BPS. Additionally, contextual moderating factors could include variables such as unemployment (e.g., being unable to work due to pain-related disability) as well as issues related to accessibility. Future research should incorporate interpersonal and contextual factors into the IC-SRM to determine how social and environmental variables might impact coping within this condition.

There are also several experimental studies that could be proposed as per the direct findings of this dissertation. For example, this dissertation suggests various adaptive strategies and skills that are associated with better outcomes in women with IC/BPS. As such, the next steps would be to test each of these strategies for their efficacy in comparison to a control group. For one, this dissertation found that improving illness perceptions of self-efficacy and decreasing negative cognitive-emotional perceptions are associated with better outcomes. Future research could evaluate whether activities such as thought records help improve illness perceptions in patients with IC/BPS. The study could use experimental manipulation with three groups: A) participants engaging in thought records about challenging negative illness perceptions; B) participants engaging in thought records about enhancing illness self-efficacy and control; and C) participants engaging in journaling with no particular focus (i.e., as a control group). This study would be able to compare and contrast whether or not thought records are an effective activity in order to help patients with IC/BPS challenge and improve their illness cognitions in comparison to a control group.

Based on the results on the proposed research above, the most traditional method of evaluating the efficacy of this study’s findings would be to employ a wait-list control design. The sample would be women diagnosed with IC/BPS, and would be identified by the staff physician
at the tertiary care hospitals that were used for recruitment of the present study. The sample
would be randomly selected from the clinic list, and the wait-list participants would continue with
treatment-as-usual. The treatment manual would be adapted from the recently published
feasibility trial in a sample of men with CP/CPPS that used a CBT framework (Tripp et al., 2011).
The feasibility trial evaluated the efficacy of a treatment protocol over 8 weeks in a group therapy
format. Each session would focus on particular strategies that were suggested within the IC-SRM.
For example, one session would focus on challenging and improving illness cognitions using
reaction records. Another session would focus on decreasing the use of IFC and increasing the
use of WFC using strategies such as behavioural activation, behavioural experiments and
exposure. Other sessions would focus on improving emotion regulation strategies such as
acceptance and reappraisal. There would be a baseline measurement and weekly assessments of
the outcomes variables in order to systematically assess for change throughout the therapy
sessions. There would also be a post-intervention assessment to assess for changes associated
with the therapy over time. The results and findings of this dissertation have significant
theoretical and clinical implications and can help guide various areas of future research, however,
this research also contains some limitations, which are discussed below.
Study Limitations

There are several limitations to be discussed in the current research. Primarily, the use of self-report data is often viewed as a limitation. Indeed, questionnaires collected using self-reported data from respondents are by its very nature a lower quality type of research compared to studies that employ direct manipulation of key variables. Self-report data has the possibility of containing biases such as selective memory, attribution errors and exaggeration. However, this is also a necessary feature of pain research due to the subjective nature of the experience of pain, as well as because of time and support costs to completing large-scale observational studies. Self-report data are a necessary part of clinical research, especially within the exploratory phase, and future studies could collect both self-report questionnaires as well as more objective measures for a more comprehensive evaluation (i.e., physicians’ ratings of functioning, biomedical markers of urinary symptoms).

Another potential limitation of this study was that the women were recruited from centers in Canada and the US. There were no significant differences in demographic variables such as education, partner status or time since diagnosis, or in clinical variables such as IC/BPS symptoms (e.g., urinary frequency, urgency, nocturia). Conversely, the Canadian and US sample differed in terms of age, in which T-tests demonstrated the Canadian sample to be older (mean = 51.34 ± 15.81) than the US sample (mean = 44.61 ± 13.71). However, these age ranges are consistent with other samples in the US (Clemens, Brown, Kozloff, & Calhoun, 2006; Rabin et al., 2000) and in Canada (Katz et al., 2013; Nickel et al., 2010; Nickel et al., 2007; Tripp et al., 2006). Additionally, the mean ICPI scores were significantly higher in the US sample (11.60 ± 3.49) than the Canadian sample (10.42 ± 3.70), although this discrepancy was not clinically meaningful (O’Leary et al., 1997). Moreover, the range of ICPI scores were consistent with
problems associated with IC/BPS symptoms in other published clinical North American samples (Clemens et al., 2008; Nickel et al., 2010; Tripp et al., 2009).

Another limitation of this study is in relation to the generalizability of the sample. Caution should be exercised when applying the results of this study to women of other ethnicities as the majority of this sample identified as Caucasian. However, Clemens et al. (2007) evaluated the prevalence of IC/BPS and effects on QoL in Black, Hispanic and Caucasian patients in which analyses revealed that there were no variations by race or ethnicity (Clemens et al., 2007). In a similar line, this sample only consisted of women diagnosed with IC/BPS, and the results of this study may not be generalizable to men with IC/BPS or other chronic pelvic pain syndromes. Future research should examine similar models of self-regulation in men with pelvic pain, such as CP/CPPS, to expand the generalizability of the present findings.

Another limitation of this study is associated with the statistical methodology. One limitation in SEM is the assumption of causality amongst pathways. The only true method of inferring causation is through study design features (e.g., longitudinal studies with experimentation of key variables). Yet SEM has some advantages over other statistical methods for establishing the conditions necessary to infer causality and is a useful procedure in model construction. For one, it has the ability to account for random and systematic measurement error. It also allows for flexibility in assessing for numerous and complex hypotheses. Furthermore, it has the ability to simultaneously assess multiple relationships amongst variables (Kline, 2005). The use of SEM within cross-sectional datasets is a necessary feature of research due to the time and support costs of completing large-scale projective studies with the manipulation of variables.

A final limitation relates to this study’s cross-sectional design. This dissertation outlines a model of the process of how women cope with IC/BPS, however it only captures a snapshot of
their experience at one point in time. As such, caution should be taken when generalizing the
effects of this dissertation as this model specifies a summary of the average effect of the coping
process and the various constructs that may impact on these relationships. Moreover, the term
“process” reflects that coping is dynamic in terms of the mechanisms that occur over time. Future
research should evaluate the IC-SRM over time to understand how the specified cognitions,
coping and outcomes are associated over time.
General Conclusion

This dissertation provides novel findings from the IC-SRM, which modeled the process in which women appraise and cope with their experiences associated with IC/BPS. Findings support that negative cognitive-emotional illness perceptions and illness self-efficacy perceptions are associated with how individuals cope with IC/BPS-related pain and symptoms through illness and wellness-focused behavioural coping as well as emotion regulation strategies. Emotion regulation strategies are emphasized within this model as a mechanism to decrease physical disability and improve mental health and well-being. Moreover, wellness-focused strategies appear to interrupt the progression from negative illness perceptions to decreased mental health outcomes. The feedback loop within the IC-SRM supports the cyclical nature of chronic pain such that increased disability is associated with greater impairments thus leading to further pain, symptoms and maladaptive coping; and the fear-avoidance model of chronic pain theoretically supports this finding. The finding from this study offer direct treatment targets in which negative illness perceptions, catastrophizing and illness-focused behavioural strategies should be discouraged, while perceptions of illness self-efficacy, reappraisal, pain acceptance and wellness-focused behavioural strategies should be encouraged. The IC-SRM is a parsimonious model that examined a general understanding of how women with IC/BPS experience impairments, perceptions, coping and outcomes in relation to their condition. As such, future clinical interventions should employ the generalized results from this dissertation to individualized treatment based on individual’s needs. In conclusion, the results of this dissertation have clinical and theoretical implications that could impact and reform treatment models for women suffering from IC/BPS.
References


*Current Directions in Psychological Science, 16*(6), 351-355.


New York: The Guilford Press.


Appendix A: Short-Form – McGill Pain Questionnaire

Pain Rating Index: Please rate each of the following words in terms of how it describes your present pain by placing a check mark next to one number (0, 1, 2, or 3) per word.

<table>
<thead>
<tr>
<th></th>
<th>NONE</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throbbing</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Shooting</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Stabbing</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Sharp</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Cramping</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Gnawing</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Hot-Burning</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Aching</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Heavy</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Tender</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Splitting</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Tiring-Exhausting</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Sickening</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Fearful</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
<tr>
<td>Punishing-Cruel</td>
<td>0)____</td>
<td>1)____</td>
<td>2)_____</td>
<td>3)____</td>
</tr>
</tbody>
</table>

Numeric Rating Scale
Please circle the number that describes your present pain where 0 equals “no pain” and 10 equals “worst pain possible”

No Pain | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10
---------|---|---|---|---|---|---|---|---|---|---
Worst pain possible

Present Pain Index
Choose the number of the word which best describes your present pain by circling the word

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pain</td>
<td>Mild</td>
<td>Discomforting</td>
<td>Distressing</td>
<td>Horrible</td>
<td>Excruciating</td>
</tr>
</tbody>
</table>
Appendix B: Interstitial Cystitis Symptom and Problem Indices

Interstitial Cystitis Symptom Index:

Q1. During the past month, how often have you felt the strong need to urinate with little or no warning?

0. _ not at all
1. _ less than 1 time in 5
2. _ less than half the time
3. _ about half the time
4. _ more than half the time
5. _ almost always

Q2. During the past month, have you had to urinate less than 2 hours after you finished urinating?

0. _ not at all
1. _ less than 1 time in 5
2. _ less than half the time
3. _ about half the time
4. _ more than half the time
5. _ almost always

Q3. During the past month, how often did you most typically get up at night to urinate?

0. _ none
1. _ once
2. _ 2 times
3. _ 3 times
4. _ 4 times
5. _ 5 or more times

Q4. During the past month, have you experienced pain or burning in your bladder?

0. _ not at all
1. _ a few times
2. _ fairly often
3. _ usually
5. _ almost always

Add the numerical values of the checked entries;

Total Score: _______

Interstitial Cystitis Problem Index:

Q1. Frequent Urination during the day?

0. _ no problem
1. _ very small problem
2. _ small problem
3. _ medium problem
4. _ big problem

Q2. Getting up at night to urinate?

0. _ no problem
1. _ very small problem
2. _ small problem
3. _ medium problem
4. _ big problem

Q3. Need to urinate with little warning?

0. _ no problem
1. _ very small problem
2. _ small problem
3. _ medium problem
4. _ big problem

Q4. Burning, pain, discomfort, or pressure in your bladder?

0. _ no problem
1. _ very small problem
2. _ small problem
3. _ medium problem
4. _ big problem

Add the numerical values of the checked entries;

Total Score: _______

Interstitial Cystitis Symptom Index and Problem Index
(O’Leary, Sant, Fowler, Whitmore, Spolarich-Kroll, 1997)

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## Appendix C: Brief – Illness Perceptions Questionnaire

1. **How much does your illness affect your life?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>no affect at all</td>
<td>severely affects my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **How long do you think your illness will continue?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>a very short time</td>
<td>forever</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **How much control do you feel you have over your illness?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>absolutely no control</td>
<td>extreme amount of control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **How much do you think your treatment can help your illness?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all</td>
<td>extremely helpful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **How much do you experience symptoms from your illness?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>no symptoms at all</td>
<td>many severe symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. **How concerned are you about your illness?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all concerned</td>
<td>extremely concerned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. **How well do you feel you understand your illness?**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>don’t understand at all</td>
<td>understand very clearly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. **How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?)**
   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all affected emotionally</td>
<td>extremely affected emotionally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please list in rank-order the three most important factors that you believe caused your illness.  
*The most important causes for me:*

1. ____________________________
2. ____________________________
3. ____________________________
## Appendix D: Chronic Pain Coping Inventory

**Instructions:** During the past week, how many days did you use each of at least once in the day to cope with your pain? Please include days when you use to prevent or minimize pain, even if you did not have pain at that time.

<table>
<thead>
<tr>
<th></th>
<th>Number of Days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Limited my standing time</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>2.</strong> Lay down on a bed</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>3.</strong> Asked for help with a chore or task</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>4.</strong> Focused on relaxing my muscles</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>5.</strong> I didn’t let the pain interfere with my activities</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>6.</strong> Exercised to improved my overall physical condition for at least 5 minutes</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>7.</strong> I got support from a friend</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>8.</strong> Told myself the pain will get better</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>9.</strong> Avoided activity</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>10.</strong> Rested in a chair or recliner</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>11.</strong> Asked for help in carrying, lifting, or pushing something</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>12.</strong> Used deep, slow breathing to relax</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>13.</strong> Did not let the pain affect what I was doing</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>14.</strong> Stretched the muscles where I hurt and held the stretched for at least 10 seconds</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>15.</strong> Talked to a friend or family member for support</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td><strong>16.</strong> Reminded myself that there are people who are worse off than I am</td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>
Appendix E: Pain Catastrophizing Scale

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

<table>
<thead>
<tr>
<th>When I’m in pain …</th>
<th>Not at all</th>
<th>To a slight degree</th>
<th>To a moderate degree</th>
<th>To a great degree</th>
<th>All the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I worry all the time about whether the pain will end.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>2. I feel I can’t go on.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>3. It’s terrible and I think it’s never going to get any better.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>4. It’s awful and I feel that it overwhels me.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>5. I feel I can’t stand it anymore.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>6. I become afraid that the pain will get worse.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>7. I keep thinking of other painful events.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>8. I anxiously want the pain to go away.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>9. I can’t seem to keep it out of my mind.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>10. I keep thinking about how much it hurts.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>11. I keep thinking about how badly I want the pain to stop.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>12. There’s nothing I can do to reduce the intensity of the pain.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
<tr>
<td>13. I wonder whether something serious may happen.</td>
<td>○₀</td>
<td>○₁</td>
<td>○₂</td>
<td>○₃</td>
<td>○₄</td>
</tr>
</tbody>
</table>
Appendix F: Emotion Regulation Questionnaire

The Emotion Regulation Questionnaire is designed to assess individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression.

Instructions and Items
We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1. _____ When I want to feel more positive emotion (such as joy or amusement), I change what I’m thinking about.

2. _____ I keep my emotions to myself.

3. _____ When I want to feel less negative emotion (such as sadness or anger), I change what I’m thinking about.

4. _____ When I am feeling positive emotions, I am careful not to express them.

5. _____ When I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

6. _____ I control my emotions by not expressing them.

7. _____ When I want to feel more positive emotion, I change the way I’m thinking about the situation.

8. _____ I control my emotions by changing the way I think about the situation I’m in.

9. _____ When I am feeling negative emotions, I make sure not to express them.

10. _____ When I want to feel less negative emotion, I change the way I’m thinking about the situation.
Appendix G: Chronic Pain Acceptance Questionnaire

Directions: Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices. For instance, if you believe a statement is ‘Always True,’ you would write a 6 in the blank next to that statement.

0
Never
True
1
Very
Rarely
2
Seldom
True
3
Sometimes
True
4
Often
True
5
Almost
Always
True
6
Always
True

1. I am getting on with the business of living no matter what my level of pain is ........
2. My life is going well, even though I have chronic pain ........
3. It’s OK to experience pain ........
4. I would gladly sacrifice important things in my life to control this pain better ........
5. It’s not necessary for me to control my pain in order to handle my life well ........
6. Although things have changed, I am living a normal life despite my chronic pain ........
7. I need to concentrate on getting rid of my pain ........
8. There are many activities I do when I feel pain ........
9. I lead a full life even though I have chronic pain ........
10. Controlling pain is less important than any other goals in my life ........
11. My thoughts and feelings about pain must change before I can take important steps in my life ........
12. Despite the pain, I am now sticking to a certain course in my life ........
13. Keeping my pain level under control takes first priority whenever I’m doing something ........
14. Before I can make any serious plans, I have to get some control over my pain ........
15. When my pain increases, I can still take care of my responsibilities ........
16. I will have better control over my life if I can control my negative thoughts about pain ........
17. I avoid putting myself in situations where my pain might increase ........
18. My worries and fears about what pain will do to me are true ........
19. It’s a relief to realize that I don’t have to change my pain to get on with my life ........
20. I have to struggle to do things when I have pain ........
Appendix H: Positive and Negative Activation Schedule

**Directions:** This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you felt this way in the last week. Use the following scale to record your answers:

<table>
<thead>
<tr>
<th></th>
<th>1 very slightly or not at all</th>
<th>2 a little</th>
<th>3 moderately</th>
<th>4 quite a bit</th>
<th>5 extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>interested</td>
<td>11. scared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>distressed</td>
<td>12. hostile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>excited</td>
<td>13. enthusiastic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>upset</td>
<td>14. proud</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>strong</td>
<td>15. irritable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>guilty</td>
<td>16. alert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>ashamed</td>
<td>17. attentive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>inspired</td>
<td>18. jittery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>nervous</td>
<td>19. active</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>determined</td>
<td>20. afraid</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Appendix I: Patient Health Questionnaire – 9

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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Not at all (0)</th>
<th>Several days (1)</th>
<th>More than half the days (2)</th>
<th>Nearly every day (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little interest or pleasure in doing things.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Feeling down, depressed, or hopeless.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Trouble falling/staying asleep, sleeping too much.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Feeling tired or having little energy.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Poor appetite or overeating.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Feeling bad about yourself, or that you are a failure, or have let yourself or your family down.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Trouble concentrating on things, such as reading the newspaper or watching TV.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Moving or speaking so slowly that other people could have noticed.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Or the opposite; being so fidgety or restless that you have been moving around more than usual.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Thoughts that you would be better off dead or of hurting yourself in some way.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2. If you checked off any problem on this questionnaire so far, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

☐ Not difficult at all  ☐ Somewhat difficult  ☐ Very difficult  ☐ Extremely difficult
Appendix J: Satisfaction with Life Survey

Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

1 = Strongly disagree
2 = Disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Agree
7 = Strongly agree

_____ 1. In most ways my life is close to my ideal.
_____ 2. The conditions of my life are excellent.
_____ 3. I am satisfied with life.
_____ 4. So far I have gotten the important things I want in life.
_____ 5. If I could live my life over, I would change almost nothing.
Appendix K: Life Orientation Test – Revised

Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no ‘correct’ or ‘incorrect’ answers. Answer according to your own feelings, rather than how you think ‘most people’ would answer.

4 = I agree a lot
3 = I agree a little
2 = I neither agree nor disagree
1 = I disagree a little
0 = I disagree a lot

_____ 1. In uncertain times, I usually expect the best.
_____ 2. It’s easy for me to relax.
_____ 3. If something can go wrong for me, it will.
_____ 4. I’m always optimistic about my future.
_____ 5. I enjoy my friends a lot.
_____ 6. It’s important for me to keep busy.
_____ 7. I hardly ever expect things to go my way.
_____ 8. I don’t get upset too easily.
_____ 9. I rarely count on good things happening to me.
_____ 10. Overall, I expect more good things to happen to me than bad.
Appendix L: Pain Disability Index

**Directions:** The scales below indicate how much your pain is preventing you from doing what you would normally do, or from doing it as well as you normally would. Respond to each category by indicating the *overall impact* of pain in your life, not just pain at its worst. Please fill in the circle of the number on the scale that describes the level of disability you typically experience. A score of 0 “no disability at all”, and a score of 10 “all of the activities in which you would normally be involved have been totally disrupted or prevented by your pain”.

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

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO Disability</td>
<td>TOTAL Disability</td>
<td></td>
<td></td>
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</table>

2. **Recreation**
   This category includes hobbies, sports, and other similar leisure time activities (e.g., tennis, playing cards).

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<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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<th>4</th>
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<th>10</th>
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</thead>
<tbody>
<tr>
<td>NO Disability</td>
<td>TOTAL Disability</td>
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3. **Social Activity**
   This category refers to activities that involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out, and other social functions.

<table>
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<tr>
<th>0</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>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO Disability</td>
<td>TOTAL Disability</td>
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4. **Occupation**
   This category refers to activities that are part of or directly related to one’s job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

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<th>0</th>
<th>1</th>
<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO Disability</td>
<td>TOTAL Disability</td>
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</table>

5. **Sexual Behaviour**
   This category refers to the frequency and quality of one’s sex life.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO Disability</td>
<td>TOTAL Disability</td>
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</tbody>
</table>

6. **Self-care**
This category includes activities that involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.)

<table>
<thead>
<tr>
<th>$Q_0$</th>
<th>$Q_1$</th>
<th>$Q_2$</th>
<th>$Q_3$</th>
<th>$Q_4$</th>
<th>$Q_5$</th>
<th>$Q_6$</th>
<th>$Q_7$</th>
<th>$Q_8$</th>
<th>$Q_9$</th>
<th>$Q_{10}$</th>
</tr>
</thead>
</table>

**NO Disability** | **TOTAL Disability**

7. **Life-support activity**

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

<table>
<thead>
<tr>
<th>$Q_0$</th>
<th>$Q_1$</th>
<th>$Q_2$</th>
<th>$Q_3$</th>
<th>$Q_4$</th>
<th>$Q_5$</th>
<th>$Q_6$</th>
<th>$Q_7$</th>
<th>$Q_8$</th>
<th>$Q_9$</th>
<th>$Q_{10}$</th>
</tr>
</thead>
</table>

**NO Disability** | **TOTAL Disability**