

PAIN CONGRUENCE IN COUPLES WITH CANCER: EXAMINING THE ROLE OF AGE
AND BIOPSYCHOSOCIAL CORRELATES

PANIZ HAGHIGHI

A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

GRADUATE PROGRAM IN KINESIOLOGY AND HEALTH SCIENCE
YORK UNIVERSITY
TORONTO, ONTARIO

FEBRUARY 2022

ABSTRACT

Using Gauthier and Gagliese's biopsychosocial model, this study examined age-related patterns in pain severity and interference congruence. Patients with cancer and their spouse-caregivers (SCs) completed biopsychosocial measures and rated their pain experiences using the Brief Pain Inventory. SCs also rated their partner's pain. Younger (YC; patient < 60 years old) and older (OC; patient $\geq$ 60 years old) couples did not differ on pain severity or interference congruence; however, correlates associated with each outcome differed by age group. Correlates of pain severity congruence in YC were: patient pain interference, solicitous responses, SC depression and caregiving strain. Correlates in OC were: pain acceptance and SC punishing responses. Correlates of pain interference congruence in YC were: SC attachment avoidance. Correlates in OC were: patient pain severity, depression and SC marital satisfaction. These results support Gauthier and Gagliese's model and highlight the importance of age-related patterns in supporting couples coping with cancer pain.

TABLE OF CONTENTS

ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS	vii
CHAPTER ONE: INTRODUCTION	1
Cancer Pain and Aging	3
Pain Definition and Theories	5
Pain Congruence	8
Age Differences in Pain Experience and Congruence	14
Spouse-Caregiver Factors Associated with Pain Congruence	15
Patient Factors Associated with Pain Congruence	19
Couple Factors Associated with Pain Congruence	24
OBJECTIVES	27
HYPOTHESES	27
CHAPTER TWO: METHODS	28
Patient Recruitment.....	28
Sample, Inclusion and Exclusion Criteria.....	28
Procedure	30
<i>Recruitment of patients in the study “Biopsychosocial Age Differences in the Experience of Cancer Pain”</i>	<i>30</i>
<i>Recruitment of patients in the study “Age-related Patterns in Pain following Breast Cancer Surgery”</i>	<i>31</i>
<i>Recruitment of SCs for the current sub-study:</i>	<i>32</i>
Measures	33
Data Analysis.....	39
CHAPTER THREE: RESULTS	45
Differences Between Patients and SCs.....	47
Age Group Differences	51
Pain Congruence Outcomes.....	55
CHAPTER FOUR: DISCUSSION.....	62

The Biopsychosocial Model of Pain Congruence.....	62
Participant Characteristics	65
Pain Congruence Across Age Groups	74
Pain Severity Congruence.....	78
Pain Interference Congruence.....	87
Pain Congruence Across Outcomes.....	93
Strengths and Limitations	94
Implications and Future Directions.....	98
CHAPTER FIVE: CONCLUSION	101
REFERENCES.....	102
APPENDICES	133
Appendix A: Informed Consent Forms	133
Appendix B: Questionnaires	139

LIST OF TABLES

Table 1. Measures Completed by Patients and their SCs	34
Table 2. Demographic Characteristics and Biopsychosocial Factors of Patients and SCs.....	50
Table 3. Correlations of the Three Measures of Pain Catastrophizing (PCS)	50
Table 4. Comparison of Demographic Characteristics and Biopsychosocial Factors Between Younger and Older Couples.....	51
Table 5. Comparison of Relationship Characteristics and Pain Congruence Outcomes Between Younger and Older Couples.....	55
Table 6. Candidate Correlates of each Pain Congruence Outcome in Younger and Older Couples	58
Table 7. Multivariate Linear Regression Correlates of Pain Severity Congruence	60
Table 8. Multivariate Linear Regression Correlates of Pain Interference Congruence	61
Table 9. Summary of Significant Biopsychosocial Correlates for Each Pain Congruence Outcome in Younger and Older Couples.....	77

LIST OF FIGURES

Figure 1. Hypothesized Model of Correlates of Pain Congruence in Patients with Cancer Pain and their SCs	2
Figure 2. CONSORT diagram of participants	46
Figure 3. Frequency Distribution of Pain Severity and Interference Congruence Difference Scores in Younger and Older Couples	56
Figure 4. Summary Model of Significant Biopsychosocial Correlates for Pain Severity Congruence in Younger and Older Couples	64
Figure 5. Summary Model of Significant Biopsychosocial Correlates for Pain Interference Congruence in Younger and Older Couples	65

LIST OF ABBREVIATIONS

Abbreviation	Meaning
BPI	Brief Pain Inventory
CCI	Charlson Comorbidity Index
CES-D	Centre for Epidemiologic Studies – Depression Scale
CMS	Caregiver Mastery Scale
CPAQ	Chronic Pain Acceptance Questionnaire
CSI	Caregiver Strain Index
ECR	Experiences in Close Relationships Scale
IASP	International Association for the Study of Pain
KMS	Kansas Marital Satisfaction Scale
MPI	Multidimensional Pain Inventory
OC	Older Couples
PCS	Pain Catastrophizing Scale
RA	Research Assistant
SC	Spouse Caregiver
SOMC	Short Orientation-Memory-Concentration
YC	Younger Couples

CHAPTER ONE: INTRODUCTION

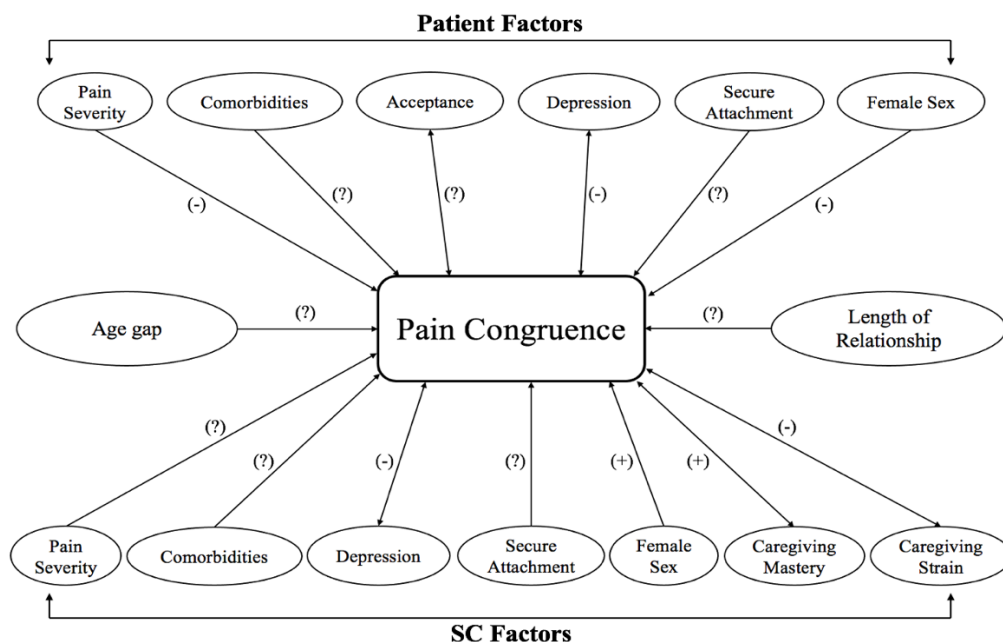
Cancer is the leading cause of death among Canadians, and pain is among its most common symptoms (Cleeland, 1998; National Cancer Institute of Canada, 2019; Patrick et al., 2004). As the population ages, there will be an increase in the number of older adults with cancer and their caregivers who will be required to cope with pain. Spouses (i.e., individuals who are married, partnered or in common law relationships [Pension Benefits Act, 2017]) are the most common informal caregivers (Kurtz et al., 1994) and are the most vulnerable to the negative effects of coping with cancer and disease-related pain (Nijboer et al., 1998; Westman et al., 2008). Many of these spouse caregivers (SCs) are also coping with their own health challenges and functional limitations, which may impact the way they interact with their spouses (Haley, 2003).

Pain congruence refers to the extent of agreement in perceptions of pain between members of a dyad, in this instance people with cancer pain and their SCs. It is associated with greater psychological wellbeing, coping and adjustment behaviours for both members of the dyad (Cano, Johansen, et al., 2005; Cremeans-Smith et al., 2003; Junghaenel et al., 2018; Martire et al., 2006; Miaskowski, Zimmer, et al., 1997; Riemsma et al., 2000). Unfortunately, little is known about age-related patterns in how couples understand and collectively cope with cancer-related pain and its impact. Using Gauthier and Gagliese's biopsychosocial model of pain congruence as a framework (Figure 1), age differences and hypothesized variables from both patients and SCs were incorporated in the present study to provide a comprehensive lens with which to examine pain congruence in couples coping with cancer.

The current study is the first, to our knowledge, to examine age differences and to use relative difference scores as a continuous variable measuring pain congruence. Although most

research has focused on congruence in pain severity as the sole measure of concordance among couples, pain interference also plays an important role in the caregiving processes and interactions of couples coping with cancer pain. Elements of pain interference, such as difficulty walking or performing housework, may be more visible to caregivers or understood in different ways than pain severity (Cano, Johansen, et al., 2005; Johannessen, 2019). Therefore, it is important to consider both outcomes when examining pain congruence, as each may present its own unique findings. This study developed separate models for pain severity and interference congruence in younger and older couples using demographic, biological, relational, psychological and caregiving variables. Identifying modifiable risk factors and age-related patterns in correlates of pain congruence will inform the development of tailored pain communication strategies, which may contribute to a better shared understanding of pain between patients with cancer and their SCs.

Figure 1. Hypothesized Model of Correlates of Pain Congruence in Patients with Cancer Pain and their SCs



Symbols: (+), positive relationship; (-), negative relationship; (?), relationship has yet to be examined.

Cancer Pain and Aging

An estimated 1 in 2 Canadians will develop cancer over their lifetime, making this illness the leading cause of death in Canada (National Cancer Institute of Canada, 2019). Although cancer can be accompanied by a number of different symptoms, pain is the most common and feared (Cleeland, 1998; Patrick et al., 2004). Over two-thirds of people with cancer report pain (Kirkova et al., 2012; Miaskowski et al., 2012), with the prevalence and severity increasing as the disease progresses (Bruera & Kim, 2003; McCarthy et al., 2000; Peng et al., 2006). This pain is complex and may be caused by tumor involvement or metastatic spread to soft tissue, viscera or bone (Bruera & Kim, 2003), as well as treatments such as radiation, surgery or chemotherapy (Bruera & Kim, 2003; Caraceni & Portenoy, 1999; Green & Hart-Johnson, 2010; McGuire, 2004). Cancer-related pain may be nociceptive, stemming from the activation of afferent nerves in somatic tissue or viscera (Caraceni & Portenoy, 1999; Ellingson & Vanderah, 2020) or neuropathic, resulting from damage to the peripheral and/or central nervous systems (Backonja, 2003), with a substantial number of patients experiencing both types of pain (Grond et al., 1999).

Pain severity is described as an individual's perceived magnitude of pain experienced (Haefeli & Elfering, 2006). Its impact is multidimensional, as it can influence a broad spectrum of life domains, including physical and psychological wellbeing, and social and family relationships (Badr et al., 2010; Turk et al., 1998; Wells et al., 2003; Williamson & Schulz, 1995). Changes in cancer pain severity may be due to various factors such as disease progression, inadequate treatment, or responses to analgesic therapy (Bruera & Kim, 2003). Patients with cancer often report moderate levels of pain severity, with various biopsychosocial factors such as depression, negative mood and pain-related distress all impacting these reports

(L. R. Gauthier et al., 2009, 2012; Lin, 2001; Mah et al., 2018; Wells et al., 2003; Williamson & Schulz, 1995).

Similar to pain severity, pain interference, the extent to which pain affects one's everyday work, social, and interpersonal activities, is also multidimensional and may be influenced by a broad range of biopsychosocial factors (Miettinen et al., 2019). More than half of people with cancer report that their pain interferes with psychological and physical functioning, including activities of daily living such as walking or socializing (Tegegn & Gebreyohannes, 2017). Greater pain interference has been related to inadequate pain management, increased distress about pain, depression, comorbidities and decreased functional status (Cleeland et al., 1994; Wells et al., 2003; Williamson & Schulz, 1995).

Although cancer pain affects people of all ages, older adults make up the largest proportion of patients with cancer (National Cancer Institute of Canada, 2019), with a projected 70% of all cancer diagnoses occurring in adults aged 65 or older in the next 10 years (Cope, 2019). Despite this, cancer pain in older people often remains unrecognized, underestimated, or inadequately treated (R. F. Lyons et al., 2006). A long-held assumption is that pain is a normal, inevitable part of aging (Appelt et al., 2007; Thielke et al., 2012) and that older patients may have an easier experience than younger patients in coping with cancer pain (Blank & Bellizzi, 2008). However, several cross-sectional and longitudinal studies have suggested that this is not the case, and that younger and older adults with cancer report similar pain experiences (Gagliese et al., 2009; Green & Hart-Johnson, 2010; Mah et al., 2018; Williamson & Schulz, 1995). Unfortunately, our understanding of cancer pain and its impact, especially with regards to pain interference, across age groups is still limited. With the increasing aging population (Statistics Canada, 2021), and projected increase in incidence of cancer (National Cancer Institute of

Canada, 2019), this information is needed to inform the development of treatments tailored to the needs of individuals coping with cancer pain at different life stages. In the current study, age differences in congruence on measures of cancer pain severity and interference are examined for the first time in both younger and older couples.

Pain Definition and Theories

The International Association for the Study of Pain (IASP) currently defines pain as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage” (IASP, 2020, p. 1976). However, it was not always viewed as such.

In 1965, the gate control theory of pain (Melzack & Wall, 1965) proposed that pain was more than just a biophysical phenomenon as had been previously believed. Instead, pain was created through modulating effects of the central nervous system. Specifically, incoming signals from the periphery were influenced, in both inhibitory and excitatory directions, in the spinal cord by central and peripheral inputs, including the brain (Melzack & Wall, 1965). That is, the brain played a critical role in the creation and modulation of pain. With time, the model was widely accepted and the conceptualization of pain shifted from a simple sensory experience to a complex psychological experience modulated by peripheral and central nociceptive systems and impacted by various biomedical and psychosocial interventions (Asmundson & Wright, 2004; Melzack & Wall, 1983; Merskey, 1998).

The biopsychosocial model of pain was developed as an adaptation of the gate control theory, suggesting that pain experience, expression, report, and judgments are influenced by the dynamic interaction of biological, psychological, and social factors (Gatchel et al., 2007). These

factors include age, cognitive status, physical functioning and socio-economic status among others (Gagliese et al., 2018). Although the importance of interpersonal factors in pain has long been recognized (Melzack & Wall, 1983), the predominant focus of pain researchers has been on intrapersonal biological and psychological processes, leaving the social dimensions of the biopsychosocial model relatively unexamined (Hadjistavropoulos et al., 2011).

To further understand the interpersonal features of pain, various social models were later developed. The communications model of pain proposes that an individual's social environment plays a determinative role in pain experience, treatment, and expression as caregivers devote their attention to decoding expressive pain behavior and responding to the person in pain (Hadjistavropoulos & Craig, 2002). It recognizes that biological mechanisms are fundamental to the psychological processes involved in the expression of pain, but that social processes also serve as causes and consequences of painful experiences (Rosenthal, 1982).

The communications model is rooted in Rosenthal's (1982) A-B-C judgement model, whereby observers decode and react to the behaviour of their partners. The model proposes that communication from a patient to their observer is a three-step process (Rosenthal, 1982). The patient undergoes an internal experience of pain (Step A) that is encoded with various forms of expressive behaviour (Step B). The expressive behaviours are decoded by the observer (Step C). Thus, the observer's decoding or interpretation of their partner's pain cues will help shape their response to the person in pain (Rosenthal, 1982). The accuracy of these interpretations may be influenced by many observer or patient factors, such as age or sex (Hadjistavropoulos et al., 2011).

Other social models of pain have also been developed such as the communal coping model (CCM), which suggests that certain expressive behaviours, such as catastrophizing, may

serve as coping efforts (Thorn et al., 2003). Catastrophizing, defined as a hypervigilant state characterized by excessive focus on the negative implications of pain, is characterized by magnification, rumination and feelings of helplessness (Sullivan et al., 2001). According to the CCM, individuals may use catastrophizing as a means of eliciting support from and conveying distress to their caregivers (Sullivan et al., 2001). Therefore, catastrophizing is not always maladaptive, but may be part of a broader interpersonal process of effectively coping with distress and communicating pain to caregivers.

Unfortunately, the communication of pain between individuals with cancer and their caregivers has been understudied. In addition, various aspects of the pain experience such as pain acceptance, attachment style, or spouses' pain symptoms and comorbidities have yet to be studied in the context of cancer pain congruence. Thus, to address these gaps in the literature, Gauthier and Gagliese developed the model outlined in Figure 1 to incorporate biopsychosocial aspects from both patients and their caregivers and generate hypotheses about the shared understanding of pain within couples. This framework borrows from and adapts the models reviewed above to create a comprehensive lens with which to view pain congruence. The current study is designed to test and refine this model by incorporating multiple relational factors, biological attributes, psychological distress, and social determinants of health for the first time simultaneously. In addition, it examines age-related differences in two specific pain congruence outcomes (pain severity and pain interference). The factors most important to this model are outlined in the following sections.

Pain Congruence

Pain congruence refers to the extent of agreement between two members of a dyad in their perceptions of one partner's experience of pain, in this instance people with cancer pain and their SCs (Pence et al., 2006). To measure congruence, both members of the dyad are asked to provide ratings of the same construct on the same scale (e.g., rate the patient's pain from 0 = no pain to 10 = worst pain possible) and the difference between these ratings is calculated. When ratings are similar, for example both partners have rated the patient's pain as a 6 out of 10, then the dyad is congruent. Conversely, incongruence occurs when partners differ in their ratings of pain, either through SC underestimation or overestimation of the patient's pain. Underestimation occurs when SCs give a lower rating of their spouse's pain than do their spouses about themselves. For example, the SC has rated their spouse's pain as a 3, whereas their spouse has rated their own pain as a 7. On the other hand, overestimation occurs when SCs give a higher rating of their spouse's pain than do their spouses. For example, the SC has rated their partner's pain as a 7, whereas their spouse has rated their own pain as a 3. It is important to note that most studies have failed to consider these two types of incongruence, underestimation and overestimation of pain, separately.

Greater pain congruence may have positive effects for both individuals with cancer and their SCs, such as better psychological wellbeing, lower levels of pain intensity and better physical functioning (Cano, Johansen, et al., 2005; Lin, 2001; Martire et al., 2006; Miaskowski, Zimmer, et al., 1997). In congruent dyads, SCs may provide assistance that better meets their spouses' needs, both physically and emotionally (Martire et al., 2006).

Incongruence related to underestimation of pain may be related to empathic accuracy. Pain-related empathic accuracy is defined as the awareness and acknowledgement of another person's

experience of pain (Goubert et al., 2005). According to the empathic accuracy model, intimate knowledge of a partner's suffering may be related to poor SC wellbeing, especially when unable to escape from a potentially threatening situation, or when prior attempts to help manage pain have been unsuccessful (Goubert et al., 2005; Simpson et al., 2003). When efforts to help manage their partner's pain fail, spouses may try to escape from the situation or to avoid discussion about the topic altogether (Simpson et al., 2003). This may lead SCs to move toward a state of "motivated inaccuracy" as a way to manage their own distress, often resulting in underestimation of the patient's pain severity and interference (Goubert et al., 2005).

Conversely, incongruence related to overestimation of pain may be related to emotional contagion. According to this concept, caregivers often feel similar but more intense emotions to those of the care recipients, especially when reporting more closeness to their partners, as in the case of spouses (Monin & Schulz, 2009). Marital satisfaction has an effect on emotional contagion such that spouses who are more satisfied with their marriages show greater distress and hypervigilance to expressions of pain by their partners than unsatisfied spouses (Monin & Schulz, 2009), often resulting in overestimation. This overreaction by the observer may elicit a re-evaluation of pain in the patient as more serious than initially thought (Goubert et al., 2005). In an effort to help their partners, SCs may become overprotective, hindering their spouse's independent functioning and potentially contributing to greater psychological distress (Goubert et al., 2005).

The present study examines both of types of incongruence, underestimation and overestimation of pain, as each type may be associated with its own potential risk factors. Studying pain congruence in the contexts of these factors may provide a better understanding of

the correlates associated with a couple's shared agreement of pain and help guide the development of pain communication strategies in couples coping with cancer pain.

Studies on pain congruence have focused almost exclusively on pain severity as the measure of patient-spouse concordance, while other aspects of the pain experience, such as pain interference, remain relatively unexamined. Pain interference has been associated with greater incongruence in pain severity among couples in which one partner has cancer-related pain (Lin, 2001; Miaskowski, Zimmer, et al., 1997). This may, in part, be because patients whose pain is misunderstood, may not receive adequate support from their SCs to manage their pain properly (Miaskowski, Zimmer, et al., 1997).

To our knowledge, only two studies have examined pain interference congruence as an outcome variable (Cano, Johansen, et al., 2005; Suso-Ribera et al., 2019). Suso-Ribera et al. (2019) found that only patient physical functioning was a significant correlate of pain interference congruence, with better physical functioning associated with greater overestimation of pain interference by caregivers. Furthermore, Cano et al. (2005) found both patient and SC psychological distress were correlated with pain interference congruence, albeit in opposite directions. Patient psychological distress was associated with greater underestimation of pain interference by SCs, whereas SC psychological distress was associated with greater overestimation of pain interference by SCs (Cano, Johansen, et al., 2005). In addition, when the patient was a woman, both members of the couple rated pain interference higher than when the patient was a man (Cano, Johansen, et al., 2005). These studies included sex, physical functioning and psychological distress but not the broader range of biopsychosocial correlates of pain interference congruence (Cano, Johansen, et al., 2005; Suso-Ribera et al., 2019). Furthermore, the participants (Cano, Johansen, et al., 2005; Suso-Ribera et al., 2019) were

patients with chronic non-malignant pain, thus these results may not be generalizable to people with cancer or their SCs. In addition, other factors important to pain adjustment, such as attachment style, response behaviours, or pain catastrophizing, and their associations with pain interference congruence remain to be studied.

Measuring Pain Congruence. The literature on pain congruence is relatively small, and no clear consensus has emerged on how best to measure congruence between two pain reports. The majority of studies categorize dyads into two groups, “congruent” or “noncongruent”, based on the extent of agreement in pain reports between two members of a dyad (Lin, 2001; Miaskowski, Zimmer, et al., 1997; Shega et al., 2004). This approach categorizes both underestimation and overestimation of pain as “noncongruent”, making it impossible to consider differences between these types of incongruence. Another approach to measuring congruence is to use absolute difference scores (Suso-Ribera et al., 2019) in which patients and caregivers’ pain reports are subtracted from each other and the absolute value of this difference is taken. These absolute scores often range from a value representing complete incongruence to perfect congruence. Similar to binary categorization, this approach treats underestimation and overestimation of pain as equivalent outcomes. However, as outlined above, underestimation and overestimation of pain may have different correlates and impacts on patients and their caregivers. Thus, it is essential that these relationships be examined separately.

A third approach is to categorize dyads into three groups: “underestimation”, “overestimation” and “congruence” (Cremeans-Smith et al., 2003; Junghaenel et al., 2018; Martire et al., 2006; Riemsma et al., 2000; Wilson et al., 2019); however, this strategy also has limitations. With smaller sample sizes, it may result in unequal distributions or small groups (Rogers et al., 2018), and statistical power may be lost by creating groups (Cano, Johansen, et

al., 2005). Importantly, in this approach, any incongruence (i.e., from one point to ten points when pain is rated from 0 to 10) is considered essentially equal. However, couples that are highly incongruent in their shared understanding of the patient's pain may differ in important ways from dyads with minimal incongruence. Therefore, it is important that the full range of scores are used when examining congruence in order to preserve statistical power, avoid arbitrary category cut-offs, and preserve sensitivity to enable consideration of level of agreement.

To address these limitations, dyadic researchers both within and outside the field of pain, have employed other data analysis strategies such as intraclass correlation coefficients (ICC) (Blake et al., 2020), *k* parameter (Kenny & Ledermann, 2010), multilevel modeling (Cano, Johansen, et al., 2005; Clark et al., 2017), and percent agreement (Blake et al., 2020).

Correlations and percent agreement allow researchers to assess concordance by providing a quantitative index reflecting the extent of agreement between two partners on a given measure (Rogers et al., 2018). Percent agreement examines individual differences in pain judgements between members of a dyad, whereas correlations focus on group differences (Rogers et al., 2018). *k* parameter is a quantitative index used to measure actor and partner effects on a given variable, and was created as an extension of the actor-partner interdependence model (APIM) (Kenny & Ledermann, 2010). According to the APIM, a person's impact on their own outcome variable is referred to as the "actor effect", whereas their influence on their partner's outcome variable is known as the "partner effect" (Kenny & Ledermann, 2010). Therefore, *k* parameter is defined as the ratio of the partner effect to the actor effect in a given outcome, and may range from -1 to 1, with values of a greater magnitude indicating more equal actor and partner effects (Kenny & Ledermann, 2010). Although these methods are insightful in examining the extent of agreement between two partners, or the contribution of each spouse on a given outcome variable,

they do not allow for the identification of correlates associated with the congruence of pain. Multilevel modeling allows both examination of the level of agreement between partners on a given measure, as well as identification of how actor, partner, or relationship characteristics influence this agreement. Although this method can be used to examine correlates of pain congruence at the multivariate level, large sample sizes (usually ≥ 100) are required to produce unbiased estimates of coefficients (Maas & Hox, 2005).

In order to address our research question regarding age differences in correlates of pain congruence, relative difference scores were used. Relative difference scores subtract the partners' judgements of pain from one another, using the following equation: pain rated by patient – pain rated by caregiver. Difference scores provide a quantitative index with which to measure dissimilarity between two members of a dyad, with values of a smaller magnitude suggesting greater similarity in couples' pain reports (Rogers et al., 2018). This method also allows researchers to examine the direction of incongruence (i.e., underestimation or overestimation), through the positive or negative signs of these scores. In the case of our study, participants were asked to use the Brief Pain Inventory (BPI) to rate the pain severity and interference experienced by the spouse with cancer on a scale of 0 to 10. Thus, difference values may range from -10 to 10, with a difference of -10 indicating complete overestimation by SCs of their spouse's pain, whereas a score of 10 suggests complete underestimation; difference scores of 0 represent perfect congruence or agreement between spouses.

This method was employed because it preserves statistical power that may be lost when creating categories, while accounting for the underestimation or overestimation of scores across a range of values. Greater detail regarding computing and interpreting relative difference is presented in the data analysis section (see page 41).

Age Differences in Pain Experience and Congruence

With the aging population, the prevalence of older SCs is expected to gradually increase overtime (National Cancer Institute of Canada, 2019). These caregivers may have their own unique caregiving needs and limitations (Nijboer et al., 1998), including their own declining physical health, psychological distress or the presence of other painful comorbidities (Haley, 2003). This will have significant implications for the way couples cope with cancer pain and its accompanying impacts (Cano, Leonard, et al., 2005). However, age-related patterns in couples' adjustment to cancer pain have yet to be elucidated.

The developmental contextual model of patient and spouse coping with disease suggests couples' adjustment to chronic illness differs across the lifespan (Berg & Upchurch, 2007), and that over time, couples may become more similar in attitudes and behaviours (Carstensen et al., 1995). Compared to younger couples who may be experiencing chronic illness for the first time, older spouses may be more experienced at coping collaboratively with stressful events. These experiences over time may contribute to older spouses being more attuned to each other (Berg & Upchurch, 2007; Revenson & Pranikoff, 2005). This may greatly influence couples' congruence on measures of pain, as partners may have a better understanding of the patient's expression of pain and communication of their symptoms with increasing age. However, the literature regarding age-differences in pain congruence is mixed, with one study concluding that older age was associated with incongruence on estimates of cancer pain (Lin, 2001), whereas another study found no significant relationship between age and pain congruence (Miaskowski, Zimmer, et al., 1997).

In a qualitative study (Gagliese et al., 2009), older patients with cancer pain described strengthened marital relationships as a result of their illness, arising from their partner's

expressions of support and empathy. In contrast, younger patients described marital conflict due to their ongoing pain as well as a desire to protect their partners from the burdens of their disease. This study highlighted age as an important factor in adaptation to cancer-related pain. Consistent with this, in a more recent study, younger patients were more likely than older patients to minimize the seriousness of their stress to their spouses and experienced the illness as more intrusive in their everyday lives (Acquati & Kayser, 2019). Finally, other studies have found that younger dyads experience greater difficulties adjusting to the affective limitations associated with cancer pain compared to older dyads (Acquati & Kayser, 2019; Blanchard et al., 1995; Gaugler et al., 2005). Taken together, age-related differences in dyadic coping behaviours may have implications for congruence and adjustment to cancer pain. Thus, it is important to study correlates of pain congruence across different age groups.

The study by Gagliese et al. (2009) provided the basis for the present study and informed the framework of pain congruence among younger and older dyads (Figure 1). The present study used this model as a framework to guide our analyses through the examination of multidimensional patient, SC and couple factors. This study was the first to test these associations and examine age-related patterns in correlates of pain congruence across two different pain outcomes: pain severity and pain interference.

Spouse-Caregiver Factors Associated with Pain Congruence

The growing trends toward the early discharge of hospital patients and longer survival in people with cancer have shifted the focus of caregiving from professional to more informal care systems (Braun et al., 2007; Nijboer et al., 1998). Informal caregivers are people who provide unpaid assistance to someone with whom they have a personal relationship, often a family

member (Schulz & Tompkins, 2010). Spouses are the most common informal caregivers (Kurtz et al., 1994) and may play the most important caregiving role (Fleming et al., 2006; Haley, 2003; Yates et al., 2004). Caregiving for a loved one is a dynamic process, with alterations in a patient's functional ability, physical appearance, mental health, employment status, sexual functioning, marital and social roles all having a direct impact on the caregiver (Nijboer et al., 1998).

For many individuals coping with cancer-related pain, SCs provide essential and unpaid physical and emotional support that healthcare systems cannot provide (Haley, 2003). Compared to other informal caregivers (e.g., parents, children or siblings), SCs are also the most vulnerable to the negative effects of coping with cancer and disease-related pain (Nijboer et al., 1998; Westman et al., 2008), including experiencing greater caregiving strain (Campbell et al., 2004; Porter et al., 2008), caregiving burden and deteriorating psychological wellbeing (Miaskowski, Kragness, et al., 1997). SCs may also experience social and economic deficits such as lifestyle disruptions, less socializing, and possible financial difficulties (Haley 2003).

Positive aspects of caregiving have also been reported (Nijboer et al., 1998), including caregiver mastery (Martire et al., 2006) and a strengthened marital relationship, with greater intimacy, communication, and sensitivity to one another's feelings (Haley, 2003). As a result, SCs' own mental and physical health may influence not only their own perceived caregiving strain and wellbeing, but also their perception of and communication about their spouses' pain (Blyth et al., 2008; Ferrell, 2001; M. E. Robinson & Wise, 2004).

SC Pain and Comorbidities. Although previous literature has mainly focused on the pain experiences of individuals coping with cancer-related pain, it is also important to consider the health and potential comorbidities of their caregivers. The prevalence of chronic pain in late life

is high, with both spouses likely to experience more chronic conditions with increasing age (Berg & Upchurch, 2007). This may suggest that older caregivers are more likely to experience multiple chronic conditions compared to younger caregivers. Interestingly, Leonard and Cano (2006) found that almost half of spouses of people with chronic noncancer pain also reported chronic pain themselves. In fact, among couples where both spouses reported chronic pain, psychological distress was frequent and did not differ in intensity between the partners (Leonard & Cano, 2006), highlighting the multidimensional nature of this phenomenon. However, the association between SCs own pain experiences and comorbidities have yet to be studied within the context of pain congruence. Thus, using Gauthier and Gagliese's model as a framework, this study is the first to assess the relationship of both members' pain experiences and comorbidities to pain congruence across different age groups.

SC Sex. Women are predominantly the primary providers of informal care to family members and make up the biggest proportion of the SC demographic (Blyth et al., 2008; Fleming et al., 2006; Sharma et al., 2016). Women are not only more likely to be exposed to greater caregiving stressors than men, but they also perceive and cope with these stressors differently than men (Sharma et al., 2016). Women SCs generally spend more time providing care for their spouses and perform personal-care tasks more often than men (Sharma et al., 2016). Women SCs also experience greater caregiving strain, caregiving burden, and psychological distress than do men SCs (Sharma et al., 2016). When caring for a loved one, women also rate their loved one's observed pain intensity significantly higher than men (M. E. Robinson & Wise, 2004), accounting for some of the variance in these results. Studies on pain congruence have also found that caregivers who are women are significantly more congruent than caregivers who are men when rating their spouse's pain (Shega et al., 2004). However, these findings were not specific to

couples coping with cancer-related pain. This study was designed to recruit both male and female SCs and is the first to examine the relationship between age, sex and pain congruence.

SC Marital Satisfaction. SCs' marital satisfaction also influences a couple's shared coping and adjustment behaviours (Henry et al., 2007). However, the association between perceived marital satisfaction and various biopsychosocial factors has received little attention in the literature, especially in the context of cancer pain. Nonetheless, caregiver age has been found to play a crucial role. Older couples generally report greater marital satisfaction than younger couples (Carstensen et al., 1995), most likely due to their engagement in more positive accommodative coping behaviours, shared decision making and survivorship (Berg & Upchurch, 2007).

SC marital satisfaction also has a major influence on the pain experience. According to Monin and Schulz's (2009) interpersonal model of caregiving relationships, caregivers who feel close to their partners often share their partner's experience of suffering more intensely than those that are distant, a phenomenon known as emotional contagion. Marital satisfaction has an effect on emotional contagion such that SCs who are more satisfied with their marriages show greater hypervigilance than unsatisfied SCs to their partner's expression of pain (Monin & Schulz, 2009). This may suggest that SCs who report greater marital satisfaction are also more likely to overestimate their spouse's pain. However, studies have not demonstrated any significant associations between SC marital satisfaction and couples' congruence on estimates of pain in patients with chronic non-malignant pain (Martire et al., 2006). These associations have not been examined in caregivers of spouses with cancer-related pain, thus this study will provide new insights into this association.

As this review has shown, a patient's pain and illness adjustment impact not only the individual with pain but also their spouses (N. Gauthier et al., 2008). In the context of pain congruence, SCs who are more accurate in their perceptions of their partner's level of pain are less stressed, respond less negatively, and provide more emotional support to their partners, resulting in greater patient satisfaction (Martire et al., 2006). SCs who are more congruent in their estimates of the patient's pain severity also perceive significantly less caregiving strain than caregivers of non-congruent dyads (Miaskowski, Zimmer, et al., 1997). Although the importance of congruence on pain interference is not known, this study hopes to bridge this gap in order to further explore the significance of this relationship. Furthermore, previous studies have only collected data from one member of the couple (Pence et al., 2006) or non-spouse caregivers (Blyth et al., 2008; Gaugler et al., 2005; Lin, 2001; Porter et al., 2008) which may confound relational issues or underestimate the heightened distress that spouses must particularly endure (Given et al., 2001). Therefore, using Gauthier and Gagliese's framework, the current study examined SC, as well as patient and couple factors to address these limitations.

Patient Factors Associated with Pain Congruence

Illness adjustment and the communication of pain in spouses with cancer are influenced by a multitude of biopsychosocial factors. Individuals with cancer who report higher levels of pain, pain-related distress, and negative affective states also report greater interference with daily life (Wells et al., 2003) and lower self-efficacy in managing their pain and related symptoms (Porter et al., 2008). This may be associated with significantly higher levels of fatigue, depression, and anxiety as well as worse physical and functional well-being (Porter et al., 2008), which may all influence a couple's shared understanding of pain in the dyadic context.

Pain Catastrophizing. Catastrophizing, an exaggerated negative mindset brought to bear during actual or anticipated pain experience (Sullivan et al., 2001), is a multidimensional construct that negatively impacts illness adjustment in persons coping with chronic pain (Hadjistavropoulos et al., 2011). Pain catastrophizing is associated with greater pain and psychological distress in people with cancer and chronic non-malignant pain (L. R. Gauthier et al., 2012; Jacobsen & Butler, 1996; Keefe et al., 2003; Moldovan et al., 2009; Pence et al., 2006). Studies of age differences in cancer pain catastrophizing have reported mixed results. One study found that younger women undergoing breast cancer surgery were more likely than older women to catastrophize about their pain (Jacobsen & Butler, 1996), whereas a more recent study found no differences in catastrophizing in younger and older people with cancer-related pain (Mah et al., 2018).

Research regarding the associations between catastrophizing and pain congruence in couples is in its infancy. According to the Communal Coping Model, pain catastrophizing has a major social function, eliciting empathy, assistance, and social support from others (Sullivan et al., 2001). Thus, it may be expected that individuals who catastrophize about their pain also communicate better with their partners about their internal experiences, contributing to a greater shared understanding of pain. However, a recent study using a cold pressor task found that neither participants' nor their observers' pain catastrophizing was related to pain congruence, even when examining concordance over several points in time (Clark et al. 2017). Similar findings were also reported by Gauthier et al. (2008). In this study, partners were asked to rate the patient's pain when completing an occupational lifting task. These findings must be interpreted cautiously. First, both investigated pain congruence in couples performing experimental tasks in a lab. Thus, these findings may not be generalizable to clinical pain

including couples living with cancer pain. Second, these studies did not assess age differences in pain congruence or the effects of pain catastrophizing on other aspects of the pain experience such as pain interference. The present study is the first to extend Gauthier and Gagliese's model to examine the impact of pain catastrophizing on multiple pain congruence outcomes in both younger and older couples living with cancer pain.

Attachment Style. Attachment style is defined as the way individuals interact and respond to support in close relationships (Bowlby, 1982). An individual's attachment style develops during infancy based on caregiver interactions and remains stable throughout the lifespan (Bowlby, 1982; Fraley & Shaver, 2000; Mikulincer & Shaver, 2003). It is marked by two dimensions: attachment avoidance and attachment anxiety. High attachment avoidance is characterized by a discomfort with dependency on others, whereas high attachment anxiety is associated with a fear of rejection and abandonment (Brennan et al., 1998; Mikulincer & Shaver, 2003; Porter et al., 2007). It has been found to influence the wellbeing and illness adjustment of individuals with cancer (Rodin et al., 2007).

Research on patients with chronic non-malignant pain suggest that insecure attachment is strongly associated with greater pain and distress (Ciechanowski et al., 2003; Davies et al., 2009; McWilliams et al., 2000; McWilliams & Asmundson, 2007; McWilliams & Holmberg, 2010; Meredith et al., 2005, 2006, 2007). In the context of cancer, more secure attachment styles have also been associated with greater psychological wellbeing and perceptions of more positive reactions from caregivers in response to pain (L. R. Gauthier et al., 2012).

Mixed results have been reported with regards to age and attachment style. In populations of healthy persons, avoidant attachment especially has been associated with increasing age, with older adults more likely to report higher levels of avoidant attachment than younger adults (Diehl

et al., 1998). This may in part be due to various relational transitions experienced later in life, such as the loss of loved ones or greater difficulties engaging in social activity, contributing to more emphasis on independence rather than relying on others (Spence et al., 2020). However, no significant age differences have been found in either attachment anxiety or avoidance in persons with cancer pain (Mah et al., 2018). Moreover, the relationship between attachment style and age in caregivers of patients with cancer remains unknown.

In a relational context, couples with secure attachment styles experience greater marital quality and better physical and psychological adjustment when coping with their cancer pain (Porter et al., 2012; Shields et al., 2000). Avoidant attachment, specifically, may impede both the support-seeking and caregiving processes of couples coping with pain (Monin et al., 2014). This suggests that patients who are avoidant in their interactions are more likely to distance themselves from their partners, leading to less frequent conversations about their pain experiences. This lack of effective communication within dyads may contribute to discrepancies in the understanding of pain between partners. To date, the role of attachment style in the context of pain congruence has not been examined, proving novel to this study.

Patient Sex. Various studies have shown significant sex differences in the expression of pain between men and women (Nayak et al., 2000; M. E. Robinson & Wise, 2004). Across cultures, the overt expression of pain has been believed to be more appropriate for women than men (Nayak et al., 2000), encouraging men to suppress their pain and discomfort (Hadjistavropoulos et al., 2011). Thus, one of most consistent findings in pain research is that there is a bias in the observation of pain between sexes such that observers rate women as experiencing greater pain intensity than men in response to the same stimulus (M. E. Robinson & Wise, 2004). These discrepancies in the interpretation of pain between sexes may influence not

only SCs' perceptions of pain in their partners but also the physical cues they use to judge the patients' pain experience (i.e., verbal or nonverbal expressions of pain such as facial grimacing or guarding of body parts). Interestingly, caregivers are more accurate in rating pain when the patient is a man than when the patient is a woman (Kristjanson et al., 1998; Shega et al., 2004). The present study examines the relationship between sex and pain congruence for the first time separately in younger and older couples in order to provide new insights into these associations across the lifespan.

Patient's Marital Satisfaction. Marital satisfaction plays a crucial role in the patient-caregiver dynamic with various biopsychosocial factors greatly influencing the interplay between these two roles. As emphasized in the developmental-contextual model of couples coping with chronic illnesses (Berg & Upchurch, 2007), many life-span differences occur in marital relationships when comparing younger and older adults. Older adults experience greater marital satisfaction, intimacy and shared decision-making strategies compared to younger adults (Berg & Upchurch, 2007; Gagliese et al., 2009). This may reflect a greater use of collaborative forms of involvement associated with the communication of pain in older couples. Patients experiencing greater marital strain also report a greater duration of pain and higher pain intensities than those who do not report marital strain (Gagliese et al., 2009). However, previous studies have not demonstrated any significant associations between marital satisfaction and pain congruence in samples of people with non-malignant pain (Clark et al., 2017; Martire et al., 2006). These findings have yet to be examined in the context of people with cancer-related pain or their caregivers. Thus, this is the first study to examine both members' reports of marital satisfaction and their associations with pain congruence within this specific patient subgroup.

In summary, patients in non-congruent dyads report higher levels of pain and poorer levels of functional performance than patients in congruent dyads (Lin, 2001). Less concordance on pain-related estimates among couples has also been associated with significantly more mood disturbances and a poorer quality of life in patients throughout the course of their illness (Miaskowski, Zimmer, et al., 1997). However, important factors such as pain catastrophizing or attachment style have yet to be studied with regards to pain congruence, and previous studies have relied exclusively on the reports of patients. Data from SCs are essential to fully understand these relationships. This study bridges this gap in the literature by incorporating patient, SC and couple factors in examining pain severity and interference congruence.

Couple Factors Associated with Pain Congruence

Relational factors such as age gaps, length of relationship, marital satisfaction and adjustment may each influence a couple's shared understanding of the patient's pain experience. However, many of these relational demographics have yet to be studied in the context of pain congruence. Thus, this study is the first to examine these factors in the context of individuals with cancer pain and their caregivers, in order to account for this gap in the literature and provide new insights into these couples' shared experiences.

Age gaps. An age gap is the difference in age between two members of a dyad (Pradeep & Sutin, 2015). Age differences between partners may impact multiple domains of quality of life. However, mixed results have been reported with regards to age gaps and marital interaction. Zak et al. (2001) found that age-discrepant marriages, operationalized as an age gap greater than 3 years between spouses, were associated with greater trust and less jealousy than age-similar marriages. However, Lee and McKinnish (2018) found that spouses with larger age gaps

experience greater declines in marital satisfaction than age-similar couples over the duration of their marriages. Although there is no clear consensus on these relationships, it is important to note that both studies examined healthy couples in romantic relationships, and that these findings may not be generalizable to samples of patients with chronic illnesses.

To our knowledge, studies have not yet examined the role of age gaps in couples' congruence on estimates of pain. However, one study demonstrated that compared to same-aged couples, spouses with at least a 1–2 year age gap experience greater depressive symptoms in both partners, regardless of sex or marital role (J. H. Kim et al., 2015). These results suggest a general concordance among spouses' symptoms and highlight the importance of age gaps between spouses on their overall shared and individual health and well-being (Pradeep & Sutin, 2015). This study is the first to examine the impact of age gaps on the shared understanding of pain in individuals with cancer and their SCs.

Pain Response Behaviours. Pain response behaviours, classified as solicitous, distracting or punishing responses, are characterized by expressing sympathetic, avoidant or hostile behaviours towards the patient, respectively (Flor et al., 1987). Solicitous responses are portrayed through providing positive reinforcement to the patient, often through attention from the SC, and may lead to more frequent expressions of pain and distress by the patient (Boothby et al., 2004). Distracting responses are described as trying to take the patient's mind off the pain, such as by engaging in activities they may enjoy. Conversely, punishing response behaviours are negative reactions towards the individual in pain (e.g., anger) or ignoring the problem; this may lead to less frequent communication between partners regarding the patient's pain and distress (Flor et al., 1987).

Previous research has presented mixed results with regards to age differences in pain response behaviours. Although one study found no significant differences between younger and older adults in any of the three pain response behaviours (Mah et al., 2018), other studies have suggested older adults perceive their spouse's behaviour as less negative and hostile than younger adults, in both samples of healthy people (Henry et al., 2007) and couples in which one spouse is coping with cancer-related pain (Acquati & Kayser, 2019).

Mixed results have also been reported with regards to the association between the three pain response behaviours and pain congruence. Most studies have suggested that punishing responses are associated with greater incongruence in the understanding of pain in couples, usually as a result of the SCs' underestimation of their spouse's illness severity (Cano, Johansen, et al., 2005; N. Gauthier et al., 2008; Martire et al., 2006). However, there is no clear consensus with regards to the association between pain congruence and the other two response behaviours. Although one study found no significant associations between solicitous and distracting responses with pain congruence (Martire et al., 2006), a more recent study found that spouses who overestimated their partner's pain reported more solicitous responses than couples who were in agreement or who underestimated pain (Junghaenel et al., 2018). However, these studies all consisted of individuals with chronic non-malignant pain and their SCs, thus these findings may not be generalizable to our sample of individuals coping with cancer-related pain. This study is the first to examine age differences in the association of pain congruence and both partners' perceptions of pain response behaviours in a sample of individuals with cancer-related pain and their SCs.

This review has shown that research surrounding different pain congruence outcomes, other than pain severity, and the examination of biopsychosocial correlates of these outcomes is

needed. The role of various factors such as age, length of relationship, age gaps, pain acceptance, or attachment style in pain congruence has yet to be clarified. Gauthier and Gagliese's framework (Figure 1) was developed to guide research into the gaps in the literature based on a dyadic and biopsychosocial conceptualization of pain. The current study uses this framework to examine intra- and interpersonal correlates of cancer pain severity and interference congruence in younger and older dyads. The results will develop and refine the model, contribute to our understanding of cancer pain and aging, and be hypothesis-generating for future research.

OBJECTIVES

Based on the literature reviewed above, and using Gauthier and Gagliese's model (Figure

1) as a framework, the objective of the present study was to:

- 1) Determine age differences in couples' congruence on measures of pain severity and interference.
- 2) Identify correlates of pain congruence among younger and older couples separately.

HYPOTHESES

- 1) Older couples will be more congruent on both measures of pain severity and pain interference.
- 2) There will be differences in the variables that contribute to each model. Older adults will retain more biophysical correlates of pain congruence (e.g., comorbidities), whereas younger couples will retain more affective factors (e.g., depression, catastrophizing and pain acceptance).

CHAPTER TWO: METHODS

Patient Recruitment

The current study was derived from two larger projects investigating pain associated with advanced cancer (entitled “Biopsychosocial Age Differences in the Experience of Cancer Pain”) and breast cancer (“Age-related Patterns in Pain following Breast Cancer Surgery”). It involved no additional burden to the patients that had already consented to participate. Participants were recruited from Toronto General Hospital, Princess Margaret Cancer Centre, and Mount Sinai Hospital. Ethics approval was obtained from the University Health Network (UHN), Mount Sinai Hospital, and York University (#2013 - 062).

Sample, Inclusion and Exclusion Criteria

Participation in the larger studies:

The criteria for patients in the study “Biopsychosocial Age Differences in the Experience of Cancer Pain” were as follows:

Inclusion criteria. Participants were required to be ≥ 18 years old, have advanced cancer, cancer-related pain, and sufficient English to provide informed consent and complete questionnaires.

Exclusion criteria. Documented cognitive impairment as identified by a healthcare provider or medical chart. Patients must also have been able to score above the predetermined cut-off on a measure of cognitive functioning (i.e., <10 errors on the SOMC [Katzman et al., 1983]).

The criteria for patients in the study “Age-related Patterns in Pain following Breast Cancer Surgery” were as follows:

Inclusion criteria. Participants were required to be ≥ 18 years old, with sufficient English fluency to provide informed consent and complete questionnaires, and scheduled for unilateral or bilateral modified radical mastectomy or lumpectomy with axillary node dissection.

Exclusion criteria. Significant central nervous system, respiratory, cardiac, hepatic, renal or endocrine dysfunction and/or any significant associated sequelae; cognitive impairment or documented diagnosis of a DSM-IV Axis 1 disorder; contraindication to opioids or acetaminophen; documented substance abuse or dependence within 1 year; pregnancy or breastfeeding within 6 months; regularly menstruating women who have used exogenous hormones (oral contraceptives or hormone replacement therapy) within 3 months; immunization within 30 days; blood donation within 60 days; acute/infectious illness, allergic reactions of any severity, herbal supplements, physical injuries or dental work within 2 weeks. Patients must also have been able to score above the predetermined cut-off on a measure of cognitive functioning to be eligible to participate (i.e., <10 errors on the SOMC [Katzman et al., 1983]). These eligibility criteria were necessary due to the biomedical aspects of the two larger studies from which the patients in this study were recruited.

Participation in the current sub-study:

Additional criteria for this sub-study were as follows:

Inclusion criteria. Patients from either of the larger studies must have reported their spouse (common law or legally married) as their primary caregiver and given permission to contact their spouse regarding the study. SCs were required to be ≥ 18 years old and to speak and read English sufficiently to provide informed consent and complete questionnaires.

Exclusion criteria. Both partners were required to score above the predetermined cut-off on a measure of cognitive functioning to be eligible to participate (i.e., <10 errors on the SOMC).

Procedure

Recruitment of patients in the study “Biopsychosocial Age Differences in the Experience of Cancer Pain”:

Eligible patients were identified by their homecare physician and administrative staff at Mount Sinai Hospital who obtained permission for an RA to approach them. The RA telephoned identified patients, explained the study and obtained verbal consent to visit interested patients in their home at a time convenient to them. At the patient’s home, the RA explained the study and obtained written informed consent. Clinical staff of the Gastrointestinal, Lung, Breast, Gynecological, Genitourinary, Pain, and Palliative Care clinics at Princess Margaret Hospital also identified eligible patients who assented to be approached, either verbally or with an introductory letter informing them of the study. Staff requested patients’ permission to be approached by an RA. The RA approached assenting patients, explained the study, and obtained written informed consent. The Short-Orientation-Memory-Concentration (SOMC) Test, a short cognitive screen, was then administered by the RA to the patient to ensure that participants had the capacity to consent to participate and complete the questionnaires. Patients with scores suggesting cognitive impairment (>10 errors) were withdrawn.

Demographic, medical, and comorbidity (CCI) information, were collected by an RA at the time of obtaining consent, both by asking brief questions and from the patient’s medical record in order to minimize patient burden. Participants were given a questionnaire package including self-report measures of pain (BPI), psychological functioning (CES-D, PCS, CPAQ),

social and relational factors (MPI [patient version], ECR, KMS. *See Measures*). Patients were given the option of completing the questionnaire package at home and returning them in the mail with postage paid, addressed envelopes. Participants who did not return the questionnaire package after two weeks were telephoned and letters of appreciation were sent to all those who agreed to participate.

Recruitment of patients in the study “Age-related Patterns in Pain following Breast Cancer Surgery”:

Although various biomedical procedures (e.g., the collection of blood samples) were conducted as part of this larger study, only the procedures relevant to the current sub-study are outlined. Full details on these other procedures can be found in Goodall et al. (*in preparation*).

Patients scheduled for unilateral or bilateral modified radical mastectomy or lumpectomy were recruited from the UHN one week before surgery. Participants were informed about the study and if interested, were asked to provide informed consent. The SOMC was completed and any patient whose SOMC score suggested cognitive impairment (>10 errors) was withdrawn. Following this assessment, the RA completed the CCI, and a chart review of disease, treatment and demographic characteristics. Patients were given various measures (BPI, PCS, CES-D) to complete at home and return on the day of surgery. On the day of surgery, patients who had not complied with the instructions or not completed the questionnaires were withdrawn. All aspects of the surgical management of patients in the study were conducted according to standard practice. After extubation, patients were transported to the Post Anaesthesia Care Unit (PACU). At 24 hours, the following measures were obtained: CES-D, analgesic use and adverse events. Time from surgery to hospital discharge were recorded.

Follow-up assessments occurred at 1 week, 6 weeks, 3 months, 6 months, one year and two years after surgery. Patients were contacted by telephone or e-mail (depending on their preference) in order to schedule each follow-up. If patients living in Toronto preferred not to travel to UHN, the RA went to their home. If patients lived outside of Toronto or preferred not to have the RA visit them, telephone assessments of only the self-report measures were conducted. Each assessment began with the SOMC, and any patient scoring below the normal range was withdrawn. Patients were asked about sensations other than pain (e.g., numbness) at the surgical site, chest, or arm; use of analgesics; and any adverse events or complications in the week prior to the assessment. Patients were given the CES-D and BPI to complete and return in the mail. At one year and two years after surgery, patients were contacted by e-mail or by phone to schedule a telephone assessment of demographics, disease and treatment factors, pain and health history. Following these assessments, they were provided a questionnaire package consisting of the BPI, PCS, CES-D, ECR, and KMS to complete at home and return in the mail. Women who reported pain on most days in the last 3 months also completed the CPAQ and MPI Caregiver Responses scales. Participants were also given the option of having the questionnaire package mailed to them or sent a digital copy via e-mail, to complete and mail back. Self-addressed stamped envelopes were provided and telephone reminders given after 2 and 4 weeks. Following the assessment, the RA updated the CCI and chart review.

Recruitment of SCs for the current sub-study:

Patients participating in either of the two larger studies who identified their spouse as their primary caregiver were approached at Toronto General Hospital, Princess Margaret Cancer Centre or Mount Sinai Hospital, informed of this study and asked for permission to approach

their SC. All patients approached were documented, and if unwilling to participate in the study, reasons for doing so were recorded. There was no additional burden for patients who consented to participate in the sub-study. If the SC was present, a research assistant (RA) explained the study, answered any questions, and obtained informed consent. However, if the SC was not present, the RA provided the patient with a letter for the SC explaining the study and informing them that they would be telephoned regarding its procedures. The SC was then contacted 1-2 days later to further explain the study. Once informed consent was obtained, the RA administered the SOMC test over the phone to the SC. Participants who failed to meet the cut-off were withdrawn. Eligible participants were mailed a questionnaire package and consent form.

SCs were asked to provide demographic and comorbidity (CCI) information, as well as completing several measures of pain (BPI and MPI-S), psychosocial wellbeing and relational factors (CES-D, ECR, KMS, PCS and PCS-S). SCs were also asked about their perception of pain in their spouses (BPIso), as well as caregiving and support factors (CMS and CSI). A summary of each measure and whether they were completed by patients and/or SCs can be found in Table 1. All participants were given the option of completing the questionnaires with the help of the RA or taking it home. SCs who had not returned the questionnaire package after two weeks were telephoned as a reminder. Letters of appreciation were sent to those who agreed to participate.

Measures:

Data from 9 measures were used for patients and 12 measures for SCs (Table 1).

Table 1. Measures Completed by Patients and their SCs

	Patient	SC
Short Orientation-Memory-Concentration Test (SOMC)	X*	X*
Brief Pain Inventory (BPI)	X	X (completed in relation to their own pain and the patient's pain)
Charlson Comorbidity Index (CCI)	X**	X (self-report version)
Center for Epidemiologic Studies-Depression Scale (CES-D)	X	X
Caregiver Mastery Survey (CMS)		X
Chronic Pain Acceptance Questionnaire (CPAQ)	X	
Caregiver Strain Index (CSI)		X
Experiences in Close Relationships Inventory (ECR)	X	X
Kansas Marital Satisfaction Scale (KMS)	X	X
Multidimensional Pain Inventory (MPI) Caregiver Responses Scale	X – Patient Version	X – Significant Other Version
Pain Catastrophizing Scale (PCS)	X	X (completed in relation to their own pain and the patient's pain – PCS-S)

*Administered by RA to participant; **Completed by RA.

Pain Measures

The *Brief Pain Inventory (BPI)* is an 11-item questionnaire that assesses pain severity and its interference in physical, emotional and social domains of life (Cleeland & Ryan, 1994). The pain severity subscale is composed of four items assessing an individual's lowest, usual and worst pain intensity ratings. The pain interference subscale is composed of seven items assessing the extent to which pain has interfered with daily activities. The BPI has demonstrated excellent psychometric properties in both patients with cancer (Cleeland & Ryan, 1994) and chronic pain (Ger et al., 1999). It has also been used in family caregivers of patients with cancer (Lin, 2001). The BPI was completed by both patients and SCs separately regarding their own pain. The

Significant Other Version of the BPI (BPIso) was also completed by SCs regarding their perceptions of the patient's pain.

The *Multidimensional Pain Inventory (MPI) Caregiver Responses Scale* is a 14-item self-report questionnaire used to determine patients' perceptions of their spouse's behavioural reactions to their pain. It is composed of three subscales: Solicitous, Distracting, and Punishing responses (Kerns et al., 1985). Solicitous responses are characterized by expressing sympathy toward the patient or providing positive reinforcement (e.g., attention), assessed with items such as "he/she gets me pain medication". Distracting responses include trying to take the patient's mind off the pain, assessed with items such as "he/she encourages me to work on a hobby". Punishing response behaviours are negative reactions towards the individual in pain or ignoring the problem, such as the item, "he/she gets irritated with me" (Kerns & Rosenberg, 1995). The MPI has demonstrated good validity and reliability in both patients with chronic (Kerns et al., 1985) and cancer (Cetin et al., 2016) pain.

The Significant Other Version of the *Multidimensional Pain Inventory (MPI-S)* is a 17-item self-report measure completed by SCs regarding their perceptions of their behavioural responses to the patient's pain. It is similar to the patient version and is composed of the same three subscales (i.e., Solicitous, Distracting and Punishing responses), but has been modified to assess caregivers' perceptions of their own responses (Kerns & Rosenberg, 1995). For example, phrases such as "he/she gets irritated with me" have been altered to "I express irritation at him/her". The MPI-S has been validated with spouses of patients with chronic pain (Kerns & Rosenberg, 1995).

Cognitive Status

The Short Orientation-Memory-Concentration Test (SOMC) is a 6-item measure used to assess cognitive impairment and orientation to time, person, place, and memory (Katzman et al., 1983). It is both valid and reliable across age groups (Wade & Vergis, 1999), as well as in medically ill inpatients (Goring et al., 2004). The SOMC was completed separately by both patients and SCs.

Physical Function

The *Charlson Comorbidity Index (CCI)* measured comorbidities by generating a weighted score to predict age-adjusted mortality based on the presence of 19 co-occurring conditions (Charlson et al., 1987). It is well validated and extensively used both in medically ill older populations (Frenkel et al., 2014), patients with cancer (Extermann, 2000), and general clinical research (de Groot et al., 2003). For the present study, a modified self-report version of the CCI was used for SCs (Katz et al., 1996). This self-report version has good agreement with and similar predictive value as the chart-report version of the CCI (Mukerji et al., 2007; Susser et al., 2008). It is particularly useful when medical charts are not readily available (de Groot et al., 2003). The CCI was used to measure comorbidities separately in both patients and SCs.

Psychosocial Function

The *Center for Epidemiologic Studies – Depression Scale (CES-D)* is a 20-item measure used to assess current depressive symptoms and their frequency over the last week (Radloff, 1977). This scale has excellent psychometric properties (Beeber et al., 1998; Coyle & Roberge, 1992; Pasacreta, 1997) and has been extensively validated and found reliable for use in clinical research specifically for patients with cancer (Hann et al., 1999), as well as older adults (Radloff

& Teri, 1986). The CES-D was completed separately by both patients and SCs regarding their own depressive symptomology.

The *Chronic Pain Acceptance Questionnaire* (CPAQ) measures the degree to which individuals continue to participate in valued life activities despite pain, and their willingness to experience pain without controlling it (McCracken et al., 2004). It has been used in samples of patients with both chronic non-cancer and cancer pain (L. R. Gauthier et al., 2009; McCracken, 2005; McCracken et al., 2004). The CPAQ was only completed by patients regarding their own pain acceptance.

The *Experiences in Close Relationships Inventory* (ECR) is a 36-item self-report questionnaire used to measure both patients' and SCs' attachment style on two dimensions: attachment avoidance and attachment anxiety (Brennan et al., 1998). Attachment avoidance is defined as the extent to which individuals are uncomfortable with closeness and dependence on others, whereas attachment anxiety refers to the extent to which individuals fear rejection and abandonment (Brennan et al., 1998; Mikulincer & Shaver, 2003; Porter et al., 2007). It has demonstrated good validity and reliability among adults in romantic relationships (Brennan et al., 1998), as well as for medically ill older populations and patients with cancer (Lo et al., 2009). The ECR was completed separately by both patients and SCs reporting on their own experiences.

The *Pain Catastrophizing Scale* (PCS) is a 13-item measure used to assess rumination about pain, magnification of its negative implications, and feelings of helplessness towards pain and its management (Sullivan et al., 1995). Its validity and reliability have been widely demonstrated among the older adult population (Youngcharoen et al., 2018), as well as in patients with chronic pain (Cano, Leonard, et al., 2005; Osman et al., 2000). The PCS was

completed separately by both patients and SCs regarding their catastrophizing about their own pain.

The *PCS-Significant other version (PCS-S)* is a 13-item measure used to assess SCs' catastrophizing about their significant other's pain (Cano, Leonard, et al., 2005). It consists of three subscales examining SCs' rumination about their partner's pain, magnification of its negative implications, and feelings of helplessness towards its management. It has excellent psychometric properties (Cano, Leonard, et al., 2005) and has been used among spouses of patients with chronic pain (Cano, Leonard, et al., 2005; Leonard & Cano, 2006).

The *Kansas Marital Satisfaction Scale (KMS)* is a 3-item measure used to assess both participants' sense of marital satisfaction (Schumm et al., 1983). It has demonstrated good validity and reliability among couples (Schumm et al., 1986), and has been used in patients with cancer (L. R. Gauthier et al., 2009; Mah et al., 2018). The KMS was completed separately by both patients and SCs regarding their own marital satisfaction.

Caregiving Factors

The *Caregiver Mastery Scale (CMS)* was used to measure the caregivers' perceived ability to provide sufficient support and assistance to their spouse (Lawton et al., 1989). A revised scale created by Martire et al. (2006) was used, combining 5 items taken from the original caregiver appraisal scale (Lawton et al., 1989), and 5 items that were specific to patients with arthritis. Items were modified to reflect this specific population of caregivers of patients with cancer. This scale has previously been used with SCs of older patients with non-malignant pain (Martire et al., 2006).

The *Caregiver Strain Index (CSI)* is a brief 13-item tool used to measure SCs' perceived burden in caring for their spouse (B. C. Robinson, 1983). It has been used with older adult caregivers (B. C. Robinson, 1983), as well as with caregivers of patients with cancer pain (Miaskowski, Kragness, et al., 1997; Porter et al., 2002).

Data Analysis

Missing Data. Data was screened for missing values and outliers. Missing data was assessed using Little's Missing Completely at Random (MCAR) test. If values were found to be missing "completely at random" or "missing at random", they were imputed using Expectation Maximization. This method for imputing data was chosen because it prevents overfitting of the data, and creates less disturbance to variances than with other methods of imputation, such as mean substitution (Tabachnick & Fidell, 2012).

Normality. Normality was assessed by dividing skewness and kurtosis values by the corresponding standard error. A cut-off of 3.29 was used to determine normality, with scores greater than this value indicating a non-normal distribution (H.-Y. Kim, 2013). Variables scoring above this predetermined cut-off were transformed accordingly to normalize their distributions.

Descriptive statistics were calculated for all patient, SC, and couple variables. Means and standard deviations were reported for normally distributed continuous variables; medians and interquartile range were reported for non-normally distributed variables; frequencies and percentages were reported for categorical variables.

Differences Between Patients and SCs:

Differences between patient and SC factors including sociodemographic, clinical (CCI), psychosocial (CES-D, ECR, KMS, PCS) and pain-related factors (MPI) were assessed using paired t-tests for continuous variables and Chi-Squares for categorical variables. A one-way analysis of variance (ANOVA) was also used to test for any significant differences in the three PCS measures (i.e., PCS-S, PCS [patient version], and PCS [SC version]). If the distribution of scores for either patient or SC variables demonstrated significant skewness or kurtosis on any of these sociodemographic or biopsychosocial variables, Wilcoxon signed-rank tests were used on the transformed scores, instead of paired t-tests, to assess differences between partners on that measure. To account for multiplicity, Bonferroni corrections were used with the following equation: $0.05/n$ (where n stands for the number of different t-tests conducted). The following analysis included a total of 6 paired t-tests, therefore, a p-value of 0.0083 was used to signify statistically significant differences between the two groups. Because the Chi-Square test does not specify which combination of categories contributes to statistical significance, the Standardized Residual Method (SRM) was used as post-hoc test for all statistically significant chi-square tests (Beasley et al., 2014).

Age Group Differences:

Participants were divided into two age groups, using a cut-off of 60 years old in patients, to distinguish younger and older couples (National Cancer Institute of Canada, 2019). This age cut-off is consistent with other studies of age-related patterns in pain (Gagliese et al., 2005, 2008) and adjustment to cancer (Kotkamp-Mothes et al., 2005). It also has clinical relevance as it has been associated with significant differences in cancer symptoms (Cheung et al., 2011); mortality (Canadian Cancer Society, 2015); likelihood of referral for supportive and palliative

care (Ellis et al., 2009); and beliefs about and adaptation to cancer pain (Gagliese et al., 2009; Yates et al., 2002).

Differences in patient and SC factors, as well as relational factors (e.g., marital status, length of relationship, and age gaps) between younger and older couples were assessed using independent samples t-tests for continuous variables, and Chi-Squares for categorical variables. Age gaps were calculated by subtracting the patients and SCs' ages and taking the absolute value of this number using the following equation: $\text{Age gap} = |\text{Age}_{\text{patient}} - \text{Age}_{\text{SC}}|$. This method of measuring age gaps between partners is consistent with previous literature examining couples in romantic relationships across various different age groups (Barnes, 2003; J. H. Kim et al., 2015).

Pain Congruence Outcomes:

Similar to previous literature studying pain congruence in dyadic samples (Creameans-Smith et al., 2003; Miaskowski, Zimmer, et al., 1997; Riemsma et al., 2000; Suso-Ribera et al., 2019), pain congruence was assessed by computing difference scores between patient and SC ratings of the two pain-related outcomes: (1) pain severity, and (2) pain interference. Relative values (rather than absolute scores) indicated both the magnitude and direction of the difference from complete agreement. Each of the congruence values were calculated as follows:

Pain Severity. Difference values were computed by subtracting the patient and SC's BPI Severity score using the following equation: $\text{BPI}(\text{severity})_{\text{patient}} - \text{BPI}(\text{severity})_{\text{SC}}$. Difference values could range from -10 to 10. Difference scores of 0 represent perfect congruence or agreement between patients and their SCs (e.g., both the patient and SC report the patient's pain to be 7/10). A difference of -10 indicates maximum overestimation by the SC of the patient's pain severity (i.e., the patient reports his/her pain at 0 but the SC reports the patient's pain to be

10/10), whereas a score of 10 indicates complete underestimation of the patient's pain severity by the SC (i.e., the patient reports their pain to be 10/10 but the SC reports the patient's pain at 0).

Pain Interference. Difference values were computed by subtracting the patients and SCs scores using the following equation: $BPI(\text{interference})_{\text{patient}} - BPI(\text{interference})_{\text{SC}}$. Difference values could range from -10 to 10. Difference scores of 0 represent perfect congruence or agreement between patients and their SCs (e.g., both the patient and SC report the patient's pain interference to be 7/10). A difference of -10 indicates maximum overestimation by the SC of the patient's pain interference (i.e., the patient reports his/her interference as 0 but the SC reports the patient's interference to be 10/10), whereas a score of 10 suggests complete underestimation of the patient's pain interference by the SC (i.e., the patient reports their interference to be 10/10 but the SC reports the patient's interference as 0).

A linear transformation, adding a constant value of 10, was then applied to both congruence outcomes, to transform the difference scores. This was done to eliminate negative values in the dependent variable of the regression analyses. Linear transformations do not affect the fit of the regression model, standard deviation of the distribution, or the distance between values (Gelman & Hill, 2010). Instead, the distribution is shifted up the scale to eliminate negative values, shifting the possible range of scores to 0 to 20. With this range, scores between 0 and 9 represent overestimation of pain severity or interference by SCs, scores of 10 represent perfect agreement between patients and SCs regarding the patient's pain severity or interference, and scores between 11 and 20 represent underestimation of pain severity or interference by SCs.

Bivariate Analyses:

To test **Objective 1**, age differences in congruence on pain severity and interference were examined using independent samples t-tests with age group as the grouping variable. Levene's Test for Equality of Variance was conducted to assess homogeneity of variance across groups. If Levene's test was found to be significant at $p < .05$, Welch's t-test was used to compare differences in outcomes between groups (Field, 2009).

Identifying candidate correlates:

To test **Objective 2**, two backward multiple regression models were fit separately for younger and older couples to identify patient, SC and couple correlates for both pain severity and pain interference congruence. In order to identify candidate correlates for the regression models, bivariate analyses were calculated between patient, SC and couple factors, and the two pain congruence outcomes; this was done separately for younger and older couples. Pearson product-moment correlations were calculated for continuous variables and point biserial correlations for categorical variables (Tabachnick & Fidell, 2012). Variables associated with the outcome variables at a significance level of $p \leq 0.15$ (Tabachnick & Fidell, 2012) for either age group were considered for inclusion in the multiple regression models. This was done to test whether the two age groups would exhibit similar sets of correlates using the same pool of candidates. In cases where candidate variables were highly correlated with one another ($r \geq 0.7$), the variable with the least missing data was considered for inclusion in the multivariate models (Tabachnick & Fidell, 2012).

Fisher's Z-tests were used to compare the magnitude of the correlations between younger and older couples. This was done in addition to the Pearson product-moment and Point Biserial

correlations to examine the significance of the difference in the magnitude of these correlations coefficients between age groups. The following equation for z-tests was used (Lenhard & Lenhard, 2014):

$$r'_1 = \frac{1}{2} \ln \left(\frac{1 + r_1}{1 - r_1} \right) \quad \text{and} \quad r'_2 = \frac{1}{2} \ln \left(\frac{1 + r_2}{1 - r_2} \right)$$

$$S = \sqrt{S_1^2 + S_2^2} = \sqrt{\frac{1}{n_1 - 3} + \frac{1}{n_2 - 3}}$$

$$z = \frac{r'_1 - r'_2}{S}$$

where r = correlation coefficient, n = sample size, and z = Fisher's z statistic

Significant z-tests ($p < 0.05$) indicated a difference in correlations between younger and older couples for a given measure.

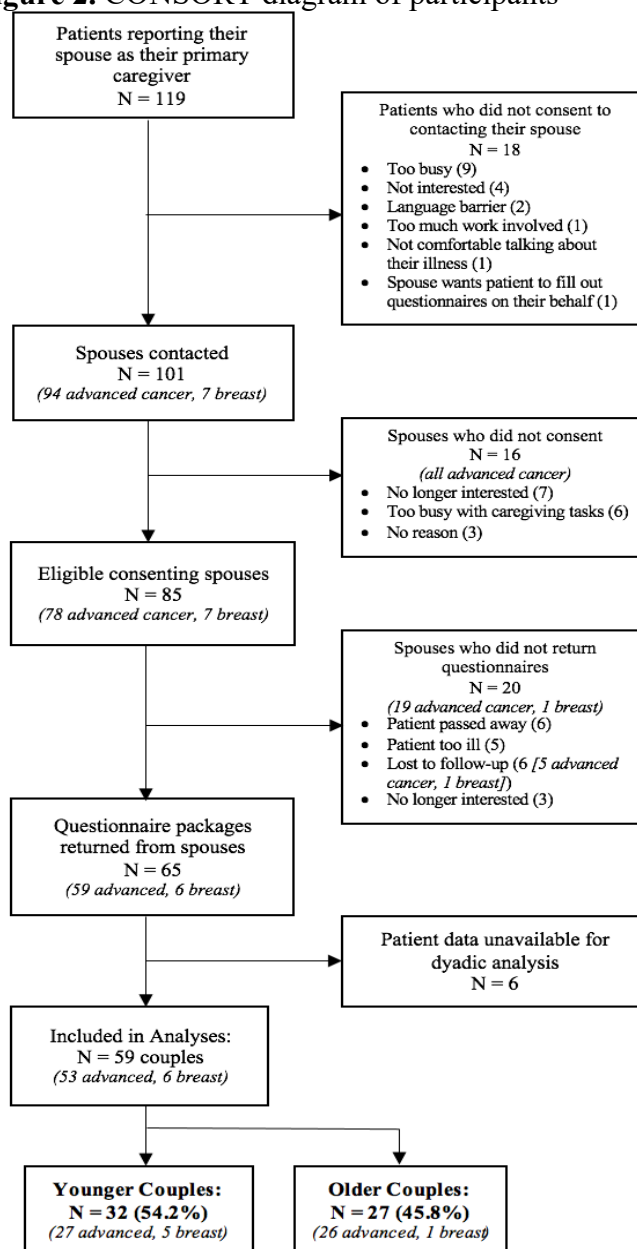
Regression Analyses:

All identified candidate correlates were entered into the regression models for both younger and older couples for each outcome. Backward selection determined significant correlates of pain severity and interference congruence separately for younger and older couples. A cut-off value of $p \leq 0.05$ and $p \geq 0.10$ established criteria for entry and removal, respectively (Hosmer & Lemeshow, 2004). Tolerance and variance inflation factor (VIF) statistics were examined for evidence of multicollinearity (tolerance ≤ 0.10 and VIF ≥ 10) (Hair et al., 2010). All statistical analyses were conducted using IBM SPSS v 27.

CHAPTER THREE: RESULTS

Sample. 119 patients who reported their spouse as their primary caregiver were approached at Toronto General Hospital, Mount Sinai Hospital or Princess Margaret Cancer Centre (Figure 2) and asked for consent to contact their spouse regarding this study. 18 patients did not provide consent to contact their spouse. The most common reasons for refusal were too busy ($n = 9$), lack of interest ($n = 4$), the presence of a language barrier ($n = 2$), or other reasons ($n = 3$) as reflected in Figure 2. 101 SCs were contacted and informed about the study. 16 SCs did not provide consent for the following reasons: not interested ($n = 7$), too busy with caregiving tasks ($n = 6$) or no specified reason (3). Of the remaining 85 SCs, 20 did not return their questionnaire packages and stated reasons such as: the patient passing away ($n = 6$) or being too ill ($n = 5$), or lack of interest ($n = 3$). Six additional SCs were lost to follow-up. Of the 65 SCs who returned their questionnaire packages, six patients did not have data available for dyadic analysis. This resulted in 59 patient-caregiver dyads with complete data to be used in the analysis.

Figure 2. CONSORT diagram of participants



Missing Data. The overall amount of missing data was low, with less than 20% of data missing for each measure. The BPI completed by SCs regarding their own pain was the only exception to this, with 13 SCs (22.0%) missing at least one of the four pain severity questions, and 15 SCs (25.4%) missing at least one of the pain interference questions. Little's MCAR Test

was conducted and revealed that the data were “missing at random” ($p = 1.00$), thus, the values were imputed using the Expectation Maximization technique.

One couple reported that they were separated but still legally married. Sensitivity testing was conducted to see if this couple was comparable to the other dyads. No significant differences were found, therefore for subsequent analysis they were collapsed into the younger couples group.

Normality. The following variables were found to have non-normal distributions: age gap, patient CCI, patient ECR anxiety, patient-rated MPI punishing responses, patient KMS, SC CCI and SC KMS. These variables were transformed using the following methods: square root transformations (age gap, patient ECR anxiety, and patient-rated MPI punishing responses), square root and reflected transformations (SC-reported KMS), as well as log and reflected transformations (patient-reported KMS). Both patient and SC versions of the Charlson Comorbidity Index (CCI) demonstrated significant skewness and kurtosis that did not reach normality with any transformations. For this reason, the CCI was treated as a dichotomous variable ($CCI > 0$) indicating the presence or absence of any comorbidities within the participants, as has been done in previous studies (L. R. Gauthier et al., 2012, 2018).

Differences Between Patients and SCs

Sociodemographic and Clinical Characteristics. The participants’ clinical and sociodemographic characteristics are described in Table 2. Patients and SCs had a mean age of 58.17 ± 10.49 and 57.37 ± 10.02 years, respectively; this did not differ between partners. Sex was almost evenly split between the groups, with patients consisting of slightly more women (57.6%), most likely due to the women recruited from the breast cancer study. Both patients and SCs were highly educated, with the majority having attained at least a Bachelor’s degree. No

significant differences were found between patients and SCs on any sociodemographic variables including sex, education, or religion. About a third of patients (32.2%) and of SCs (37.3%) reported comorbidities; this did not significantly differ between patients and SCs ($p = 0.52$).

Pain Measures. The majority of SCs (64.9%) did not report pain on the BPI. Of the 35.1% who did report pain, both pain severity ($M = 1.80 \pm 2.10$) and interference scores ($M = 1.60 \pm 2.16$) were low. 15.0% of SCs in this group reported moderate-to-severe pain severity and 20.0% reported moderate-to-severe pain interference. Therefore, for all subsequent analyses, the SCs' BPI was transformed into a dichotomous variable (0 = no pain; 1 = pain). Conversely, 79.7% of patients reported pain on the BPI. On average, patients reported mild-to-moderate pain severity ($M = 3.47 \pm 1.85$) with 40.7% reporting moderate-to-severe pain. Furthermore, patients reported moderate pain interference ($M = 4.42 \pm 2.55$), with 55.9% reporting moderate-to-severe interference with their everyday lives and activities.

With regards to the three pain response behaviours, both partners reported that SCs displayed high levels of solicitous responses, moderate amounts of distracting responses, and low punishing responses. Patients and SCs did not differ on their perceptions of spousal solicitous ($p = 0.21$) and punishing pain responses ($p = 0.38$). However, SCs reported that they displayed significantly higher amounts of distracting responses than patients perceived of them ($p = 0.007$).

Psychosocial Factors. Both patients and SCs reported low attachment anxiety and avoidance on the ECR, suggesting that on average, both partners demonstrated relatively secure attachment styles. There were no significant differences between patients and SCs on either attachment anxiety ($p = 0.12$) or avoidance ($p = 0.37$). Both patients and SCs also reported high levels of marital satisfaction on the KMS, suggesting that they were both content in their marriages.

Average patient CES-D scores ($M = 20.23 \pm 10.38$) were above the cut-off for clinically relevant depressive symptomatology (total score ≥ 16), with 57.6% scoring above this cut-off. However, average SC CES-D scores ($M = 13.28 \pm 9.40$) were below the cut-off for clinically relevant depressive symptomatology (total score ≥ 16), with 35.6% scoring above this cut-off. Upon comparison, it was found that patients had significantly higher CES-D scores than did their SCs ($p < 0.001$).

Patients also obtained significantly higher scores than SCs on the PCS ($p = 0.007$), with 18.6% of patients and 13.6% of SCs scoring above the clinically relevant cut-off for pain catastrophizing in relation to their own pain. Table 3 presents Pearson's correlation coefficients examining the associations between patients' ratings of their own catastrophizing, SCs' ratings of catastrophizing about their own pain, and SCs' ratings of catastrophizing about their partner's pain. SCs' catastrophizing about their partner's pain (PCS-S) was significantly correlated with both patients' catastrophizing for themselves ($p = 0.003$) and SCs' catastrophizing for themselves ($p = 0.019$). Patients' and SCs' PCS scores for themselves were not significantly correlated ($p = 0.59$).

A significant difference was found between the three PCS measures ($p < 0.001$). More specifically, post hoc tests indicated that the PCS-S, where SCs rated their catastrophizing about their partner's pain, was associated with the highest scores ($M = 24.45 \pm 10.49$) when compared to the patient ($M = 19.26 \pm 11.43$; $p = 0.030$) and SC versions of the PCS ($M = 13.70 \pm 11.11$; $p = 0.001$). The patient version of the PCS was also significantly higher than the SC version in which spouses rated their catastrophizing about their own pain ($p = 0.019$).

Caregiving Factors. On average, SCs reported moderate caregiving strain ($M = 5.52 \pm 3.99$) and mastery ($M = 43.44 \pm 9.59$).

Table 2. Demographic Characteristics and Biopsychosocial Factors of Patients and SCs

	Patient (n = 59)	SC (n = 59)	P-Value
Sociodemographic Factors			
<i>Age (years)</i>	58.17 ± 10.49	57.37 ± 10.02	0.24
<i>Sex</i>			0.066
Female	34 (57.6)	24 (40.7)	
Male	25 (42.4)	35 (59.3)	
<i>Religion</i>			0.18
Christian	36 (61)	37 (62.7)	
Other	4 (6.8)	8 (13.6)	
None	19 (32.2)	11 (18.6)	
<i>Level of Education</i>			0.53
High School or less	14 (23.7)	21 (35.6)	
Community College	9 (15.3)	7 (11.9)	
Bachelor's Degree	24 (40.7)	19 (32.2)	
Graduate Degree	12 (20.3)	12 (20.3)	
Clinical Factors			
<i>SOMC</i>	26.27 ± 1.95	27.31 ± 1.49	0.002
<i>CCI >0</i>	19 (32.2)	22 (37.3)	0.56
Pain Measures			
<i>Brief Pain Inventory (BPI) & Significant other version (BPIso)</i>			
Pain Severity	3.47 ± 1.85	4.13 ± 2.32	Not tested
Pain Interference	4.42 ± 2.55	5.51 ± 2.66	
<i>Multidimensional Pain Inventory (MPI)</i>			
Solicitous Responses	4.67 ± 1.00	4.50 ± 0.85	0.21
Distracting Responses	2.80 ± 1.27	3.39 ± 1.42	0.007
Punishing Responses	0.93 ± 1.20	0.82 ± 0.92	0.38
Psychosocial Factors			
<i>Depression (CES-D)</i>	20.23 ± 10.38	13.28 ± 9.40	<0.001
<i>Caregiver Mastery Scale (CMS)</i>	-	43.44 ± 9.59	
<i>Chronic Pain Acceptance Questionnaire (CPAQ)</i>	58.62 ± 20.10	-	
<i>Caregiver Strain Index (CSI)</i>	-	5.52 ± 3.99	
<i>Experiences in Close Relationships Inventory (ECR) - Anxiety</i>	2.33 ± 1.09	2.56 ± 1.01	0.12
<i>Experiences in Close Relationships Inventory (ECR) - Avoidance</i>	3.03 ± 0.97	3.20 ± 1.18	0.37
<i>Kansas Marital Satisfaction Scale (KMS)</i>	19.64 ± 2.03	19.07 ± 2.27	0.058
<i>Pain Catastrophizing (PCS)</i>	19.26 ± 11.43	13.70 ± 11.11	0.007
<i>Pain Catastrophizing Scale – Significant other version (PCS-S)</i>	-	24.45 ± 10.49	

Values are means ± SD or frequency (%).

SC = Spouse Caregiver.

Notes. In the significant other version of the Brief Pain Inventory (BPIso), SCs were asked to rate the patient's pain.

Table 3. Correlations of the Three Measures of Pain Catastrophizing (PCS)

	PCS (patient)	PCS-S (spouse rated for patient)	PCS (spouse)
PCS (patient)		0.381**	0.072
PCS-S (spouse rated for patient)			0.304*
PCS (spouse)			

Values are Pearson's Correlation coefficients.

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

Age Group Differences

There were 32 (54.2% of the sample) younger couples (mean age: 50.78 ± 7.23 years) and 27 (45.8% of the sample) older couples (mean age: 66.93 ± 6.04 years; $p < 0.001$). Couples reported an average relationship length of 26.67 ± 13.54 years. Comparisons of demographic and biopsychosocial factors between younger and older couples are presented in Table 4.

Table 4. Comparison of Demographic Characteristics and Biopsychosocial Factors Between Younger and Older Couples

	Younger Couples (n = 32)	Older Couples (n = 27)	P-Value
Patient Factors			
<i>Age (years)</i>	50.78 ± 7.23	66.93 ± 6.04	<0.001
<i>Sex</i>			0.41
Female	20 (62.5)	14 (51.9)	
Male	12 (37.5)	13 (48.1)	
<i>BPI Pain Severity</i>	3.77 ± 1.89	3.11 ± 1.78	0.18
<i>BPI Pain Interference</i>	4.60 ± 2.58	4.21 ± 2.56	0.56
<i>CCI > 0</i>	9 (28.1)	10 (37.0)	0.47
<i>CES-D</i>	21.08 ± 10.34	19.23 ± 10.53	0.50
<i>CPAQ</i>	58.11 ± 19.92	59.23 ± 20.68	0.83
<i>ECR Anxiety</i>	2.38 ± 1.21	2.27 ± 0.95	0.81
<i>ECR Avoidance</i>	2.99 ± 1.00	3.08 ± 0.96	0.75
<i>KMS</i>	19.66 ± 2.31	19.63 ± 1.69	0.59
<i>MPI Solicitous</i>	4.60 ± 1.05	4.75 ± 0.96	0.58
<i>MPI Distracting</i>	2.70 ± 1.37	2.92 ± 1.16	0.51
<i>MPI Punishing</i>	0.92 ± 1.27	0.95 ± 1.13	0.62
<i>PCS</i>	20.38 ± 12.33	17.93 ± 10.34	0.42
SC Factors			
<i>Age (years)</i>	50.91 ± 8.09	65.04 ± 5.77	<0.001
<i>Sex</i>			0.28
Female	11 (34.4)	13 (48.1)	
Male	21 (65.6)	14 (51.9)	
<i>BPI Pain Presence</i>	10 (33.3)	10 (37.0)	0.77
<i>CCI > 0</i>	11 (34.4)	11 (40.7)	0.61
<i>CES-D</i>	13.51 ± 9.03	13.00 ± 9.98	0.84
<i>CMS</i>	43.72 ± 9.55	43.11 ± 9.80	0.81
<i>CSI</i>	5.34 ± 3.74	5.73 ± 4.33	0.71
<i>ECR Anxiety</i>	2.38 ± 0.83	2.77 ± 1.17	0.16
<i>ECR Avoidance</i>	2.97 ± 1.22	3.48 ± 1.10	0.10
<i>KMS</i>	19.15 ± 2.19	18.98 ± 2.40	0.83
<i>MPI Solicitous</i>	4.43 ± 0.91	4.58 ± 0.78	0.50
<i>MPI Distracting</i>	3.25 ± 1.64	3.55 ± 1.12	0.41
<i>MPI Punishing</i>	0.74 ± 0.88	0.91 ± 0.97	0.50
<i>PCS</i>	13.13 ± 11.01	14.38 ± 11.40	0.67
<i>PCS-S</i>	23.55 ± 9.91	25.50 ± 11.24	0.48

Values are means $\pm$ SD or frequency (%).

SC = Spouse Caregiver.

Notes. BPI, Brief Pain Inventory; CCI, Charlson Comorbidity Index; CES-D, Center for Epidemiologic Studies-Depression Scale; CPAQ, Chronic Pain Acceptance Questionnaire; ECR, Experiences in Close Relationships Inventory; KMS, Kansas Marital Satisfaction Scale; CMS, Caregiver Mastery Scale; CSI, Caregiver Strain Index; MPI, Multidimensional Pain Inventory.

Patient Factors:

Younger patients had a mean age of 50.78 ± 7.23 years, whereas older patients had a mean age of 66.93 ± 6.04 years; age was the only patient factor that was significantly different between age groups. There were slightly more women than men in both patient age groups but this proportion did not attain statistical significance (YC: 62.5%; OC: 51.9%; $p = 0.41$).

Pain Measures. Both younger and older patients reported mild-to-moderate pain severity (YC: 3.77 ± 1.89 ; OC: 3.11 ± 1.78) and moderate pain interference (YC: 4.60 ± 2.58 ; OC: 4.21 ± 2.56) on the BPI. Neither ratings of patients' pain severity ($p = 0.18$) nor pain interference ($p = 0.56$) differed between age groups.

With regards to the three pain response behaviours, both younger and older patients rated high levels of spousal solicitous responses, moderate amounts of distracting responses, and low punishing responses. Younger and older patients did not differ on their estimates of either of the three pain response behaviours (solicitous: $p = 0.58$; distracting: $p = 0.51$; punishing: $p = 0.62$).

Psychosocial Factors. Both younger and older patients reported low attachment anxiety and avoidance on the ECR, suggesting that on average, both age groups demonstrated relatively secure attachment styles. There were no significant differences between younger and older patients on either attachment anxiety ($p = 0.81$) or avoidance ($p = 0.75$). Both younger and older patients reported high levels of marital satisfaction on the KMS, which did not differ between age groups ($p = 0.59$).

Younger and older patients reported moderate scores on the CPAQ, with no significant differences between age groups ($p = 0.83$). Average scores on the CES-D (YC: 21.08 ± 10.34 ; OC: 19.23 ± 10.53) were above the cut-off for clinically relevant depressive symptomatology

(total score ≥ 16) in both age groups. 62.5% of younger patients and 51.9% of older patients scored above this cut-off. This did not significantly differ between age groups ($p = 0.50$).

Younger and older patients reported moderate scores on the PCS, with 28.1% of younger patients and 7.4% of older patients scoring above the clinically relevant cut-off for pain catastrophizing (PCS total score ≥ 30). Although total PCS scores did not differ between age groups ($p = 0.42$), the proportion of younger and older patients scoring above this cut-off reached statistical significance ($p = 0.042$).

SC Factors:

Younger SCs had a mean age of 50.91 ± 8.09 years, whereas older SCs had a mean age of 65.04 ± 5.77 years; age was the only SC factor that was significantly different between age groups ($p < 0.001$). Both younger and older SCs consisted of slightly more men than women but this proportion did not differ between age groups (YC: 65.6%; OC: 51.9%; $p = 0.28$).

Pain Measures. The majority of both younger and older SCs (YC: 66.7%; OC: 63.0%) reported having no pain on the BPI; this did not significantly differ between age groups ($p = 0.77$).

With regards to the three pain response behaviours, both younger and older SCs rated that they demonstrated high levels of solicitous responses, moderate amounts of distracting responses, and low punishing responses. Younger and older SCs did not differ on their estimates of either of the three pain response behaviours (solicitous: $p = 0.50$; distracting: $p = 0.41$; punishing: $p = 0.50$).

Psychosocial Factors. Both younger and older SCs reported low attachment anxiety and avoidance on the ECR, suggesting that on average, both age groups demonstrated relatively secure attachment styles. There were no significant differences between younger and older SCs on either attachment anxiety ($p = 0.16$) or avoidance ($p = 0.10$). Both younger and older SCs reported high levels of marital satisfaction on the KMS, which did not significantly differ between age groups ($p = 0.83$).

Average scores on the CES-D (YC: 13.51 ± 9.03 ; OC: 13.00 ± 9.98) were below the cut-off for clinically relevant depressive symptomology (total score ≥ 16) in both age groups, with 43.8% of younger SCs and 25.9% of older SCs scoring above this cut-off. Chi-square tests revealed that the proportion of SCs reaching this cut-off did not significantly differ between age groups ($p = 0.15$).

Both younger and older SCs demonstrated low levels of catastrophizing about their own pain (PCS), with 12.5% of younger SCs and 14.8% of older SCs scoring above the clinically relevant cut-off for pain catastrophizing (PCS total score ≥ 30). However, both age groups demonstrated high levels of catastrophizing about their partner's pain (PCS-S), with 34.4% of younger SCs and 37.0% of older SCs scoring above the clinically relevant cut-off. Both of these measures did not significantly differ between age groups (PCS: $p = 0.67$; PCS-S: $p = 0.48$).

Caregiving Factors. On average, younger and older SCs reported moderate caregiving strain (YC: 5.34 ± 3.74 ; OC: 5.73 ± 4.33) and mastery (YC: 43.72 ± 9.55 ; OC: 43.11 ± 9.80). Ratings of caregiving strain ($p = 0.71$) and mastery ($p = 0.81$) did not significantly differ between age groups.

Relationship Characteristics:

The participants' relationship characteristics are described in Table 5. Across age groups there was no significant difference between younger and older couples with regards to marital status ($p = 0.89$). Patients and their spouses had a mean age gap of 3.44 ± 3.88 years, although this also did not significantly differ between younger and older couples ($p = 0.15$). Not surprisingly, older couples had longer marriages than younger couples ($p < 0.001$).

Table 5. Comparison of Relationship Characteristics and Pain Congruence Outcomes Between Younger and Older Couples

	Total (n = 59)	Younger Couples (n = 32)	Older Couples (n = 27)	P-Value
Relational Factors				
<i>Marital Status</i>				0.89
Married	49 (83.1)	26 (81.3)	23 (85.2)	
Common Law	9 (15.3)	5 (15.6)	4 (14.8)	
Separated but legally married	1 (1.7)	1 (3.1)	0 (0.0)	
<i>Length of Relationship</i>	26.67 ± 13.54	20.93 ± 11.59	33.48 ± 12.65	<0.001
<i>Age gap</i>	3.44 ± 3.88	2.50 ± 2.74	4.56 ± 4.72	0.15
Pain Congruence Outcomes				
Pain Severity	9.34 ± 2.33	9.72 ± 2.29	8.88 ± 2.33	0.17
Pain Interference	8.92 ± 2.32	9.25 ± 2.10	8.53 ± 2.54	0.24

Values are means $\pm$ SD or frequency (%).

Pain Congruence Outcomes

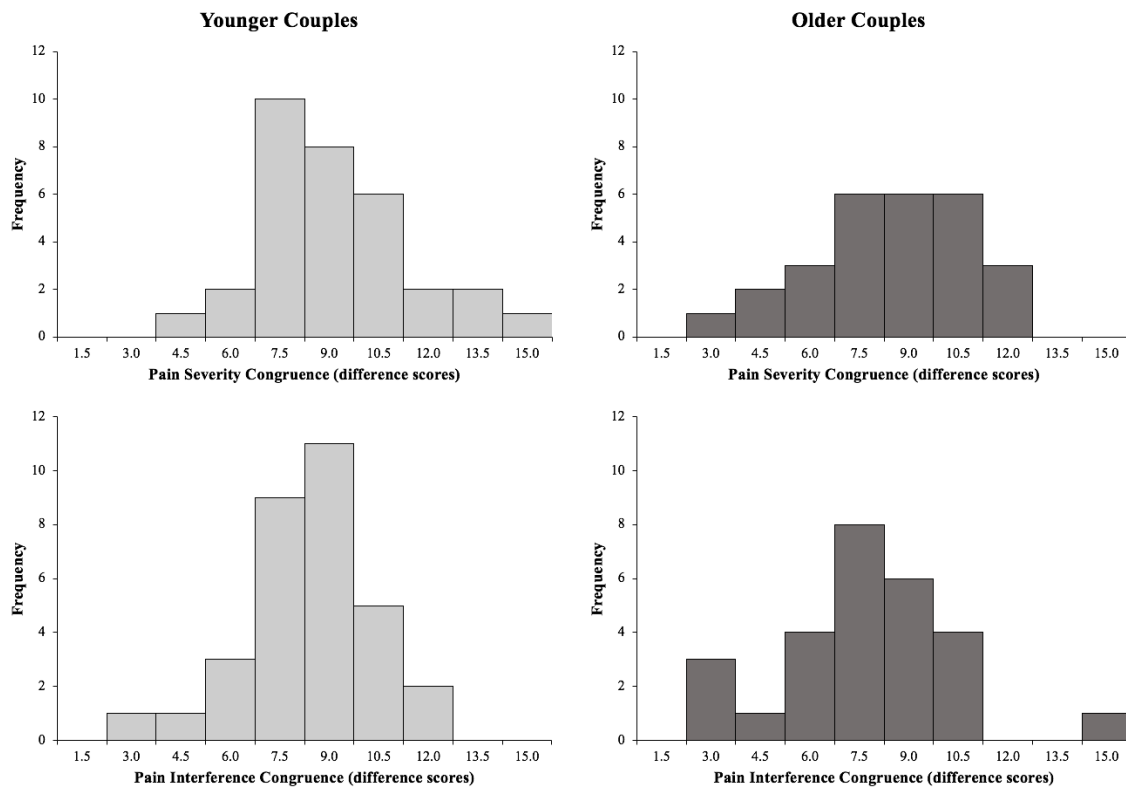
Bivariate Analyses:

Pain Severity Congruence. Frequency distributions of pain severity congruence in younger and older couples can be found in the upper half of Figure 3. On average, both younger and older couples slightly overestimated the patient's pain severity (YC: 9.72 ± 2.29 , OC: 8.88 ± 2.33). Upon testing **Objective 1**, no significant difference was found between the age groups on pain severity congruence ($p = 0.17$).

Pain Interference Congruence. Frequency distributions of pain interference congruence in younger and older couples can be found in the lower half of Figure 3. Similar to pain severity, both younger and older couples slightly overestimated the patient's pain interference (YC: $9.25 \pm$

2.10, OC: 8.53 ± 2.54). However, no significant difference was found between age groups on pain interference congruence ($p = 0.24$).

Figure 3. Frequency Distribution of Pain Severity and Interference Congruence Difference Scores in Younger and Older Couples



Notes. Difference scores range from 0 to 20. Scores between 0-9 represent overestimation, scores of 10 represent perfect congruence, and scores between 11-20 represent underestimation.

Identifying candidate correlates:

Pain Severity Congruence. Table 6 (second column) presents Point Biserial and Pearson's Correlation coefficients between pain severity congruence and each categorical and continuous variable, by age group. Candidate correlates of pain severity congruence in YC were patient pain interference, patient attachment anxiety, patient-rated solicitous responses, caregiving mastery, and caregiver strain. Candidate correlates of pain severity congruence in OC were patient depressive symptoms, pain acceptance, patient attachment anxiety, patient-rated

marital satisfaction, SC depressive symptoms, SC attachment anxiety, caregiver strain, SC marital satisfaction, and spouse-reported punishing responses.

Z-tests comparing the magnitude of the correlations between age groups showed that the correlations of CPAQ ($p = 0.039$), patient ECR attachment anxiety ($p = 0.005$), patient-rated MPI solicitous responses ($p = 0.045$), CSI ($p = 0.002$), and SC-reported MPI punishing responses ($p = 0.002$) with pain severity congruence were significantly different between younger and older couples.

In total, 12 candidate correlates were identified for inclusion in the multiple regression models for pain severity congruence (**Patient:** BPI interference, CES-D, CPAQ, ECR anxiety, KMS, MPI solicitous; **SC:** CES-D, CMS, CSI, ECR anxiety, KMS, MPI punishing). This is within the recommended range of 6-12 candidate correlates for our sample size (Hair et al. 2010). No candidate variables were highly correlated with one another ($r \geq 0.7$) (Tabachnick & Fidell, 2012). Therefore, these candidate correlates were all entered into the two separate backward regression models for younger and older couples, with pain severity congruence as the outcome variable.

Table 6. Candidate Correlates of each Pain Congruence Outcome in Younger and Older Couples

	Pain Severity Congruence (Difference values range from 0-20)			Pain Interference Congruence (Difference values range from 0-20)		
	Younger Couples	Older Couples	z-test	Younger Couples	Older Couples	z-test
Patient Factors						
Sex ^a	-0.094	0.142	-0.86	-0.063	0.075	-0.50
BPI Pain Severity	-	-		0.114	0.299*	-0.70
BPI Pain Interference	0.293*	-0.133	1.58	-	-	
CCI > 0	-0.011	-0.117	0.39	0.040	-0.306*	1.29
CES-D	0.124	-0.308*	1.61	-0.078	-0.319*	0.92
CPAQ	-0.156	0.319*	-1.77**	-0.127	0.07	-0.72
ECR Anxiety	0.279*	-0.396**	2.56***	0.12	-0.242	1.33
ECR Avoidance	0.127	-0.108	0.86	0.001	-0.258	0.96
KMS	-0.099	-0.450**	1.40	0.232	-0.092	1.19
MPI Solicitous	0.291*	-0.167	1.70**	0.008	-0.241	0.92
MPI Distracting	0.20	0.259	-0.23	0.004	-0.043	0.17
MPI Punishing	0.103	-0.165	0.98	0.121	-0.019	0.51
PCS	0.082	-0.063	0.53	0.15	0.063	0.32
Couple Factors						
Marital Status ^b	0.03	0.056	-0.094	0.001	-0.046	0.17
Length of Relationship	0.088	0.194	-0.39	0.307*	0.355*	-0.195
Age gap	0.007	-0.149	0.57	-0.269*	-0.193	-0.29
SC Factors						
Sex ^a	0.022	-0.142	0.60	0.091	-0.075	0.60
BPI Pain Presence ^c	-0.051	0.159	-0.77	-0.228	0.018	-0.91
CCI > 0	-0.165	-0.217	0.196	-0.349**	-0.244	-0.42
CES-D	-0.186	-0.469**	1.16	-0.057	-0.167	0.40
CMS	0.301*	0.267	0.13	0.101	0.21	-0.41
CSI	0.327*	-0.429**	2.89***	-0.104	-0.527***	1.75**
ECR Anxiety	-0.155	-0.503***	1.44	0.056	-0.385**	1.67**
ECR Avoidance	0.145	0.063	0.30	0.385**	0.114	1.06
KMS	-0.033	-0.313*	1.05	-0.075	-0.376*	1.16
MPI Solicitous	0.172	0.247	-0.28	0.078	0.167	-0.39
MPI Distracting	0.256	0.000	0.95	0.001	-0.072	0.27
MPI Punishing	0.231	-0.521***	2.95***	0.057	-0.28	1.25
PCS	-0.151	-0.198	0.176	0.023	-0.352*	1.42
PCS-S	-0.112	-0.195	0.31	-0.072	-0.183	0.41

Values are Point Biserial or Pearson's Correlation coefficients.

* $p \leq .15$; ** $p \leq .05$; *** $p \leq .01$, bolded coefficients were retained for inclusion in the Multivariate models.

Notes. BPI, Brief Pain Inventory; CCI, Charlson Comorbidity Index; CES-D, Center for Epidemiologic Studies-Depression Scale; CPAQ, Chronic Pain Acceptance Questionnaire; ECR, Experiences in Close Relationships Inventory; KMS, Kansas Marital Satisfaction Scale; CMS, Caregiver Mastery Scale; CSI, Caregiver Strain Index; MPI, Multidimensional Pain Inventory.

^a Reference group: male.

^b Reference group: married.

^c Reference group: no pain.

Pain Interference Congruence. Table 6 (fourth column) presents Point Biserial and Pearson's Correlation coefficients between pain interference congruence and each categorical and continuous variable, by age group. Candidate correlates of pain interference congruence in YC were length of relationship, age gaps, SC attachment avoidance and the presence of comorbidities in SCs (CCI > 0). Candidate correlates of pain interference congruence in OC

were patient pain severity, patient comorbidities, patient depressive symptoms, length of relationship, SC attachment anxiety, caregiver strain, SC marital satisfaction, and SC catastrophizing about their own pain.

Z-tests comparing the magnitude of the correlations between age groups showed that the correlations of SC ECR attachment anxiety ($p = 0.047$), and CSI ($p = 0.04$) with pain interference congruence were significantly different between younger and older couples.

In total, 11 candidate correlates were identified for inclusion in the multiple regression models for pain interference congruence (**Patient:** BPI severity, CCI, CES-D; **SC:** CCI, CSI, ECR anxiety, ECR avoidance, KMS, PCS; **Couple:** length of relationship, age gap). This is within the recommended range of 6-12 candidate correlates for our sample size (Hair et al. 2010). No candidate variables were found to be highly correlated with one another ($r \geq 0.7$) (Tabachnick & Fidell, 2012). Therefore, these identified candidate correlates were all entered into the two separate backward regression models for younger and older couples, with pain interference congruence as the outcome variable.

Regression Analyses:

Pain Severity Congruence. Table 7 presents the results of the multivariate linear regression models of pain severity congruence, performed separately for younger and older couples. In YC, greater SC underestimation of pain severity was associated with greater patient-reported pain interference and solicitous responses, greater SC-reported caregiver strain and lower depressive symptoms. SC depression made the greatest contribution to the regression model ($p = 0.003$). This model explained 35.7% of the variance in pain severity congruence. An examination of the tolerance and VIF values revealed no multicollinearity.

In OC, greater SC underestimation of pain severity was associated with greater patient-reported pain acceptance and lower SC-reported punishing responses; both variables made important contributions to this model. SC marital satisfaction also made a non-significant contribution to the model. This model explained 41.8% of the variance in pain severity congruence. Tolerance and VIF values revealed no multicollinearity.

Table 7. Multivariate Linear Regression Correlates of Pain Severity Congruence

	Younger Couples (n = 32)	Older Couples (n = 27)
	Standardized β (SE) ^a	Standardized β (SE) ^a
Patient Factors		
<i>BPI Pain Interference</i>	0.415* (0.150)	
<i>CES-D</i>		
<i>CPAQ</i>		0.434** (0.017)
<i>ECR Anxiety</i>		
<i>KMS</i>		
<i>MPI Solicitous</i>	0.327* (0.329)	
SC Factors		
<i>CES-D</i>	-0.547** (0.043)	
<i>CMS</i>		
<i>CSI</i>	0.371* (0.091)	
<i>ECR Anxiety</i>		
<i>KMS</i>		-0.275 (0.562)
<i>MPI Punishing</i>		-0.500** (0.373)
	$F_{(4,27)} = 5.302, p = 0.003$ $R^2 = 0.357$	$F_{(3,23)} = 7.228, p = 0.001$ $R^2 = 0.418$

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

Notes. BPI, Brief Pain Inventory; CES-D, Center for Epidemiologic Studies-Depression Scale; CMS, Caregiver Mastery Scale; CPAQ, Chronic Pain Acceptance Questionnaire; CSI, Caregiver Strain Index; ECR, Experiences in Close Relationships Inventory; KMS, Kansas Marital Satisfaction Scale; MPI, Multidimensional Pain Inventory.

^a Standard error.

Pain Interference. Table 8 presents the results of the multivariate linear regression models of pain interference congruence, performed separately for younger and older couples. In YC, greater SC underestimation of pain interference was associated with greater SC attachment avoidance. This was the only significant correlate retained in this model, explaining 12% of the variance. Tolerance and VIF values revealed no multicollinearity.

In OC, greater SC underestimation of pain interference was associated with greater patient-reported pain severity and lower depressive symptoms and greater SC-rated marital satisfaction. Patient depression made the greatest contribution to the regression model ($p = 0.023$). This model explained 29.6% of the variance in pain interference congruence. Tolerance and VIF values revealed no multicollinearity.

Table 8. Multivariate Linear Regression Correlates of Pain Interference Congruence

	Younger Couples (n = 32)	Older Couples (n = 27)
	Standardized β (SE) ^a	Standardized β (SE) ^a
Patient Factors		
<i>BPI Pain Severity</i>		0.350* (0.240)
<i>CCI > 0</i>		
<i>CES-D</i>		-0.410* (0.04)
Couple Factors		
<i>Length of Relationship</i>		
<i>Age gap</i>		
SC Factors		
<i>CCI > 0</i>		
<i>CSI</i>		
<i>ECR Anxiety</i>		
<i>ECR Avoidance</i>	0.385* (0.291)	
<i>KMS</i>		-0.377* (0.642)
<i>PCS</i>		
	$F_{(1,30)} = 5.212, p = 0.030$ $R^2 = 0.120$	$F_{(3,23)} = 4.648, p = 0.011$ $R^2 = 0.296$

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

Notes. BPI, Brief Pain Inventory; CCI, Charlson Comorbidity Index; CES-D, Center for Epidemiologic Studies-Depression Scale; CSI, Caregiver Strain Index; ECR, Experiences in Close Relationships Inventory; KMS, Kansas Marital Satisfaction Scale; PCS, Pain Catastrophizing Scale.

^a Standard error.

CHAPTER FOUR: DISCUSSION

Pain congruence refers to the extent of agreement in perceptions of pain between two members of a dyad, in this case people with cancer pain and their spouse caregivers (SCs) (Pence et al., 2006). Greater incongruence negatively impacts the psychological wellbeing, coping and adjustment behaviours of both individuals (Cano, Johansen, et al., 2005; Cremeans-Smith et al., 2003; Junghaenel et al., 2018; Miaskowski, Zimmer, et al., 1997; Riemsma et al., 2000). Using Gauthier's and Gagliese's (in preparation) biopsychosocial model of pain congruence as a framework (Figure 1), the present study examined age differences in pain severity and interference congruence in younger and older couples. This is the first study, to our knowledge, that simultaneously examined multiple biological, psychological, and relational correlates in two different pain congruence outcomes separately in younger and older couples. No significant age differences in pain severity or interference congruence were found. However, the correlates associated with these congruence outcomes differed between the age groups, with many being relational and psychosocial factors. In younger couples, correlates of pain severity congruence were patient's pain interference, solicitous responses, SC depression and caregiving strain. In older couples, correlates of pain severity congruence were pain acceptance and SC punishing responses. In younger couples, the only significant correlate of pain interference congruence was SC attachment avoidance. However, for older couples, correlates of pain interference congruence included patient's pain severity, depression, and SC marital satisfaction. Interestingly, no single variable was included in all four models.

The Biopsychosocial Model of Pain Congruence

In 2009, Gagliese et al. reported a mixed-method study examining age-related patterns in adaptation to cancer pain in younger and older patients. Despite comparable pain management,

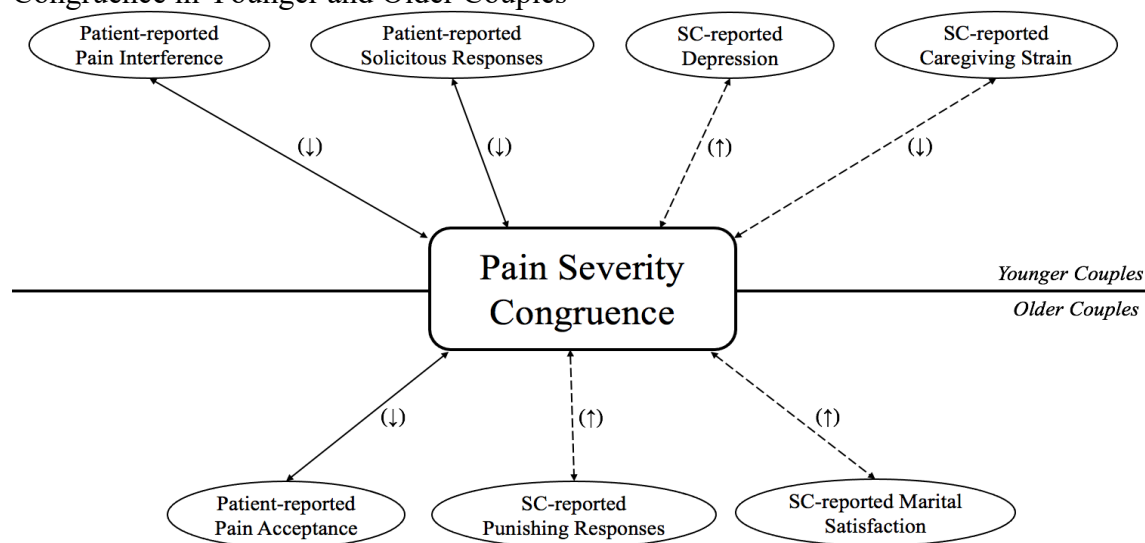
pain severity and interference, age-related patterns in adaption to cancer pain were found. Younger patients were more likely to be “waiting to live”, whereas older patients were more likely to be “living despite pain” (Gagliese et al., 2009). “Waiting to live” reflected younger patients’ belief that they needed complete pain relief before their lives could move forward. They described difficulties accepting their pain and believed that it had taken control of their lives. Marital strain was common among younger patients, as many believed their partners did not understand their pain or associated limitations. Older patients, however, frequently reported that they were “living despite pain”, understanding that pain was an inevitable part of cancer, and intending to continue pursuing life goals regardless of their diagnosis. Marital growth was common among older patients, as pain was described as belonging to the couple or “our pain”. Many older patients also described increased understanding of their partner’s health-related struggles because of their own cancer. This study highlighted age as an important factor when considering adaptation to cancer-related pain and emphasized the need to tailor psychosocial interventions to patients’ life stage.

These findings also provided the basis for the present study and helped develop the framework with which to examine pain congruence among younger and older dyads. Although previous literature has predominantly focused on intrapersonal biological or psychological processes involved in pain congruence, Gauthier and Gagliese’s framework acknowledges that the patient’s social environment also plays an important role in their pain experiences, and thus both partners’ understanding of pain needs to be considered across the adult lifespan (L. R. Gauthier & Gagliese, in preparation). The present study tested Gauthier and Gagliese’s model and the findings inform its refinement, through the explicit examination of age differences as

well as differentiation of correlates associated with SC overestimation versus underestimation of pain.

At least one biophysical factor (e.g., pain severity and interference) and multiple psychosocial factors (e.g., attachment style, depression, marital satisfaction, and pain response behaviours) were retained in the final models for each pain congruence outcome, providing support to this multidimensional framework. Furthermore, with the exception of marital satisfaction, each model retained unique correlates. This highlights the need to consider multiple outcomes simultaneously to further our understanding of cancer pain. These individual correlates will be discussed in greater detail in the following sections. Although requiring replication and further refinement, the new revised versions of Gauthier and Gagliese's model, highlighting the main findings of the present study, can be found in Figures 4 and 5.

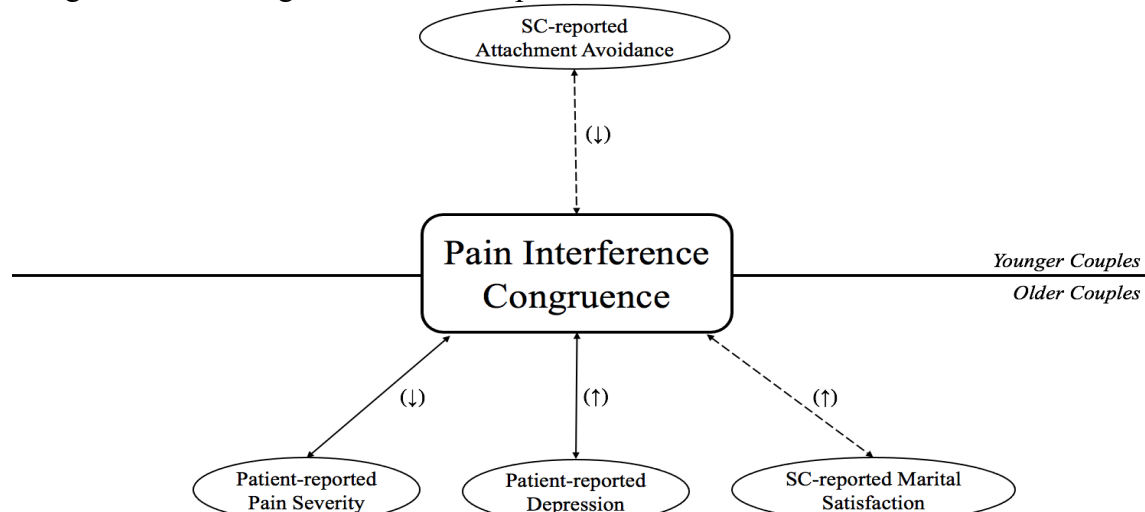
Figure 4. Summary Model of Significant Biopsychosocial Correlates for Pain Severity Congruence in Younger and Older Couples



Symbols: (↓), underestimation; (↑), overestimation.

Notes. Solid lines indicate patient factors, and dashed lines indicate SC factors.

Figure 5. Summary Model of Significant Biopsychosocial Correlates for Pain Interference Congruence in Younger and Older Couples



Symbols: (↓), underestimation; (↑), overestimation.

Notes. Solid lines indicate patient factors, and dashed lines indicate SC factors.

Participant Characteristics

Pain Measures:

Consistent with other studies of cancer-related pain (Badr et al., 2010; Lin, 2001; K. S. Lyons et al., 2014), the patients in the present study reported moderate pain severity and interference. Neither pain severity nor interference differed between age groups. This is comparable to several other studies investigating age-related patterns in patients with cancer pain (Gagliese et al., 2009; Green & Hart-Johnson, 2010), and challenges the long-held assumption that older patients have an easier experience than younger patients with cancer (Blank & Bellizzi, 2008). A common belief in the past has been that pain is a normal, inevitable part of aging (see Gagliese, 2009 for a critique of this ageist position). The results of this study add to the growing evidence that this is not the case. In addition to measures of pain, younger and older adults with cancer also did not differ on any of the psychosocial measures related to pain adjustment such as pain acceptance or depression, further suggesting that the burden of cancer does not lessen with age.

About one-third of SCs reported experiencing pain. The prevalence of chronic pain was much higher in our sample of SCs than the general Canadian population in which approximately 19% of adults report chronic pain (Schopflocher et al., 2011). However, these findings are comparable to other studies investigating SCs of patients with chronic pain (Leonard & Cano, 2006). This is the first study, to our knowledge, to examine pain and comorbidities in SCs of individuals with cancer. Our findings suggest that the burden of caregiving is high and that perhaps SCs may be at a greater risk for deteriorating physical health due to the overwhelming number of caregiving tasks they are expected to provide.

The present study also suggests that a significant number of spouses are dealing with their own physical limitations, which may impact the way they communicate with their significant others about their pain. Specifically, spouses who experience pain themselves may have a greater appreciation for the difficulties their partners with cancer pain are facing (i.e., a greater sense of knowing) due to their own personal experiences with chronic pain (Goubert et al., 2005; Leonard & Cano, 2006). However, this did not seem to be the case in our analysis, as the presence of chronic pain in SCs was not associated with greater pain congruence for either age group. These findings suggest that SCs with chronic pain do not differ in their understanding of their partners' pain symptoms when compared to pain-free SCs. This may be due, in part, to the differences in the types of pain experienced between the partners.

Interestingly, the prevalence of chronic pain in SCs did not differ between age groups. To our knowledge, the current study is the first to examine age differences with regards to the presence of chronic pain in SCs of patients with cancer. Previous literature has suggested that in addition to patients, spouses also experience a greater frequency of chronic illness and poorer self-rated health in late adulthood (Blyth et al., 2008), but that older SCs may have an easier time

dealing with these obstacles than younger SCs (Berg & Upchurch, 2007). However, this did not seem to be the case in our study, suggesting that younger and older SCs may share similar pain experiences.

Sociodemographic Characteristics:

Sex. This study is among the first to have an almost equal distribution of sex in our sample of SCs and patients. Previous research has consistently shown that women are predominantly the primary providers of informal care to family members and make up the majority of the SC demographic (Blyth et al., 2008; Fleming et al., 2006; Sharma et al., 2016). For this reason, many studies of pain congruence have relied on pain reports from female caregivers. Two studies comparing sex-differences in caregivers have found that women are more likely than men to be congruent in their estimates of the patient's pain (Kristjanson et al., 1998; Shega et al., 2004). However, the current study did not find any associations between patient or SC sex and pain severity or interference congruence. The inconsistencies of our findings with these two studies may be due to methodological differences in sample sizes, measurement tools or analytical methods.

This is also the first study to examine age differences in the association between sex and pain congruence across two different outcomes. Previous research has found significant associations between age and sex in caregivers, with women and those of older age reporting more time spent caregiving than men and younger adults (Dahlberg et al., 2007). Therefore, it is possible that older caregivers, especially women, who have spent more time with the patient, may be more in tune with their spouses and communicate more effectively regarding their pain experiences. However, the results of the present study suggest that this is not the case, and in fact

older and younger spouses demonstrated similar shared knowledge of the patient's pain experiences regardless of sex or marital role. Further research is needed to examine these relationships in larger samples of couples coping with cancer-related pain.

Psychosocial Factors:

Depression. Depression is a common symptom in cancer (Smith, 2015) and is often associated with pain (Gagliese et al., 2007). Over one-third of patients with cancer are affected by clinically significant symptoms of depression (Badr & Shen, 2014; Fleming et al., 2006), with greater disability and physical distress heightening these effects (Rodin et al., 2007). In the current study, the majority of patients reached the clinical cut-off for depression. This remains consistent other studies investigating patients with cancer-related pain (Badr & Shen, 2014), and suggests that the mental health and wellbeing of patients with cancer may play an important role in their shared coping and adjustment behaviours.

Depression is also highly prevalent among caregivers of individuals with cancer (Badr & Shen, 2014; Fleming et al., 2006), with chronic pain also contributing to higher levels of psychological distress (Blyth et al., 2008). In the present study, SCs reported moderate levels of depression, with approximately one-third scoring above the clinically relevant cut-off for depressive symptomology. These findings are consistent with several other studies of spouses of patients with cancer-related pain (Badr & Shen, 2014; Fleming et al., 2006) and highlight the importance of considering SCs' psychological distress in dyadic pain research and palliative care interventions.

No differences were found between the younger and older groups in either patient or SC depression. Although previous research has suggested that older adults with cancer are less likely

than younger adults to report depression (Kroenke et al., 2004; Schroevers et al., 2004), the role of pain in the relationship between age and depression has not been considered in these studies. Our findings, however, are comparable to several other studies within the pain literature investigating patients with cancer (Gagliese & Melzack, 2003; Green & Hart-Johnson, 2010; Mah et al., 2018; Williamson & Schulz, 1995), as well as their SCs (Badr & Shen, 2014), which suggest that younger and older adults experience similar levels of psychological distress in the context of cancer pain. The results of the present study align with these findings and suggest that these age-related patterns may be obscured by the impact of ongoing pain. Our findings imply that the experience of cancer pain is not in fact easier for older adults but that some of the factors that put younger adults at greater risk for depression may not operate in the same way when cancer pain is present (Gagliese et al., 2007).

Pain Catastrophizing. In the current study, patients reported moderate levels of catastrophizing about their own pain. This is comparable with other research investigating patients with both chronic noncancer (Cano, Leonard, et al., 2005; Pence et al., 2006) and cancer-related pain (Akbas et al., 2021). Conversely, SCs reported low levels of catastrophizing, suggesting that they were less likely than their partners to catastrophize about their own pain. It was also found that spouse's catastrophizing about the patient's pain (PCS-S) was positively correlated with both patients' catastrophizing about themselves and SCs' catastrophizing about themselves. These findings are consistent with previous literature investigating patients with chronic non-malignant pain and their partners (Cano, Leonard, et al., 2005) and healthy couples in romantic relationships (McWilliams & Holmberg, 2010).

This is the first study, to our knowledge, to assess three different types of pain catastrophizing in a sample of patients with cancer-related pain and their SCs. Our findings

suggest that on average, SCs catastrophized about their partner's pain more than their own. SCs also catastrophized about the patient's pain more than patients did for themselves. It is possible that these results are related to the high levels of marital satisfaction among these couples. More specifically, literature has shown that spouses who report greater closeness and marital satisfaction may share their partner's experience of pain more intensely than those that are more distant (Monin & Schulz, 2009). The couples in this study were highly satisfied with their marriages. Thus, it is possible that SCs may have been hypervigilant to signs of distress in their partners out of concern for their wellbeing.

No significant age differences were found on the PCS for either patients or their SCs. This contradicts a previous study which showed that younger patients with breast cancer were more likely than older patients to catastrophize about their pain (Jacobsen & Butler, 1996). Although the study by Jacobsen and Butler had a similar sample size to our study, their sample was restricted to women with breast cancer, thus providing possible reasons for the discrepancies with our findings. Another study by Cano and colleagues (2005) showed that in spouses of individuals with chronic pain, age was negatively associated only with the rumination subscale and not pain catastrophizing as a whole. However, to our knowledge, this is the first study to examine age differences in SCs' catastrophizing about their own pain. Previous studies have focused on the pain experiences of patients, often neglecting their spouse's experiences. However, as our study and others have shown (Leonard & Cano, 2006), a significant number of spouses of patients with chronic pain are also experiencing pain themselves. Thus, it is important to consider their symptoms and pain-related anxiety in the examination of dyadic adjustment across the lifespan.

Marital Satisfaction. With regards to marital satisfaction, both patients and SCs were highly satisfied with their marriages, with no significant differences existing between partners. This is consistent with other studies of patients with cancer (Boquiren et al., 2016) and their SCs (Chen et al., 2004). Furthermore, no age differences were found with regards to marital satisfaction, with both younger and older couples demonstrating high levels of marital satisfaction. This is comparable to other studies of patients with cancer and their SCs (Braun et al., 2007). However, these findings contradict a previous study by Carstensen et al. (1995) which demonstrated that older couples generally experience greater marital satisfaction than younger couples. These discrepancies with our findings may be due to the relatively smaller sample size of the current study, as well as the fact that Carstensen et al. (1995) investigated a sample of healthy participants in romantic relationships, thus their results may not be generalizable to our sample of patients coping with cancer-related pain. Furthermore, it is important to consider that these high ratings of marital satisfaction may reflect social desirability response bias. Previous literature has found that spouses have the tendency to over-report relationship satisfaction, especially on self-report questionnaires, in order to appear in a socially desirable way (Edmonds, 1967; Visschers et al., 2017). Therefore, it may be possible that the spouses in this study distorted their appraisals of marital satisfaction towards the higher end of the scale, especially because of their empathy towards the hardships their partners with cancer are facing. In addition, one of the main eligibility criteria for the present study was the identification of a spouse as a primary care provider. Therefore, it is also possible that this may have created a selection bias to only include couples in happier marriages. Perhaps couples who were not content with their spouses may have reported other close friends or family members as their primary care providers instead, thus excluding them from the present study.

Pain Response Behaviours. Pain response behaviours, classified as being solicitous, distracting or punishing response, are characterized by SCs expressing sympathy, avoidant or hostile behaviours towards the patient, respectively (Flor et al., 1987). In the current study, both patients and their SCs reported low amounts of spousal punishing responses, whereas solicitous responses were very common. This suggest that SCs were more likely to be sympathetic than hostile towards their partners in response to pain. This is consistent with previous studies of individuals with chronic non-malignant pain and their SCs (Junghaenel et al., 2018; Pence et al., 2006).

Significant differences were found, however, with regards to distracting responses; SCs reported high levels of distracting responses, whereas patients rated these responses as low. This suggests that SCs were more likely than patients to report that they attempted to take their spouse's mind off of the pain. This contradicts two previous studies examining patients with chronic non-malignant pain (Junghaenel et al., 2018; Pence et al., 2006), which found no significant differences in ratings of distracting responses between partners. However, the current study is the first to test these associations among patients with cancer and their SCs, possibly accounting for the discrepancies with our findings.

Age differences were not found between either patients' or SCs' ratings of any of the three pain response behaviours (i.e., solicitous, distracting, or punishing responses). This is consistent with previous literature on patients with cancer and their SCs (Acquati & Kayser, 2019), and suggests that younger and older SCs may react similarly towards the patient's expression of pain.

Caregiving Factors:

Caregiving Strain. Caregiving strain refers to the physical, psychological, social and financial experiences involved in providing care and may take several trajectories based on changes in the patient's health (Nijboer et al., 1998). On average, the SCs in this study reported moderate amounts of strain due to their caregiving duties. Furthermore, no age differences were found between younger and older SCs in caregiving strain. These findings are comparable with previous literature in caregivers of patients with cancer and chronic non-malignant pain (Badr & Shen, 2014; Martire et al., 2006; Miaskowski, Zimmer, et al., 1997; Shega et al., 2004), and support the need to better understand caregivers' experiences in the examination of cancer pain. Specifically in the context of cancer, patients' care needs can be expected to increase as the disease progresses (Schulz & Eden, 2016). Understanding the burdens involved in caregiving is essential to improve empathic understanding between partners, improve communication, and address modifiable factors involved with dyadic coping. The examination of these factors may help SCs provide a better quality of care to their partners and reduce potential sources of caregiving stress (Martire et al., 2006).

Caregiving Mastery. Caregiving mastery is described as a caregiver's sense of control over their care situation, with greater mastery indicating increased feelings of competence in caring for a loved one (Monin & Schulz, 2009). Consistent with the literature on SCs of patients with chronic pain (Martire et al., 2006), the sample of SCs in the present study reported moderate amounts of caregiving mastery, indicating that they generally had a sense that they were in control of their care situation. Furthermore, no age differences were found between younger and older SCs with regards to caregiving mastery. This is consistent with previous literature in family caregivers of patients following a stroke (Schreiner & Morimoto, 2003). However, to our

knowledge, this is the first study to examine age differences in caregiving mastery in a sample of SCs of patients with cancer-related pain.

Pain Congruence Across Age Groups

The present study showed that on average, SCs overestimated the patients' pain severity and interference regardless of age group. This is consistent with several other studies investigating pain congruence across a diverse sample of patients with both cancer and non-malignant chronic pain (Martire et al., 2006; Miaskowski, Zimmer, et al., 1997; Riemsma et al., 2000; Shega et al., 2004). However, these studies have focused exclusively on pain severity ratings, and the literature on pain interference congruence remains limited.

To our knowledge, only two studies have focused on pain interference congruence as an outcome, with one indicating that SCs were more likely to underestimate the patients' pain interference (Cano, Johansen, et al., 2005), and the other that patients and SCs were congruent when estimating the patients' pain interference (Suso-Ribera et al., 2019). However, both studies examined patients with chronic noncancer pain, which may limit the generalizability of their findings. Nevertheless, literature has shown that pain severity and interference are not understood in the same way (Cano, Johansen, et al., 2005), and couples may communicate differently about these two constructs (K. S. Lyons et al., 2013). Our findings lend support to this conceptualization and highlight the importance of examining this outcome measurement, in combination with pain severity, in dyadic research to provide a better understanding of pain as a multidimensional phenomenon.

The current study also found that congruence on measures of pain severity and interference did not differ between younger and older couples. The present findings contradict a previous

study examining a similar sample of patients with cancer pain and their family caregivers, which found that older adults are more likely than younger adults to be incongruent when rating patients' pain severity (Lin, 2001). However, these discrepancies could be due to various methodological differences. For example, unlike our study, Lin (2001) stratified couples into "congruent or "incongruent" groups based on their agreement of pain severity ratings regardless of the extent of under or overestimation. This method of categorizing couples reduces statistical power (Cano, Johansen, et al., 2005), and conceptualizes underestimation and overestimation of pain as equivalent, when they may have their own unique implications. Importantly, Lin (2001) was not restricted to spouse caregivers, such as in the case of our study, which may have affected the generalizability of their findings. Research has shown that caregivers who are closer to their partners, such as spouses, often show greater hypervigilance than other informal caregivers to expressions of pain by their partners (Monin & Schulz, 2009). This overprotectiveness may explain why SCs overestimated both pain severity and interference ratings regardless of age. The present study allows us to examine both the unique relationship of couples and the direction of incongruence associated with these outcomes through the use of difference scores.

Although pain severity and interference congruence did not differ between younger and older couples, age-related differences were found in the correlates associated with these outcomes. With regards to pain severity congruence, the magnitude of the correlations for pain acceptance, patient attachment anxiety, patient-rated solicitous responses, caregiver strain, and SC-rated punishing responses differed between younger and older couples. For pain interference congruence, the magnitude of the correlations for only SC attachment anxiety and caregiver strain differed between younger and older couples. Specifically, these significant variables were often associated with the underestimation of pain in younger couples but the overestimation of

pain in older couples. Most of the variables were also interactional and involved some form of communication between patients and SCs. These findings may suggest that younger and older couples adjust to the biopsychosocial impacts of cancer pain differently, and that certain factors, such as caregiving strain, may be associated with different types of incongruence (i.e., overestimation vs. underestimation) based on age. This is the first study to perform such an analysis examining bivariate correlations of pain congruence between younger and older age groups. With the exception of patient-rated solicitous responses, an overall trend was found for both pain severity and interference congruence suggesting that the correlations were also stronger in magnitude for older couples than younger couples. Our findings suggests that there may be age-related variation between pain congruence and some indices of relational interaction. More specifically, interactional variables may be associated with pain congruence to a greater degree in older couples than younger couples. This may be because older adults generally engage in more collaborative forms of coping with chronic illness than younger adults (Berg & Upchurch, 2007). However, further research is needed to replicate and more fully understand these patterns.

Table 9 summarizes the significant correlates from the regression analyses for both pain severity and interference congruence for each age group. This was done to illustrate variability of retained correlates between groups. For both age groups, significant correlates across the pain congruence outcomes were predominantly relational and psychosocial variables. In younger couples, greater SC underestimation of pain severity was associated with greater patient pain interference, patient-rated solicitous responses, caregiver strain and lower depressive symptoms in SCs. In older couples, greater SC underestimation of pain severity was associated with greater pain acceptance in patients and lower SC-reported punishing responses; this model explained the

greatest amount of variance. Furthermore, in younger couples, greater SC underestimation of pain interference was associated with greater SC attachment avoidance. In older couples, greater SC underestimation of pain interference was associated with greater patient pain severity, lower patient depressive symptoms and SC marital satisfaction.

Table 9. Summary of Significant Biopsychosocial Correlates for Each Pain Congruence Outcome in Younger and Older Couples

	Pain Severity Congruence		Pain Interference Congruence	
	<i>Underestimation</i>	<i>Overestimation</i>	<i>Underestimation</i>	<i>Overestimation</i>
Patient Factors				
<i>BPI Pain Severity</i>			OC	
<i>BPI Pain Interference</i>	YC			
<i>CES-D</i>				OC
<i>CPAQ</i>	OC			
<i>MPI Solicitous</i>	YC			
SC Factors				
<i>CES-D</i>		YC		
<i>CSI</i>	YC			
<i>ECR Avoidance</i>			YC	
<i>KMS</i>				OC
<i>MPI Punishing</i>		OC		

Abbreviations: YC, younger couples group; OC, older couples group.

Notes. BPI, Brief Pain Inventory; CES-D, Center for Epidemiologic Studies-Depression Scale; CPAQ, Chronic Pain Acceptance Questionnaire; CSI, Caregiver Strain Index; ECR, Experiences in Close Relationships Inventory; KMS, Kansas Marital Satisfaction Scale; MPI, Multidimensional Pain Inventory.

In support of our initial hypotheses, the present study did not find any shared correlates in the multiple regression models for younger and older couples for either of the pain congruence outcomes despite being presented with the same set of pooled candidate correlates. These findings are consistent with many other studies on age-differences in correlates of pain (Gagliese et al., 2008; Mah et al., 2018) and further suggest that age may serve as a proxy for many of these biopsychosocial correlates of pain congruence. More specifically, it may be possible that younger and older couples communicate differently regarding cancer-related pain.

Taken together, the variables in all four models explained a moderate amount of the variance in pain congruence. Interestingly, the models for pain severity congruence explained

more variance in both age groups when compared to the models for pain interference congruence. This suggests that other variables not included in the present analyses may also serve as important correlates of pain interference congruence in couples coping with cancer pain and may warrant further study. Furthermore, in all four models, psychosocial factors (e.g., marital satisfaction, depression, pain acceptance and pain response behaviours) accounted for the largest amount of variance in the pain congruence outcomes emphasizing the significance of the psychological and social dimensions in the pain experience. These variables are also potentially modifiable risk factors that may guide the development of tailored psychosocial and educational initiatives to improve pain communication in couples coping with cancer pain. The correlates for each of these pain congruence outcomes will be outlined in greater detail in the following sections according to age group.

Pain Severity Congruence

Correlates of Pain Severity Congruence in Younger Couples

The current study identified four specific correlates of pain severity congruence in younger couples: patient pain interference, solicitous responses, SC depression and caregiving strain. SC depression explained the greatest amount of variance in this model and was the only correlate associated with the overestimation of pain in younger couples. Each correlate associated with pain severity congruence in younger couples will be discussed in greater detail in the following sections.

Patient Pain Interference. Pain interference, the extent to which pain affects one's everyday work, social, and interpersonal activities (Cano, Johansen, et al., 2005), was associated with greater SC underestimation of pain severity in younger couples. This is consistent with

previous studies investigating patients with cancer and their caregivers (Lin, 2001; Miaskowski, Zimmer, et al., 1997), and might be explained by pain communication. For example, it is possible that spouses may avoid talking about the patient's pain in order to reduce their own personal distress (Ickes & Simpson, 2001). This may result in a lack of effective communication between partners and may put patients at a risk for poorer health-related outcomes (Miaskowski, Zimmer, et al., 1997). Specifically, patients whose pain is underestimated by their SCs may experience higher levels of interference because their pain is not being adequately managed by their caregivers. However, further research is needed before making inferences about the direction of this association.

Caregiver Strain. In younger couples, greater underestimation of pain severity was associated with increased caregiving strain. On average, younger SCs reported moderate levels of caregiver strain. These findings are consistent with a study by Miaskowski et al. (1997), which suggests that caregiving strain is associated with greater incongruence of pain severity. The current study extends these findings by examining the type of incongruence associated with greater caregiving strain, in this case, underestimation.

The association between caregiving strain and increased underestimation of pain severity is consistent with the empathic accuracy model, suggesting that intimate knowledge of a partner's suffering may be related to poor SC wellbeing (N. Gauthier et al., 2008; Monin & Schulz, 2009; Stephens et al., 2006). Changes in patients' physical functioning may cause increased stress to SCs, due to the abundance of caregiving tasks they are expected to provide (Martire et al., 2006). Spouses who feel burdened by providing help may be too overwhelmed with their caregiving duties to provide adequate support and care to the patient. According to the

empathic accuracy model, when unable to effectively provide support or when prior attempts to help manage pain have been unsuccessful, SCs may move toward a state of “motivated inaccuracy” (Goubert et al., 2005; Simpson et al., 2003). During cancer treatment, caregivers are responsible for providing numerous types of health and medical care tasks, including symptom and side effect management, nutrition, and complex medication regimens (Haley, 2003). These tasks may become overwhelming and cause changes in SCs’ social, physical, and emotional health over time (Haley, 2003). Therefore, motivated inaccuracy may serve as a strategy to help SCs manage their own distress but may also result in inaccurate judgements of the patient’s pain in the form of underestimation (Goubert et al., 2005).

Previous research has given support to the empathic accuracy model in patients coping with chronic non-malignant pain and their caregivers (N. Gauthier et al., 2008; Suso-Ribera et al., 2019). However, the current study is the first to use Gauthier and Gagliese’s biopsychosocial conceptualization of pain (Figure 1) to test this theory in couples coping with cancer pain. Although Simpson and Ickes’ original model (Ickes & Simpson, 2001) did not consider pain specifically, our findings suggest that these two frameworks may be effective in describing the dyadic communication processes of couples coping with cancer pain by incorporating influences from both the patient and caregiver. These two models, as well as other developmental contextual models of chronic illness (Berg & Upchurch, 2007), may explain the majority of the findings in the present study. More specifically, these frameworks help establish that couples adapt in different ways and might actually be motivated to be empathically inaccurate under certain conditions in order to protect their marital relationships and themselves. The implications of these models and how they align with the rest of our findings will be outlined in further detail in the following sections.

Patient-rated Solicitous Responses. Solicitous responses, one of three types of pain response behaviours, are characterised by caregivers expressing sympathy towards the patient and attempting to take care of them (Flor et al., 1987). This study found that in younger couples underestimation of pain severity was associated with greater patient-reported solicitous responses. Our findings contradict previous studies of patients with chronic noncancer pain (Junghaenel et al., 2018) and osteoarthritis (Martire et al., 2006), which did not find an association between pain congruence and patients' perceptions of their partners' solicitous responses. However, these studies used different data analysis techniques when measuring pain congruence. Specifically, they categorized dyads into three groups (patient-spouse underestimation, overestimation and agreement) based on their concordance of pain severity ratings. This may have decreased the statistical power of their analyses, contributing to the discrepancies with the present findings. Furthermore, both studies investigated patients with chronic noncancer pain, which may have limited the generalizability of their results.

Martire et al. (2006) suggested that spouses who accurately perceive their partners' pain experiences may be less inclined to exhibit solicitous behaviours as it can be detrimental to the patients' physical functioning. Taking over patient tasks can trigger a cycle of inactivity and inhibit the patient's independent functioning. Therefore, patients may believe that spouses who have a better understanding of their pain severity also better understand their needs and how best to provide support and assistance (Martire et al., 2006). These findings may also be supported by the empathic accuracy model which states that spouses may be motivated to be inaccurate under certain conditions to preserve their relationships (Ickes & Simpson, 2001). Patients may believe that their SCs are expressing overly controlling or solicitous behaviour in an attempt to suppress

their fears that their partners are suffering and convince themselves that the patient is in good health. These responses may also serve as a strategy to reduce their partners' expression of pain and distress. However, these behavioural reactions may cause patients to feel misunderstood and distance themselves, creating discrepancies in the perception of pain between partners (Riffin et al., 2016).

SC Depression. In younger couples, greater SC depressive symptoms were associated with the overestimation of pain severity by SCs. This variable explained the greatest amount of variance in this model. These findings are consistent with a previous study investigating patients with chronic musculoskeletal pain and their SCs which found that higher SC psychological distress was also associated with SCs rating pain as more severe than the patient (Cano, Johansen, et al., 2005). This highlights the importance of incorporating both partners' mental health when examining pain congruence.

Cano and colleagues (2005) suggest that greater psychological distress in caregivers may impair their ability to accurately judge pain in their significant others through greater hypervigilance to expressions of pain. This may cause SCs to perceive the patient's distress as more serious than it may be, resulting in an overestimate of the patient's pain severity. However, Cano et al. (2005) studied only older patients (aged 55 years and over) with chronic musculoskeletal pain; thus, it is important to examine these relationships across different age groups and patient subsamples. This study is the first to examine correlates of pain severity congruence with regards to psychological distress separately in younger and older couples coping with cancer-related pain.

In summary, patient pain interference, patient-rated solicitous responses, SC depression and caregiving strain were significant correlates of pain severity congruence in younger couples, with SC depression making the greatest contribution to this model. Patient pain interference, patient-rated solicitous responses and SC caregiving strain were associated with greater SC underestimation of pain severity, whereas SC depression was associated with greater SC overestimation of pain severity. Our findings collectively support the empathic accuracy model which states that spouses might be motivated to be inaccurate in their perceptions of their partners' feelings and distress under certain conditions to protect their relationships and themselves (Ickes & Simpson, 2001). In an attempt to clarify their differences, spouses may discover that their partners are suffering more than they originally believed (Ickes & Simpson, 2001).

The couples in the present study were highly satisfied with their marriages. Literature has shown that spouses who are more satisfied display less empathic accuracy than those who are not (Simpson et al., 2003). Therefore, it is possible that underestimating their partners' pain experiences might serve as a coping mechanism for SCs to preserve their relationships and suppress their fears that their spouses are struggling. SCs may also display solicitous behaviour to reduce the patient's expression of distress and convince themselves that they are in better health. This state of motivated inaccuracy may also be an attempt to reduce their own caregiving strain and distress (Goubert et al., 2005; Simpson et al., 2003). However, when unable to escape these potentially threatening situations, SCs may become so depressed and overwhelmed in their care situations that they reach a limit that causes them to go in the opposite direction, overestimating their partner's pain experiences due to their hypervigilance to signs of distress.

Correlates of Pain Severity Congruence in Older Couples

In older couples, only two significant correlates were identified for pain severity congruence: pain acceptance and SC punishing responses. Each will be outlined in greater detail below.

Patient Pain Acceptance. Acceptance of pain is the acknowledgement that one is in pain, but giving up the need to control, reduce, or disapprove of it (McCracken, 1998). This study is the first to find that pain acceptance is associated with greater underestimation of pain severity in a sample of older adults with cancer-related pain and their SCs. Previous literature has shown that patients with greater pain acceptance exhibit greater physical and psychosocial functioning (L. R. Gauthier et al., 2009; McCracken & Eccleston, 2003). Although the subjective experience of pain may remain the same for the patient, this acceptance may communicate to the caregiver that the patient is functioning well, leading them to underestimate their pain symptoms. Furthermore, the acceptance of pain has also been associated with less social support from significant others (McCracken, 2005), which may contribute to less frequent interactions and conversations between spouses regarding the patient's pain experiences. Older patients are more likely to accept the losses associated with cancer pain than younger patients (Gagliese et al., 2009), possibly explaining why this correlate was only associated with pain congruence in this age group. However, further research is needed to examine the relationship between pain acceptance and congruence in individuals with cancer and their SCs.

SC-reported Punishing Responses. Punishing responses are characterized by caregivers exhibiting negative reactions such as anger or hostility in response to a patient's expression of pain (Flor et al., 1987). Consistent with a previous study on patients with osteoarthritis (Martire

et al., 2006), this study found that greater overestimation of pain severity by SCs was associated with greater SC-reported punishing responses in older couples. Our findings, however, contradict a more recent study by Junghaenel et al. (2018) which demonstrated that partners who overestimated the patients' pain severity reported fewer punishing responses toward the patient than partners who agreed with patients about their pain severity. Moreover, another study by Cano and colleagues (2005) in patients with chronic musculoskeletal pain, in fact found no significant associations between either partners' reports of SC punishing responses and pain severity congruence. However, none of these studies used the same data analysis method of difference scores when comparing patient and SC reports of pain severity, examined patients with cancer-related pain, or stratified these samples by age group, perhaps explaining some of the discrepancies in these findings. Therefore, to our knowledge, the current study is the first to examine age differences in the relationship between punishing response behaviours and pain congruence.

It is often expected that spouses who are satisfied with their marriages may react more positively to their partner's expression of pain. However, only spousal punishing responses, rather than solicitous or distracting responses, emerged as a significant correlate for this model. Several explanations may help explain this seemingly paradoxical relationship between spousal punishing responses and the high levels of marital satisfaction among our participants. For example, this satisfaction may have been displayed in the form of protectiveness from SCs towards their significant others. According to the empathic accuracy model, caregivers that exhibit defensive emotional reactions, such as punishing responses, in response to the patient's distress, are often attempting to protect themselves against feelings of insecurity or vulnerability when witnessing the patient's suffering (Ickes & Simpson, 2001; Monin & Schulz, 2009;

Simpson et al., 2003). Therefore, it is possible that SCs who believe that their partners are not managing their illness symptoms effectively, may act hostile or angry toward their partners because they want them to get better. This frustration may also stem from the overwhelming demands of caregiving or the inability to provide adequate assistance (Martire et al., 2006). Such negative attitudes may jeopardize the quality of care SCs are able to provide and create obstacles in the communication of pain between partners.

In summary, for older couples, patient pain acceptance and SC-reported punishing responses were both significant correlates of pain severity congruence, with both variables explaining a significant amount of variance in this model. Patient pain acceptance was associated with greater SC underestimation of pain severity, whereas SC-reported punishing responses were associated with greater SC overestimation of pain severity. These findings collectively align with the empathic accuracy model which states that spouses might avoid difficult situations, such as talking about their pain, in order to protect their relationships, causing them to be inaccurate in their perceptions of their partner's feelings and distress (Ickes & Simpson, 2001). More specifically, previous research has shown that punishing responses from significant others are negatively associated with the acceptance of pain (McCracken, 2005). Anger is a prominent feeling experienced by many spouses (Fergus & Gray, 2009). However, sometimes it may be difficult to distinguish anger at the patient from anger at the disease (Fergus & Gray, 2009). Greater displays of pain may communicate to caregivers that the patient's pain is serious and real, however this may be met with greater anger and irritation from spouses (Tankha et al., 2020). Pain severity especially may not be as easily understood by caregivers compared to pain interference, as it is often characterized as a subjective experience (Johannessen, 2019). Therefore, it is possible that SCs may express frustrations towards their partners because of their

inability to adequately understand their partners' pain experiences. In response to hostile or angry reactions from their partners, spouses with cancer pain may feel that their feelings are being invalidated (McCracken, 2005). This may promote less acceptance of pain leading them to try and prove that they are justified in the way they feel. Out of fear of being accused of exaggerating or to reduce conflict, patients may distance themselves from this topic, leading to less frequent conversations about their pain experiences (McCracken, 2005). This may explain why pain acceptance and spousal punishing responses both emerged as correlates of incongruence only for pain severity, albeit in opposite directions.

Pain Interference Congruence

This study is the first to examine multiple biopsychosocial correlates of pain interference congruence simultaneously. This particular congruence outcome has been understudied in the past, with only two studies examining its correlates (Cano, Johansen, et al., 2005; Suso-Ribera et al., 2019). Although these previous studies assessed gender, physical functioning and psychological distress, the present study is the first to examine multiple biopsychosocial variables and to consider age-related patterns.

Correlates of Pain Interference Congruence in Younger Couples

In younger couples, SC attachment avoidance was the only variable retained in the final model of pain interference congruence. This model explained the smallest amount of variance compared to the other models. This suggests that other variables, not included in the present analyses, may also be important correlates of pain interference congruence in younger couples and serve as directions for future research.

SC Attachment Avoidance. According to attachment theory, individuals develop enduring attachment orientations based on their interactions with primary caregivers in early life that continue into adulthood (Monin et al., 2014). Insecure attachment styles develop in response to inconsistent or unresponsive interactions with primary caregivers in early life and are characterized by fear of rejection (anxious attachment) or discomfort with the dependency on others (avoidant attachment) (Brennan et al., 1998). Different attachment styles are associated with differences in the ability to regulate distress and engage in social support, with individuals who are more securely attached displaying greater comfort with interpersonal closeness and willingness to depend on others (Monin et al., 2014).

This study is the first to show that in younger couples, SC attachment avoidance is related to the underestimation of pain interference. To our knowledge, no studies have examined how the attachment style of spouses relates to pain congruence. However, our findings may be explained by the empathic accuracy model (Ickes & Simpson, 2001) and further suggest that empathic accuracy is not always the goal in marital relationships. Understanding their significant others' pain experiences may have a devastating impact on SCs, as they are discovering that their loved ones may be in worse health than they initially thought. This may cause them to lean towards a state of "motivated inaccuracy" in order to preserve their own psychological wellbeing and avoid learning heartbreaking truths about their partners' suffering (Ickes & Simpson, 2001). Pain interference especially may be more visible than pain severity to SCs. Therefore, avoiding or reducing interactions with the patient may serve as a coping strategy for spouses to convince themselves that their partners are doing well, thereby preserving their marriages. This lack of effective communication may create discrepancies in the pain reports of patients and their SCs, contributing to the underestimation of pain in this age group.

Correlates of Pain Interference Congruence in Older Couples

In older couples, three significant correlates of pain interference congruence were identified: patient depression, patient pain severity, and SC marital satisfaction. Patient depression made the greatest contribution to this model, highlighting the importance of psychological distress in the shared understanding of pain in couples. Each variable will be outlined further in the following sections.

Patient Depression. This study is the first to show that in older couples, greater overestimation of pain interference was associated with greater patient depressive symptoms. These findings contradict a previous study by Cano et al. (2005) which found that psychological distress is associated with greater incongruence through the underestimation of pain interference in older couples with chronic musculoskeletal pain. These discrepancies with our findings may be due to differences in the participant populations, assessment tools used to measure depression, and methods used to measure congruence. However, both studies suggest that patient psychological distress is an important correlate of pain congruence in older couples.

Multiple explanations have been provided for our findings based on previous literature regarding dyadic congruence. For example, greater psychological distress may lead to increased hypervigilance to expressions of pain, causing SCs to believe that the patient's pain is more disruptive than patients themselves believe it to be (Cano, Johansen, et al., 2005). It may also be that overestimation of the patient's pain and symptoms may give patients the impression that their spouses are being too overprotective (Riemsma et al., 2000). This supports sick role behaviour through increased dependency on significant others and may make it difficult for patients to feel that they can maintain control over their own lives, ultimately having negative consequences for their psychological wellbeing (Riemsma et al., 2000).

Patient Pain Severity. The study is the first to show that in older couples greater patient pain severity is associated with the underestimation of pain interference. Although deteriorating physical functioning has been found to serve as a correlate of pain interference congruence in the past (Suso-Ribera et al., 2019), pain severity specifically has not been examined with regards to this outcome. Although the exact reasons for these findings are unclear, it has been suggested that when interference is underestimated by SCs, patients may actually experience higher levels of pain because it is not being adequately managed by their caregivers (Miaskowski, Zimmer, et al., 1997). It is also possible that when spouses attempt to clarify their differences, they may discover that their partners are experiencing more pain than they previously believed (Ickes & Simpson, 2001). According to the empathic accuracy model, these discoveries may cause increased distress in caregivers who are worried about their partners and want to preserve their relationships (Ickes & Simpson, 2001). Therefore, to reduce their strain, SCs may lean towards a state of motivated inaccuracy, underestimating the patients' pain interference to try and convince themselves that their spouses are doing well.

Marital Satisfaction. Although not significant in the final regression model for pain severity congruence, SC marital satisfaction was the only correlate that was retained in the final models for both pain congruence outcomes, albeit only for older couples. This study is the first to show that SC marital satisfaction is associated with greater overestimation of pain interference by SCs in older couples. Previous studies have not found significant associations between marital or relational satisfaction and pain congruence (Clark et al., 2017; Martire et al., 2006); however, these studies only examined concordance of pain severity rather than interference. Discrepancies in the assessments of pain severity congruence (rather than pain interference) may have

contributed to the contradictions with the present findings. Previous research has suggested that pain severity and interference are not understood in the same way among couples (Cano, Johansen, et al., 2005). Therefore, examining marital satisfaction in the context of pain interference congruence specifically may provide new insights into these relationships.

As emphasized in the developmental-contextual model of couples coping with chronic illnesses (Berg & Upchurch, 2007), many life-span differences occur in marital relationships. Older adults experience greater marital satisfaction, intimacy and shared decision-making strategies compared to younger adults (Berg & Upchurch, 2007). This may reflect a greater use of collaborative forms of involvement associated with the communication of pain in older couples. Spouses who report greater marital satisfaction also perceive their partners to be more involved in positive aspects of dyadic coping such as activity engagement and joint problem solving (Berg & Upchurch, 2007). However, this greater involvement may also result in an overprotectiveness of SCs regarding the patient, leading to the overestimation of pain severity and interference. It may also be that caregivers who feel close to their partners share their partner's experience of suffering more intensely than those that are more distant. This is explained through a phenomenon known as emotional contagion (Monin & Schulz, 2009). Marital satisfaction, which is related to closeness, has an effect on emotional contagion such that spouses who are more satisfied with their marriages, show greater distress to expressions of pain by their partners than unsatisfied spouses (Monin & Schulz, 2009). These features of interpersonal illness adjustment are more frequently seen in older couples (Berg & Upchurch, 2007), which may explain why marital satisfaction only appeared in the final models for this age group for both pain congruence outcomes. Our current findings support these developmental

models of pain and emphasize the role of marital quality when examining pain congruence and communication strategies in couples coping with cancer pain.

In summary, patient pain severity, patient depression, and SC marital satisfaction were each significant correlates of pain interference congruence in older couples, with patient depression explaining the greatest amount of variance in this model. Patient pain severity was associated with greater underestimation of pain interference, whereas patient depressive symptoms and SC marital satisfaction were both associated with greater overestimation of pain interference by SCs. Our findings collectively support the empathic accuracy model which states that spouses might be motivated to be inaccurate in their perceptions of their partner's feelings and distress under certain conditions to protect their relationships (Ickes & Simpson, 2001). The couples in the present study were shown to be highly satisfied with their marriages. Therefore, it may be possible that this satisfaction was displayed in the form of overprotectiveness from SCs towards their spouses. Perhaps in an attempt to protect their spouses, SCs were too overbearing, inhibiting the patient's independent functioning through increased dependency on their significant others (Berg & Upchurch, 2007). This may have made it difficult for patients to feel a sense of control over their own lives, ultimately having negative consequences for their mental health and wellbeing (Riemsma et al., 2000). Our findings also support Gauthier and Gagliese's biopsychosocial conceptualization of pain (L. R. Gauthier & Gagliese, in preparation) and highlight the importance of considering age-related patterns in pain congruence. We have revised this model (Figures 4 and 5) to incorporate age differences in the correlates associated with pain congruence in younger and older couples separately. Although further research is needed to replicate the findings of the present study, these new revised models may provide promising

targets for future interventions to improve pain communication strategies in couples coping with cancer pain.

Pain Congruence Across Outcomes

With the exception of marital satisfaction, the present study did not find any shared correlates in the multiple regression models for either of the pain congruence outcomes despite being presented with the same set of pooled candidate correlates. Despite similar reports of pain severity and interference congruence, younger and older couples with cancer pain displayed unique biopsychosocial correlates of these outcomes. Previous literature has shown that pain severity and interference are not understood in the same way (Cano, Johansen, et al., 2005), and that couples may communicate differently about these two constructs (K. S. Lyons et al., 2013). Specifically, elements of pain interference may be more visible to caregivers (Johannessen, 2019), possibly explaining why different correlates were associated with these two outcomes.

Rosenthal's (1982) A-B-C judgement model may help explain the differences between these two indices of pain. The model proposes that the patient undergoes an internal experience of pain (Step A) that is encoded with various forms of expressive behaviour (Step B). The expressive behaviours are decoded by the observer (Step C), and inferences are made about the patient's pain by SCs based on the pain cues they are presented with (Rosenthal, 1982). However, because SCs do not have direct access to the patient's internal pain experiences, their judgements are often influenced by their spouse's behaviour (Prkachin et al., 2007). Objective expressions of pain (e.g., difficulty walking or performing housework) are more directly observable to SCs and thus are often used to make inferences about the patient's pain interference (Johannessen, 2019). However, pain severity is a subjective experience, differing from one individual to another, and

may not be expressed as visibly to observers as pain interference (Hadjistavropoulos et al., 2011; Johannessen, 2019; Xu & Huang, 2020). According to Johannessen (2019), people generally tend to use ungovernable signs that are beyond conscious control (e.g., inability to walk properly) to assess pain over making predictions about another's subjective pain experiences, especially if the couple does not regularly discuss the patient's pain. Therefore, differences between caregivers' perceptions of these two indices of pain may explain why no shared correlates were found in the multivariate regression models for pain severity and interference congruence regardless of age group. The findings of this study highlight the need to consider multiple outcomes simultaneously to further our understanding of cancer pain and emphasize the importance of examining pain interference, in combination with pain severity, in dyadic research to provide a better understanding of pain as a multidimensional phenomenon.

Strengths and Limitations

Strengths. Our findings extend the literature on pain congruence in several ways, with the majority of our strengths also serving as novel aspects of our study. This study is the first to examine age differences in biopsychosocial correlates of pain severity and interference congruence in younger and older couples separately. Previous literature has suggested that age-related patterns in pain are multidetermined and the same factors may have different effects across age groups (Gagliese, 2009). Thus, examining age-specific correlates of pain congruence may allow researchers to identify different underlying pathways or mechanisms by age group. In doing so, the present study contributes to the growing support for age-specific biopsychosocial models of pain (Gagliese, 2009). It also examines factors such as pain acceptance, attachment style and SCs' own pain experiences in relation to pain congruence that have yet to be examined

in previous studies. We have shown that the consideration of both patients' and SCs' biopsychosocial characteristics are important when examining pain congruence in couples coping with cancer pain.

Furthermore, the present study was the first, to our knowledge, to use relative difference scores as a continuous variable measuring congruence across two different pain-related outcomes. This methodology used to assess patient–spouse congruence provides a novel and innovative perspective with which to view the underestimation and overestimation of pain among dyads. Specifically, the use of relative difference scores, ranging from the complete overestimation to the complete underestimation of pain severity or interference by caregivers, allowed us to examine correlates of pain congruence on both ends of the spectrum. As shown with our findings, the underlying biopsychosocial correlates behind each type of discordance was different.

Another notable strength of this study was the almost equal distribution of gender in our sample of SCs. Previous research has consistently shown that women are predominantly the primary providers of informal care to family members and make up the biggest portion of the SC demographic (Blyth et al., 2008; Fleming et al., 2006; Sharma et al., 2016). For this reason, the majority of studies on pain congruence have relied on pain reports from female caregivers. The present study was among the first to examine gender differences on pain congruence. Although sex-related patterns were not found, this does not necessarily warrant the conclusion that SC gender is not important. Because of the small sample size of our study, we may not have had the power to detect subtle differences. Larger, longitudinal studies with greater methodological and statistical rigor than the current study are required before we can draw this conclusion with

confidence. Perhaps future research may also benefit from examining different correlates of pain congruence by sex, as we have done with age.

Limitations. Although this study presented many strengths, limitations must also be considered in the interpretation of these results. Firstly, participants were highly educated, predominantly Caucasian and English-speaking. Future research may benefit from examining age differences in correlates of pain congruence in more ethnically diverse samples to test for possible cultural patterns. Research has demonstrated that cultural differences affect not only the pain adjustment strategies used by couples coping with chronic pain, but also their health-related beliefs, perception of symptoms and caregiving behaviours (Berg & Upchurch, 2007; Cano et al., 2006). Therefore, the examination of these factors in the context of pain congruence may provide important insights into sociocultural influences that affect a couple's shared understanding of the pain experience. Furthermore, data pertaining to socioeconomic status, such as income, was not collected as a part of our study. Although exploring the associations between possible financial burdens associated with caregiving and its impact on pain congruence may provide further insights into the shared understanding of pain in couples, many other social determinants of health such as education and gender were still examined in the context of our study. Moreover, although various interactional variables (e.g., pain response behaviours) were taken into consideration in the present study, pain communication specifically was not measured. Future research may benefit from examining potential communication difficulties among couples or different ways in which they may interact about the patient's pain.

In addition, while the sample size of the current study appears small, likely related to general challenges with research such as the recruitment of only spouse caregivers, logistics

involved with breast cancer surgery, and other recruitment procedures as a part of the two larger studies, this study had a reasonable sample size and is comparable to many other studies on pain congruence in similar samples of patients with chronic and cancer-related pain (N. Gauthier et al., 2008; Junghaenel et al., 2018; Miaskowski, Zimmer, et al., 1997). To maximize the stability of our results, the number of variables included in the models was limited to ensure adequate power. When determining the number of candidate correlates for the multivariate regression models, the general rule of one independent variable for every 5-10 observations was used (Hair et al., 2010). This ratio prevents overfitting of the regression models and improves generalizability of results (Hair et al., 2010). Furthermore, despite inclusion of a wide range of candidate correlates in the bivariate analysis, the model predicting pain interference congruence in younger couples only retained one variable (SC attachment avoidance) and explained a relatively small amount of variance, only 12.0%. Considering our small sample size and data analysis method used to calculate congruence (i.e., difference scores), future research with larger sample sizes or different methods of analysis may find other significant variables related to pain interference congruence that were not found in this study.

Although the use of relative difference scores to assess congruence presents many advantages, the limitations of this form of analysis must also be addressed. Relative difference scores provide a quantitative index with which to measure dissimilarity between two members of a dyad by subtracting two partners' judgements of pain from one another, with values of a smaller magnitude suggesting greater similarity in couples' pain reports (Rogers et al., 2018). This method allows researchers to examine the direction of incongruence (i.e., underestimation or overestimation) based on the positive or negative signs of these scores. Benefits of differences scores include preserving statistical power that may be lost otherwise by creating groups (Cano,

Johansen, et al., 2005), and being appropriate for use with smaller samples compared to other methods such as multilevel modeling (Maas & Hox, 2005).

An important concern with this analysis method is that it presumes that incongruence on a higher level is equivalent to incongruence on a lower level (Schönbrodt et al., 2018). For example, couples in which the patient has rated their pain as a 9 and the SC has rated it as an 8 would have the same difference score as couples in which the patient has rated their pain as a 2 and the SC has rated it as a 1 (i.e., $9 - 8 = 1$ and $2 - 1 = 1$). However, when examining couples with similar congruence (e.g., couples with a difference score of 1), couples in which patients are experiencing higher levels of pain (e.g., 9/10), may present different challenges than those with mild or less severe pain (e.g., 1/10). Thus, it must be addressed that despite similar outcomes, the experience of pain among all these couples are not the same.

Lastly, the cross-sectional design of this study prevents us from making causal inferences regarding the direction of the relationships within our findings. Nonetheless, this study provides new, clinically relevant information about age-related patterns in pain congruence and identifies important directions for future research. Such research would be invaluable to our understanding of cancer pain and its management among patients and their caregivers across the adult lifespan.

Implications and Future Directions

This study has demonstrated that despite similar reports of pain severity and interference congruence, younger and older couples with cancer pain displayed unique biopsychosocial correlates of these outcomes. Each model developed in this study contained a range of variables including biological, psychological, and relational factors associated with both patients and their SCs. These findings suggest that patients coping with cancer pain and their SCs may both benefit from multidisciplinary treatments such as psychological interventions targeted towards

depression, pain acceptance and marital communication. Furthermore, variables such as sex, comorbidities, the presence of pain in SCs, caregiving mastery, pain catastrophizing, length of relationship, marital status, and age gaps were not significant correlates in any of the models for pain severity or interference congruence, regardless of age group. However, these variables may still serve as candidates for further study. Identifying the factors that influence and strengthen the relationship between both members of the dyad will be essential in understanding the processes behind the adaptation to cancer pain.

While literature has suggested that the experience of cancer pain is easier for older adults, this study demonstrated that this is not the case. Our findings show that older couples do not differ from younger couples in their reports of pain severity and interference or any other examined biopsychosocial factor. While older and younger couples also did not differ in their estimates of pain congruence, the correlates associated with these outcomes did vary across the age groups. These findings highlight age as an important factor in the consideration of dyadic agreement and suggests that younger and older couples may cope differently with regards to their shared understanding of the patient's pain. Age-tailored pain communication strategies are crucial for couples to ensure that patients feel their pain is accurately understood, help SCs provide a better quality of care to their partners, and potentially reduce sources of stress.

Findings from this study also further support previous research that family caregivers may not always be the most accurate source of information when evaluating patients' pain levels. Our results showed that SCs overestimated both the patient's pain severity and interference, regardless of age group. These findings are consistent with several other studies on pain congruence, especially in samples of patients experiencing cancer-related pain (Martire et al., 2006; Miaskowski, Zimmer, et al., 1997; Riemsma et al., 2000; Shega et al., 2004).

Incongruence in partners' pain reports may be due to the lack of knowledge regarding pain assessment or ineffective communications strategies between patients and their SCs. Therefore, couples coping with cancer-related pain may also benefit from education on how to evaluate the patient's pain or more effective ways to communicate about the patient's pain experience.

Previous research has shown that educational interventions focused on improving pain communication between patients and their family caregivers demonstrate significant improvements in knowledge and attitudes towards pain management among dyads, and improved pain relief in patients with cancer (Cagle et al., 2015). Based on the findings of the present study, age-specific educational interventions may include treatments surrounding pain acceptance and marital satisfaction in older couples for example (Gremore et al., 2021; Tankha et al., 2020), whereas younger couples may benefit from psychological interventions focused on reducing caregiving strain and avoidance in order to improve communication (Gremore et al., 2021; Martire et al., 2007).

Future research should also examine dyadic congruence on other aspects of the pain experience such as pain-related anxiety. Such information will provide insights into psychosocial aspects of the pain experience that have yet to be examined, but still have important implications on both the patient and caregiver's quality of life.

CHAPTER FIVE: CONCLUSION

In conclusion, the findings of this study strongly support both the empathic accuracy model and Gauthier and Gagliese's biopsychosocial conceptualization of pain congruence and highlight the need to tailor pain communication strategies to patients' life stages. Greater empathic accuracy may not always be the goal in marital relationships, as couples may be motivated to be inaccurate in certain situations to protect themselves and their partners from potential conflict or distress (Ickes & Simpson, 2001; Simpson et al., 2003). However, these adjustment behaviours differ across age groups. Despite comparable scores of pain severity and interference congruence, younger and older couples in this study demonstrated unique sets of correlates for both pain severity and interference congruence, emphasizing the importance of age as a proxy for many of these relationships. Examining correlates that influence a couple's shared understanding of the patient's pain experiences across the lifespan may help partners better communicate about their symptoms and help foster more effective coping adjustments and behaviours. The modifiable nature of most of the variables in each model, in particular pain response behaviours, depression, and pain acceptance, suggests that these factors could represent promising targets for interventions to improve pain communication among patients with cancer and their SCs. The findings of this study provide a basis for future research to confirm the role of these risk factors and investigate age-tailored interventions and the modifiable variables identified in this study.

REFERENCES

- Acquati, C., & Kayser, K. (2019). Dyadic coping across the lifespan: A comparison between younger and middle-aged couples with breast cancer. *Frontiers in Psychology, 10*, 404. <https://doi.org/10.3389/fpsyg.2019.00404>
- Akbas, A., Dagmura, H., Daldal, E., Dasiran, F. M., Deveci, H., & Okan, I. (2021). Association between Shoulder Range of Motion and Pain Catastrophizing Scale in Breast Cancer Patients after Surgery. *Breast Care, 16*(1), 66–71. <https://doi.org/10.1159/000506922>
- Appelt, C. J., Burant, C. J., Siminoff, L. A., Kwoh, C. K., & Ibrahim, S. A. (2007). Arthritis-specific health beliefs related to aging among older male patients with knee and/or hip osteoarthritis. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences, 62*(2), 184–190. <https://doi.org/10.1093/gerona/62.2.184>
- Asmundson, G. J. G., & Wright, K. D. (2004). Biopsychosocial approaches to pain. In *Pain: Psychological Perspectives* (pp. 35–87). <https://doi.org/10.4324/9781410609861>
- Backonja, M. M. (2003). Defining neuropathic pain. *Anesthesia and Analgesia, 97*(3), 785–790. <https://doi.org/10.1213/01.ANE.0000062826.70846.8D>
- Badr, H., Laurenceau, J. P., Schart, L., Basen-Engquist, K., & Turk, D. (2010). The daily impact of pain from metastatic breast cancer on spousal relationships: A dyadic electronic diary study. *Pain, 151*, 644–654. <https://doi.org/10.1016/j.pain.2010.08.022>
- Badr, H., & Shen, M. J. (2014). Pain catastrophizing, pain intensity, and dyadic adjustment influence patient and partner depression in metastatic breast cancer. *Clinical Journal of*

Pain, 30(11), 923–933. <https://doi.org/10.1097/AJP.0000000000000058>

Barnes, K. A. (2003). Examining predictors of marital satisfaction among age-similar and age-discrepant older couples. *Graduate Theses, Dissertations, and Problem Reports*, 1915.

<https://researchrepository.wvu.edu/etd/1915>

Beasley, T. M., Schumacker, R. E., The, S., Education, E., Fall, N., & Taylor, P. (2014).

Comparison Procedures Multiple Regression Approach to Tables : Analyzing Contingency Post Hoc and Planned Procedures Comparison. 64(1), 79–93.

Beeber, L. S., Shea, J., & McCorkle, R. (1998). The center for epidemiologic studies depression scale as a measure of depressive symptoms in newly diagnosed patients. *Journal of*

Psychosocial Oncology, 16, 1–20. https://doi.org/10.1300/J077V16N01_01

Berg, C. A., & Upchurch, R. (2007). A Developmental-Contextual Model of Couples Coping With Chronic Illness Across the Adult Life Span. *Psychological Bulletin*, 133, 920–954.

<https://doi.org/10.1037/0033-2909.133.6.920>

Blake, A., Guthrie-Dixon, N., Grindley, M., Barton-Gooden, A., Knight-Madden, J., & Asnani,

M. (2020). Level of agreement between adolescents' self-assessment and parent proxy report of health-related quality of life in adolescents with sickle cell disease. *Pediatric*

Blood and Cancer, 67, e28198. <https://doi.org/10.1002/pbc.28198>

Blanchard, C. G., Albrecht, T. L., Ruckdeschel, J. C., Grant, C. H., & Hemmick, R. M. (1995).

The role of social support in adaptation to cancer and to survival. *Journal of Psychosocial Oncology*, 13, 75–95. https://doi.org/10.1300/J077V13N01_05

- Blank, T. O., & Bellizzi, K. M. (2008). A gerontologic perspective on cancer and aging. *Cancer*, 112(11 Suppl), 2569–2576. <https://doi.org/10.1002/cncr.23444>
- Blyth, F. M., Cumming, R. G., Brnabic, A. J. M., & Cousins, M. J. (2008). Caregiving in the presence of chronic pain. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, 63, 399–407. <https://doi.org/10.1093/gerona/63.4.399>
- Boothby, J. L., Thorn, B. E., Overduin, L. Y., & Ward, L. C. (2004). Catastrophizing and perceived partner responses to pain. *Pain*, 109, 500–506. <https://doi.org/10.1016/j.pain.2004.02.030>
- Boquiren, V. M., Esplen, M. J., Wong, J., Toner, B., Warner, E., & Malik, N. (2016). Sexual functioning in breast cancer survivors experiencing body image disturbance. *Psycho-Oncology*, 25, 66–76. <https://doi.org/10.1002/pon.3819>
- Bowlby, J. (1982). Attachment and Loss: Attachment. In *New York: Basic Books*. <https://doi.org/10.4324/9780203901106-11>
- Braun, M., Mikulincer, M., Rydall, A., Walsh, A., & Rodin, G. (2007). Hidden morbidity in cancer: Spouse caregivers. *Journal of Clinical Oncology*, 25(30), 4829–4834. <https://doi.org/10.1200/JCO.2006.10.0909>
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In *Attachment Theory and Close Relationships* (pp. 46–76).
- Bruera, E., & Kim, H. N. (2003). Cancer Pain. *Journal of the American Medical Association*,

290(18), 2476–2479. <https://doi.org/10.1001/jama.290.18.2476>

Cagle, J. G., Zimmerman, S., Cohen, L. W., Porter, L. S., Hanson, L. C., & Reed, D. (2015).

EMPOWER: An intervention to address barriers to pain management in hospice. *Journal of Pain and Symptom Management*, 49(1), 1–12.

<https://doi.org/10.1016/j.jpainsymman.2014.05.007>

Campbell, L. C., Keefe, F. J., McKee, D. C., Edwards, C. L., Herman, S. H., Johnson, L. E.,

Colvin, O. M., McBride, C. M., & Donattuci, C. F. (2004). Prostate cancer in African Americans: Relationship of patient and partner self-efficacy to quality of life. *Journal of Pain and Symptom Management*, 28(5), 433–444.

<https://doi.org/10.1016/j.jpainsymman.2004.02.020>

Canadian Cancer Society. (2015). Canadian Cancer Society's Advisory Committee on Cancer

Statistics. In *Canadian Cancer Statistics 2015*. <http://www.cancer.ca/Canadian-Cancer-Statistics-2015-EN>

Cano, A., Johansen, A. B., & Franz, A. (2005). Multilevel analysis of couple congruence on pain, interference, and disability. *Pain*, 118(3), 369–379.

<https://doi.org/10.1016/j.pain.2005.09.003>

Cano, A., Leonard, M. T., & Franz, A. (2005). The significant other version of the Pain Catastrophizing Scale (PCS-S): Preliminary validation. *Pain*, 119, 26–37.

<https://doi.org/10.1016/j.pain.2005.09.009>

Cano, A., Mayo, A., & Ventimiglia, M. (2006). Coping, Pain Severity, Interference, and

Disability: The Potential Mediating and Moderating Roles of Race and Education. *Journal*

- of Pain*, 7(7), 459–468. <https://doi.org/10.1016/j.jpain.2006.01.445>
- Caraceni, A., & Portenoy, R. K. (1999). An international survey of cancer pain characteristics and syndromes. *Pain*, 82(3), 263–274. [https://doi.org/10.1016/S0304-3959\(99\)00073-1](https://doi.org/10.1016/S0304-3959(99)00073-1)
- Carstensen, L. L., Gottman, J. M., & Levenson, R. W. (1995). Emotional Behavior in Long-Term Marriage. *Psychology and Aging*, 10, 140–149. <https://doi.org/10.1037/0882-7974.10.1.140>
- Cetin, A. A., Bektas, H., & Ozdogan, M. (2016). The West Haven Yale Multidimensional Pain Inventory: Reliability and validity of the Turkish version in individuals with cancer. *European Journal of Oncology Nursing*, 20, 1–9. <https://doi.org/10.1016/j.ejon.2015.03.007>
- Charlson, M. E., Pompei, P., Ales, K. L., & MacKenzie, C. R. (1987). A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. *Journal of Chronic Diseases*, 40, 373–383. [https://doi.org/10.1016/0021-9681\(87\)90171-8](https://doi.org/10.1016/0021-9681(87)90171-8)
- Chen, M. L., Chu, L., & Chen, H. C. (2004). Impact of cancer patients' quality of life on that of spouse caregivers. *Supportive Care in Cancer*, 12, 469–475. <https://doi.org/10.1007/s00520-004-0636-z>
- Cheung, W. Y., Le, L. W., Gagliese, L., & Zimmermann, C. (2011). Age and gender differences in symptom intensity and symptom clusters among patients with metastatic cancer. *Supportive Care in Cancer*, 19, 417–423. <https://doi.org/10.1007/s00520-010-0865-2>
- Ciechanowski, P., Sullivan, M., Jensen, M., Romano, J., & Summers, H. (2003). The relationship of attachment style to depression, catastrophizing and health care utilization in patients with

- chronic pain. *Pain*, 104, 627–637. [https://doi.org/10.1016/S0304-3959\(03\)00120-9](https://doi.org/10.1016/S0304-3959(03)00120-9)
- Clark, S. M., Cano, A., Goubert, L., Vlaeyen, J. W. S., Wurm, L. H., & Corley, A. M. (2017). Pain Anxiety and Its Association With Pain Congruence Trajectories During the Cold Pressor Task. *Journal of Pain*, 18, 396–404. <https://doi.org/10.1016/j.jpain.2016.11.013>
- Cleeland, C. S. (1998). Undertreatment of cancer pain in elderly patients. *Journal of the American Medical Association*, 279, 1914–1915. <https://doi.org/10.1001/jama.279.23.1914>
- Cleeland, C. S., Gonin, R., Hatfield, A. K., Edmonson, J. H., Blum, R. H., Stewart, J. A., & Pandya, K. J. (1994). Pain and Its Treatment in Outpatients with Metastatic Cancer. *New England Journal of Medicine*, 330(9), 592–596. <https://doi.org/10.1056/nejm199403033300902>
- Cleeland, C. S., & Ryan, K. M. (1994). Pain assessment: Global use of the Brief Pain Inventory. *Annals of the Academy of Medicine, Singapore*, 23, 129–138.
- Cope, D. G. (2019). Cancer Pain Management Considerations in Older Adults. *Seminars in Oncology Nursing*, 35(3), 274–278. <https://doi.org/10.1016/j.soncn.2019.04.008>
- Coyle, C. P., & Roberge, J. J. (1992). The psychometric properties of the center for epidemiological studies-depression scale (CES-D) when used with adults with physical disabilities. *Psychology & Health*, 7, 69–81. <https://doi.org/10.1080/08870449208404296>
- Cremeans-Smith, J. K., Stephens, M. A. P., Franks, M. M., Martire, L. M., Druley, J. A., & Wojno, W. C. (2003). Spouses' and physicians' perceptions of pain severity in older women with osteoarthritis: Dyadic agreement and patients' well-being. *Pain*, 106(1), 27–34.

[https://doi.org/10.1016/S0304-3959\(03\)00268-9](https://doi.org/10.1016/S0304-3959(03)00268-9)

- Dahlberg, L., Demack, S., & Bamba, C. (2007). Age and gender of informal carers: A population-based study in the UK. *Health and Social Care in the Community*, 15(5), 439–445. <https://doi.org/10.1111/j.1365-2524.2007.00702.x>
- Davies, K. A., Macfarlane, G. J., McBeth, J., Morriss, R., & Dickens, C. (2009). Insecure attachment style is associated with chronic widespread pain. *Pain*, 143, 200–205. <https://doi.org/10.1016/j.pain.2009.02.013>
- de Groot, V., Beckerman, H., Lankhorst, G. J., & Bouter, L. M. (2003). How to measure comorbidity: A critical review of available methods. *Journal of Clinical Epidemiology*, 56, 221–229. [https://doi.org/10.1016/S0895-4356\(02\)00585-1](https://doi.org/10.1016/S0895-4356(02)00585-1)
- Diehl, M., Elnick, A. B., Bourbeau, L. S., & Labouvie-Vief, G. (1998). Adult attachment styles: Their relations to family context and personality. *Journal of Personality and Social Psychology*, 74(6), 1656–1669. <https://doi.org/10.1037/0022-3514.74.6.1656>
- Edmonds, V. H. (1967). Marital Conventionalization: Definition and Measurement. *Journal of Marriage and the Family*, 29(4), 681–688. <https://doi.org/10.2307/349220>
- Ellingson, H. M., & Vanderah, T. W. (2020). Potential therapeutic treatments of cancer-induced bone pain. *Current Opinion in Supportive and Palliative Care*, 14(2), 107–111. <https://doi.org/10.1097/SPC.0000000000000496>
- Ellis, J., Lin, J., Walsh, A., Lo, C., Shepherd, F. A., Moore, M., Li, M., Gagliese, L., Zimmermann, C., & Rodin, G. (2009). Predictors of referral for specialized psychosocial

oncology care in patients with metastatic cancer: The contributions of age, distress, and marital status. *Journal of Clinical Oncology*, 27(5), 699–705.

<https://doi.org/10.1200/JCO.2007.15.4864>

Extermann, M. (2000). Measurement and impact of comorbidity in older cancer patients. *Critical Reviews in Oncology/Hematology*, 35, 181–200. [https://doi.org/10.1016/S1040-8428\(00\)00090-1](https://doi.org/10.1016/S1040-8428(00)00090-1)

Fergus, K. D., & Gray, R. E. (2009). Relationship vulnerabilities during breast cancer: Patient and partner perspectives. *Psycho-Oncology*, 18(12), 1311–1322. <https://doi.org/10.1002/pon.1555>

Ferrell, B. (2001). Pain observed: The experience of pain from the family caregiver's perspective. *Clinics in Geriatric Medicine*, 17, 595–609, viii–ix. [https://doi.org/10.1016/S0749-0690\(05\)70099-9](https://doi.org/10.1016/S0749-0690(05)70099-9)

Field, A. (2009). Discovering Statistics Using IBM SPSS Statistics. In *SAGE Publications*.

Fleming, D. A., Sheppard, V. B., Mangan, P. A., Taylor, K. L., Tallarico, M., Adams, I., & Ingham, J. (2006). Caregiving at the End of Life: Perceptions of Health Care Quality and Quality of Life Among Patients and Caregivers. *Journal of Pain and Symptom Management*, 31, 407–420. <https://doi.org/10.1016/j.jpainsymman.2005.09.002>

Flor, H., Kerns, R. D., & Turk, D. C. (1987). The role of spouse reinforcement, perceived pain, and activity levels of chronic pain patients. *Journal of Psychosomatic Research*, 31, 251–259. [https://doi.org/10.1016/0022-3999\(87\)90082-1](https://doi.org/10.1016/0022-3999(87)90082-1)

- Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*, 4, 132–154. <https://doi.org/10.1037/1089-2680.4.2.132>
- Frenkel, W. J., Jongerius, E. J., Mandjes-Van Uitert, M. J., Van Munster, B. C., & De Rooij, S. E. (2014). Validation of the Charlson Comorbidity Index in acutely hospitalized elderly adults: A prospective cohort study. *Journal of the American Geriatrics Society*, 62(2), 342–346. <https://doi.org/10.1111/jgs.12635>
- Gagliese, L. (2009). Pain and aging: The emergence of a new subfield of pain research. *Journal of Pain*, 10(4), 343–353. <https://doi.org/10.1016/j.jpain.2008.10.013>
- Gagliese, L., Gauthier, L. R., Macpherson, A. K., Jovellanos, M., & Chan, V. W. S. (2008). Correlates of postoperative pain and intravenous patient-controlled analgesia use in younger and older surgical patients. *Pain Medicine*, 9(3), 299–314. <https://doi.org/10.1111/j.1526-4637.2008.00426.x>
- Gagliese, L., Gauthier, L. R., Narain, N., & Freedman, T. (2018). Pain, aging and dementia: Towards a biopsychosocial model. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 87, 207–215. <https://doi.org/10.1016/j.pnpbp.2017.09.022>
- Gagliese, L., Gauthier, L. R., & Rodin, G. (2007). Cancer pain and depression: A systematic review of age-related patterns. *Pain Research and Management*, 12(3), 205–211. <https://doi.org/10.1155/2007/150126>
- Gagliese, L., Jovellanos, M., Zimmermann, C., Shobbrook, C., Warr, D., & Rodin, G. (2009). Age-related patterns in adaptation to cancer pain: A mixed-method study. *Pain Medicine*,

10(6), 1050–1061. <https://doi.org/10.1111/j.1526-4637.2009.00649.x>

Gagliese, L., & Melzack, R. (2003). Age-related differences in the qualities but not the intensity of chronic pain. *Pain*, 104, 597–608. [https://doi.org/10.1016/S0304-3959\(03\)00117-9](https://doi.org/10.1016/S0304-3959(03)00117-9)

Gagliese, L., Weizblit, N., Ellis, W., & Chan, V. W. S. (2005). The measurement of postoperative pain: A comparison of intensity scales in younger and older surgical patients. *Pain*, 117(3), 412–420. <https://doi.org/10.1016/j.pain.2005.07.004>

Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The Biopsychosocial Approach to Chronic Pain: Scientific Advances and Future Directions. *Psychological Bulletin*, 133(4), 581–624. <https://doi.org/10.1037/0033-2909.133.4.581>

Gaugler, J. E., Hanna, N., Linder, J., Given, C. W., Tolbert, V., Kataria, R., & Regine, W. F. (2005). Cancer caregiving and subjective stress: A multi-site, multi-dimensional analysis. *Psycho-Oncology*, 14, 771–785. <https://doi.org/10.1002/pon.916>

Gauthier, L. R., Dworkin, R. H., Warr, D., Pillai Riddell, R., Macpherson, A. K., Rodin, G., Zimmermann, C., Lawrence Librach, S., Moore, M., Shepherd, F. A., & Gagliese, L. (2018). Age-related patterns in cancer pain and its psychosocial impact: Investigating the role of variability in physical and mental health quality of life. *Pain Medicine (United States)*, 19, 658–676. <https://doi.org/10.1093/pm/pnx002>

Gauthier, L. R., & Gagliese, L. (n.d.). *A biopsychosocial framework of congruence in reports of pain severity and impact in couples living with cancer pain*.

Gauthier, L. R., Rodin, G., Zimmermann, C., Warr, D., Librach, S. L., Moore, M., Shepherd, F.

- A., & Gagliese, L. (2012). The communal coping model and cancer pain: The roles of catastrophizing and attachment style. *Journal of Pain*, 13(12), 1258–1268.
<https://doi.org/10.1016/j.jpain.2012.10.001>
- Gauthier, L. R., Rodin, G., Zimmermann, C., Warr, D., Moore, M., Shepherd, F., & Gagliese, L. (2009). Acceptance of pain: A study in patients with advanced cancer. *Pain*, 143, 147–154.
<https://doi.org/10.1016/j.pain.2009.02.009>
- Gauthier, N., Thibault, P., & Sullivan, M. J. L. (2008). Individual and relational correlates of pain-related empathic accuracy in spouses of chronic pain patients. *Clinical Journal of Pain*, 24(8), 669–677. <https://doi.org/10.1097/AJP.0b013e318173c28f>
- Gelman, A., & Hill, J. (2010). Linear regression: before and after fitting the model. In *Data Analysis Using Regression and Multilevel/Hierarchical Models*.
<https://doi.org/10.1017/cbo9780511790942.006>
- Ger, L. P., Ho, S. T., Sun, W. Z., Wang, M. S., & Cleeland, C. S. (1999). Validation of the brief pain inventory in a Taiwanese population. *Journal of Pain and Symptom Management*, 18, 316–322. [https://doi.org/10.1016/S0885-3924\(99\)00087-1](https://doi.org/10.1016/S0885-3924(99)00087-1)
- Given, B. A., Given, C. W., & Kozachik, S. (2001). Family Support in Advanced Cancer. *CA: A Cancer Journal for Clinicians*, 51, 213–231. <https://doi.org/10.3322/canjclin.51.4.213>
- Goring, H., Baldwin, R., Marriott, A., Pratt, H., & Roberts, C. (2004). Validation of short screening tests for depression and cognitive impairment in older medically ill inpatients. *International Journal of Geriatric Psychiatry*, 19, 465–471.
<https://doi.org/10.1002/gps.1115>

- Goubert, L., Craig, K. D., Vervoort, T., Morley, S., Sullivan, M. J. L., Williams, A. C. D. C., Cano, A., & Crombez, G. (2005). Facing others in pain: The effects of empathy. *Pain, 118*, 285–288. <https://doi.org/10.1016/j.pain.2005.10.025>
- Green, C. R., & Hart-Johnson, T. (2010). Cancer Pain: An Age-Based Analysis. *Pain Medicine, 11*, 1525–1536. <https://doi.org/10.1111/j.1526-4637.2010.00957.x>
- Gremore, T. M., Brockstein, B., Porter, L. S., Brenner, S., Benfield, T., Baucom, D. H., Sher, T. G., & Atkins, D. (2021). Couple-based communication intervention for head and neck cancer: a randomized pilot trial. *Supportive Care in Cancer, 29*(6), 3267–3275. <https://doi.org/10.1007/s00520-020-05848-5>
- Grond, S., Radbruch, L., Meuser, T., Sabatowski, R., Loick, G., & Lehmann, K. A. (1999). Assessment and treatment of neuropathic cancer pain following WHO guidelines. *Pain, 79*(1), 15–20. [https://doi.org/10.1016/S0304-3959\(98\)00138-9](https://doi.org/10.1016/S0304-3959(98)00138-9)
- Hadjistavropoulos, T., & Craig, K. D. (2002). A theoretical framework for understanding self-report and observational measures of pain: A communications model. *Behaviour Research and Therapy, 40*, 551–570. [https://doi.org/10.1016/S0005-7967\(01\)00072-9](https://doi.org/10.1016/S0005-7967(01)00072-9)
- Hadjistavropoulos, T., Craig, K. D., Duck, S., Cano, A., Goubert, L., Jackson, P. L., Mogil, J. S., Rainville, P., Sullivan, M. J. L., Amanda, A. C., Vervoort, T., & Fitzgerald, T. D. (2011). A Biopsychosocial Formulation of Pain Communication. *Psychological Bulletin, 137*, 910–939. <https://doi.org/10.1037/a0023876>
- Haefeli, M., & Elfering, A. (2006). Pain assessment. *European Spine Journal, 15*(Suppl 1), S17–S24. <https://doi.org/10.1007/s00586-005-1044-x>

- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. In *Pearson*. <https://doi.org/10.1016/j.ijpharm.2011.02.019>
- Haley, W. E. (2003). Family caregivers of elderly patients with cancer: understanding and minimizing the burden of care. *The Journal of Supportive Oncology*, 1, 25–29.
- Hann, D., Winter, K., & Jacobsen, P. (1999). Measurement of depressive symptoms in cancer patients: Evaluation of the Center for Epidemiological Studies Depression Scale (CES-D). *Journal of Psychosomatic Research*, 46(5), 437–443. [https://doi.org/10.1016/S0022-3999\(99\)00004-5](https://doi.org/10.1016/S0022-3999(99)00004-5)
- Henry, N. J. M., Berg, C. A., Smith, T. W., & Florsheim, P. (2007). Positive and Negative Characteristics of Marital Interaction and Their Association With Marital Satisfaction in Middle-Aged and Older Couples. *Psychology and Aging*, 22, 428–441. <https://doi.org/10.1037/0882-7974.22.3.428>
- Hosmer, D. W., & Lemeshow, S. (2004). Applied Logistic Regression Second Edition. In *Applied Logistic Regression*.
- IASP. (2020). *IASP Announces Revised Definition of Pain*. International Association for the Study of Pain.
- Ickes, W., & Simpson, J. A. (2001). Motivational Aspects of Empathic Accuracy. In G. Fletcher & M. Clark (Eds.), *Blackwell Handbook of Social Psychology: Interpersonal Processes* (pp. 229–249). Blackwell. <https://doi.org/10.1002/9780470998557.ch9>
- Jacobsen, P. B., & Butler, R. W. (1996). Relation of cognitive coping and catastrophizing to

- acute pain and analgesic use following breast cancer surgery. *Journal of Behavioral Medicine*, 19(1), 17–29. <https://doi.org/10.1007/BF01858172>
- Johannessen, L. E. F. (2019). The commensuration of pain: How nurses transform subjective experience into objective numbers. *Social Science and Medicine*, 233, 38–46. <https://doi.org/10.1016/j.socscimed.2019.05.042>
- Junghaenel, D. U., Schneider, S., & Broderick, J. E. (2018). Partners' overestimation of patients' pain severity: Relationships with partners' interpersonal responses. *Pain Medicine (United States)*, 19, 1772–1781. <https://doi.org/10.1093/pm/pnx217>
- Katz, J. N., Chang, L. C., Sangha, O., Fossel, A. H., & Bates, D. W. (1996). Can comorbidity be measured by questionnaire rather than medical record review? *Medical Care*, 34, 73–84. <https://doi.org/10.1097/00005650-199601000-00006>
- Katzman, R., Brown, T., Fuld, P., Peck, A., Schechter, R., & Schimmel, H. (1983). Validation of a short orientation-memory-concentration test of cognitive impairment. *American Journal of Psychiatry*, 140, 734–739. <https://doi.org/10.1176/ajp.140.6.734>
- Keefe, F. J., Lipkus, I., Lefebvre, J. C., Hurwitz, H., Clipp, E., Smith, J., & Porter, L. (2003). The social context of gastrointestinal cancer pain: A preliminary study examining the relation of patient pain catastrophizing to patient perceptions of social support and caregiver stress and negative responses. *Pain*, 103, 151–156. [https://doi.org/10.1016/S0304-3959\(02\)00447-5](https://doi.org/10.1016/S0304-3959(02)00447-5)
- Kenny, D. A., & Ledermann, T. (2010). Detecting, Measuring, and Testing Dyadic Patterns in the Actor-Partner Interdependence Model. *Journal of Family Psychology*, 24(3), 359–366.

<https://doi.org/10.1037/a0019651>

- Kerns, R. D., & Rosenberg, R. (1995). Pain-relevant responses from significant others: Development of a significant-other version of the WHYMPI scales. *Pain, 61*, 245–249. [https://doi.org/10.1016/0304-3959\(94\)00173-C](https://doi.org/10.1016/0304-3959(94)00173-C)
- Kerns, R. D., Turk, D. C., & Rudy, T. E. (1985). The West Haven-Yale Multidimensional Pain Inventory (WHYMPI). *Pain, 23*, 345–356. [https://doi.org/10.1016/0304-3959\(85\)90004-1](https://doi.org/10.1016/0304-3959(85)90004-1)
- Kim, H.-Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics, 38*(1), 52–54. <https://doi.org/10.5395/rde.2013.38.1.52>
- Kim, J. H., Park, E. C., & Lee, S. G. (2015). The impact of age differences in couples on depressive symptoms: Evidence from the Korean longitudinal study of aging (2006-2012). *BMC Psychiatry, 15*, 10. <https://doi.org/10.1186/s12888-015-0388-y>
- Kirkova, J., Rybicki, L., Walsh, D., & Aktas, A. (2012). Symptom Prevalence in Advanced Cancer: Age, Gender, and Performance Status Interactions. *American Journal of Hospice and Palliative Medicine, 29*(2), 139–145. <https://doi.org/10.1177/1049909111410965>
- Kotkamp-Mothes, N., Slawinsky, D., Hindermann, S., & Strauss, B. (2005). Coping and psychological well being in families of elderly cancer patients. *Critical Reviews in Oncology/Hematology, 55*, 213–229. <https://doi.org/10.1016/j.critrevonc.2005.03.006>
- Kristjanson, L. J., Nikoletti, S., Porock, D., Smith, M., Lobchuk, M., & Pedler, P. (1998). Congruence between patients' and family caregivers' perceptions of symptom distress in

- patients with terminal cancer. *Journal of Palliative Care*, 14(3), 24–32.
<https://doi.org/10.1177/082585979801400306>
- Kroenke, C. H., Rosner, B., Chen, W. Y., Kawachi, I., Colditz, G. A., & Holmes, M. D. (2004). Functional impact of breast cancer by age at diagnosis. *Journal of Clinical Oncology*, 22(10), 1849–1856. <https://doi.org/10.1200/JCO.2004.04.173>
- Kurtz, M. E., Given, C. W., Given, B. A., & Kurtz, J. C. (1994). The interaction of age, symptoms, and survival status on physical and mental health of patients with cancer and their families. *Cancer*, 74, 2071–2078. [https://doi.org/10.1002/1097-0142\(19941001\)74:7+<2071::AID-CNCR2820741715>3.0.CO;2-R](https://doi.org/10.1002/1097-0142(19941001)74:7+<2071::AID-CNCR2820741715>3.0.CO;2-R)
- Lawton, M. P., Kleban, M. H., Moss, M., Rovine, M., & Glicksman, A. (1989). Measuring caregiving appraisal. *Journal of Gerontology*, 44, 61–71.
<https://doi.org/10.1093/geronj/44.3.P61>
- Lee, W. S., & McKinnish, T. (2018). The Marital Satisfaction of Differently Aged Couples. *Journal of Population Economics*, 31(2), 337–362. <https://doi.org/10.1007/s00148-017-0658-8>
- Lenhard, W., & Lenhard, A. (2014). Hypothesis Tests for Comparing Correlations. *Psychometrika*. <https://doi.org/10.13140/RG.2.1.2954.1367>
- Leonard, M. T., & Cano, A. (2006). Pain affects spouses too: Personal experience with pain and catastrophizing as correlates of spouse distress. *Pain*, 126, 139–146.
<https://doi.org/10.1016/j.pain.2006.06.022>

- Lin, C. C. (2001). Congruity of cancer pain perceptions between Taiwanese patients and family caregivers: Relationship to patients' concerns about reporting pain and using analgesics. *Journal of Pain and Symptom Management*, 21, 18–26. [https://doi.org/10.1016/S0885-3924\(00\)00230-X](https://doi.org/10.1016/S0885-3924(00)00230-X)
- Lo, C., Walsh, A., Mikulincer, M., Gagliese, L., Zimmermann, C., & Rodin, G. (2009). Measuring attachment security in patients with advanced cancer: Psychometric properties of a modified and brief Experiences in Close Relationships scale. *Psycho-Oncology*, 18, 490–499. <https://doi.org/10.1002/pon.1417>
- Lyons, K. S., Bennett, J. A., Nail, L. M., Fromme, E. K., Dieckmann, N., & Sayer, A. G. (2014). The role of patient pain and physical function on depressive symptoms in couples with lung cancer: A longitudinal dyadic analysis. *Journal of Family Psychology*, 28(5), 692–700. <https://doi.org/10.1037/fam0000017>
- Lyons, K. S., Jones, K. D., Bennett, R. M., Hiatt, S. O., & Sayer, A. G. (2013). Couple perceptions of fibromyalgia symptoms: The role of communication. *Pain*, 154(11), 2417–2426. <https://doi.org/10.1016/j.pain.2013.07.018>
- Lyons, R. F., Langille, L., & Duck, S. W. (2006). Difficult relationships and relationship difficulties: Relationship adaptation and chronic health problems. In *Relating Difficulty: The Processes of Constructing and Managing Difficult Interaction* (pp. 203–224). <https://doi.org/10.4324/9780203810712>
- Maas, C. J. M., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, 1. <https://doi.org/10.1027/1614-2241.1.3.86>

- Mah, K., Tran, K. T., Gauthier, L. R., Rodin, G., Zimmermann, C., Warr, D., Librach, S. L., Moore, M., Shepherd, F. A., & Gagliese, L. (2018). Do Correlates of Pain-Related Stoicism and Cautiousness Differ in Younger and Older People With Advanced Cancer? *Journal of Pain*, 19(3), 301–316. <https://doi.org/10.1016/j.jpain.2017.11.002>
- Martire, L. M., Keefe, F. J., Schulz, R., Ready, R., Beach, S. R., Rudy, T. E., & Starz, T. W. (2006). Older spouses' perceptions of partners' chronic arthritis pain: Implications for spousal responses, support provision, and caregiving experiences. *Psychology and Aging*, 21, 222–230. <https://doi.org/10.1037/0882-7974.21.2.222>
- Martire, L. M., Schulz, R., Keefe, F. J., Rudy, T. E., & Starz, T. W. (2007). Couple-oriented education and support intervention: Effects on individuals with osteoarthritis and their spouses. *Rehabilitation Psychology*, 52(2), 121–132. <https://doi.org/10.1037/0090-5550.52.2.121>
- McCarthy, E. P., Phillips, R. S., Zhong, Z., Drews, R. E., & Lynn, J. (2000). Dying with cancer: Patients' function, symptoms, and care preferences as death approaches. *Journal of the American Geriatrics Society*, 48(5), S110–S121. <https://doi.org/10.1111/j.1532-5415.2000.tb03120.x>
- McCracken, L. M. (1998). Learning to live with the pain: Acceptance of pain predicts adjustment in persons with chronic pain. *Pain*, 74, 21–27. [https://doi.org/10.1016/S0304-3959\(97\)00146-2](https://doi.org/10.1016/S0304-3959(97)00146-2)
- McCracken, L. M. (2005). Social context and acceptance of chronic pain: The role of solicitous and punishing responses. *Pain*, 113, 155–159. <https://doi.org/10.1016/j.pain.2004.10.004>

- McCracken, L. M., & Eccleston, C. (2003). Coping or acceptance: What to do about chronic pain? *Pain, 105*, 197–204. [https://doi.org/10.1016/S0304-3959\(03\)00202-1](https://doi.org/10.1016/S0304-3959(03)00202-1)
- McCracken, L. M., Vowles, K. E., & Eccleston, C. (2004). Acceptance of chronic pain: Component analysis and a revised assessment method. *Pain, 107*, 159–166. <https://doi.org/10.1016/j.pain.2003.10.012>
- McGuire, D. B. (2004). Occurrence of cancer pain. *Journal of the National Cancer Institute. Monographs, 32*, 51–56. <https://doi.org/10.1093/jncimonographs/lgh015>
- McWilliams, L. A., & Asmundson, G. J. G. (2007). The relationship of adult attachment dimensions to pain-related fear, hypervigilance, and catastrophizing. *Pain, 127*, 27–34. <https://doi.org/10.1016/j.pain.2006.07.020>
- McWilliams, L. A., Cox, B. J., & Enns, M. W. (2000). Impact of adult attachment styles on pain and disability associated with arthritis in a nationally representative sample. *Clinical Journal of Pain, 16*, 360. <https://doi.org/10.1097/00002508-200012000-00014>
- McWilliams, L. A., & Holmberg, D. (2010). Adult attachment and pain catastrophizing for self and significant other. *Pain, 149*(2), 278–283. <https://doi.org/10.1016/j.pain.2010.02.019>
- Melzack, R., & Katz, J. (2004). The Gate Control Theory: Reaching for the brain. In *Pain: Psychological Perspectives* (pp. 13–34). <https://doi.org/10.4324/9781410609861>
- Melzack, R., & Wall, P. D. (1965). Pain mechanisms: A new theory. *Science, 150*, 971–979.
- Melzack, R., & Wall, P. D. (1983). The Challenge of Pain. In *Penguin*. <https://doi.org/10.1017/s0033291700004001>

- Meredith, P. J., Strong, J., & Feeney, J. A. (2005). Evidence of a relationship between adult attachment variables and appraisals of chronic pain. *Pain Research and Management*, 10, 191–200. <https://doi.org/10.1155/2005/745650>
- Meredith, P. J., Strong, J., & Feeney, J. A. (2006). The relationship of adult attachment to emotion, catastrophizing, control, threshold and tolerance, in experimentally-induced pain. *Pain*, 120, 44–52. <https://doi.org/10.1016/j.pain.2005.10.008>
- Meredith, P. J., Strong, J., & Feeney, J. A. (2007). Adult attachment variables predict depression before and after treatment for chronic pain. *European Journal of Pain*, 11, 164–170. <https://doi.org/10.1016/j.ejpain.2006.01.004>
- Merskey, H. (1998). History of pain research and management in Canada. *Pain Research and Management*, 3, 164–173. <https://doi.org/10.1155/1998/270647>
- Miaskowski, C., Cooper, B., Paul, S. M., West, C., Langford, D., Levine, J. D., Abrams, G., Hamolsky, D., Dunn, L., Dodd, M., Neuhaus, J., Baggott, C., Dhruva, A., Schmidt, B., Cataldo, J., Merriman, J., & Aouizerat, B. E. (2012). Identification of patient subgroups and risk factors for persistent breast pain following breast cancer surgery. *Journal of Pain*, 13(12), 1172–1187. <https://doi.org/10.1016/j.jpain.2012.09.013>
- Miaskowski, C., Kragness, L., Dibble, S. L., & Wallhagen, M. (1997). Differences in mood states, health status, and caregiver strain between family caregivers of oncology outpatients with and without cancer-related pain. *Journal of Pain and Symptom Management*, 13, 138–147. [https://doi.org/10.1016/S0885-3924\(96\)00297-7](https://doi.org/10.1016/S0885-3924(96)00297-7)
- Miaskowski, C., Zimmer, E. F., Barrett, K. M., Dibble, S. L., & Wallhagen, M. (1997).

- Differences in patients' and family caregivers' perceptions of the pain experience influence patient and caregiver outcomes. *Pain*, 72, 217–226. [https://doi.org/10.1016/S0304-3959\(97\)00037-7](https://doi.org/10.1016/S0304-3959(97)00037-7)
- Miettinen, T., Kautiainen, H., Mäntyselkä, P., Linton, S. J., & Kalso, E. (2019). Pain interference type and level guide the assessment process in chronic pain: Categorizing pain patients entering tertiary pain treatment with the Brief Pain Inventory. *PLoS ONE*, 14(8), e0221437. <https://doi.org/10.1371/journal.pone.0221437>
- Mikulincer, M., & Shaver, P. R. (2003). The attachment behavioral system In adulthood: Activation, psychodynamics, and interpersonal processes. In *Advances in Experimental Social Psychology* (pp. 53–152). [https://doi.org/10.1016/S0065-2601\(03\)01002-5](https://doi.org/10.1016/S0065-2601(03)01002-5)
- Moldovan, A. R., Onac, I. A., Vantu, M., Szentagotai, A., & Onac, I. (2009). Emotional distress, pain catastrophizing and expectancies in patients with low back pain. *Journal of Cognitive and Behavioral Psychotherapies*, 9(1), 83–93.
- Monin, J. K., & Schulz, R. (2009). Interpersonal Effects of Suffering in Older Adult Caregiving Relationships. *Psychology and Aging*, 24(3), 681–695. <https://doi.org/10.1037/a0016355>
- Monin, J. K., Zhou, L., & Kershaw, T. (2014). Attachment and psychological health in older couples coping with pain. *GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*, 27(3), 115–127. <https://doi.org/10.1024/1662-9647/a000110>
- Mukerji, S. S., Duffy, S. A., Fowler, K. E., Khan, M., Ronis, D. L., & Terrell, J. E. (2007). Comorbidities in head and neck cancer: Agreement between self-report and chart review. *Otolaryngology - Head and Neck Surgery*, 136, 536–542.

<https://doi.org/10.1016/j.otohns.2006.10.041>

National Cancer Institute of Canada. (2019). Canadian Cancer Statistics 2019. In *Canadian Cancer Society/National Cancer Institute of Canada*.

Nayak, S., Shiflett, S. C., Eshun, S., & Levine, F. M. (2000). Culture and gender effects in pain beliefs and the prediction of pain tolerance. *Cross-Cultural Research*, 34(2), 135–151.

<https://doi.org/10.1177/106939710003400203>

Nijboer, C., Tempelaar, R., Sanderman, R., Triemstra, M., Spruijt, R. J., & Van Den Bos, G. A. M. (1998). Cancer and caregiving: The impact on the caregiver's health. *Psycho-Oncology*, 7, 3–13. [https://doi.org/10.1002/\(SICI\)1099-1611\(199801/02\)7:1<3::AID-PON320>3.0.CO;2-5](https://doi.org/10.1002/(SICI)1099-1611(199801/02)7:1<3::AID-PON320>3.0.CO;2-5)

Osman, A., Barrios, F. X., Gutierrez, P. M., Kopper, B. A., Merrifield, T., & Grittmann, L. (2000). The Pain Catastrophizing Scale: Further psychometric evaluation with adult samples. *Journal of Behavioral Medicine*, 23(4), 351–365.

<https://doi.org/10.1023/A:1005548801037>

Pasacreta, J. V. (1997). Depressive Phenomena, Physical Symptom Distress, and Functional Status among Women with Breast Cancer. *Nursing Research*, 46, 214–221.

<https://doi.org/10.1097/00006199-199707000-00006>

Patrick, D. L., Ferketich, S. L., Frame, P. S., Harris, J. J., Hendricks, C. B., Levin, B., Link, M. P., Lustig, C., McLaughlin, J., Ried, L. D., Turrissi III, A. T., Unützer, J., & Vernon, S. W. (2004). National Institutes of Health State-of-the-Science Conference Statement: Symptom Management in Cancer: Pain, Depression, and Fatigue, July 15-17, 2002. *Journal of the*

National Cancer Institute Monographs, 32, 9–16.

<https://doi.org/10.1093/jncimonographs/djg014>

Pence, L., Cano, A., Thorn, B., & Ward, L. C. (2006). Perceived spouse responses to pain: The level of agreement in couple dyads and the role of catastrophizing, marital satisfaction, and depression. *Journal of Behavioral Medicine*, 29, 511–522. <https://doi.org/10.1007/s10865-006-9073-4>

Peng, W. L., Wu, G. J., Sun, W. Z., Chen, J. C., & Huang, A. T. (2006). Multidisciplinary Management of Cancer Pain: A Longitudinal Retrospective Study on a Cohort of End-Stage Cancer Patients. *Journal of Pain and Symptom Management*, 32(5), 444–452. <https://doi.org/10.1016/j.jpainsymman.2006.05.017>

Porter, L. S., Davis, D., & Keefe, F. J. (2007). Attachment and pain: Recent findings and future directions. *Pain*, 128, 195–198. <https://doi.org/10.1016/j.pain.2007.02.001>

Porter, L. S., Keefe, F. J., Davis, D., Rumble, M., Scipio, C., & Garst, J. (2012). Attachment styles in patients with lung cancer and their spouses: Associations with patient and spouse adjustment. *Supportive Care in Cancer*, 20(10), 2459–2466. <https://doi.org/10.1007/s00520-011-1367-6>

Porter, L. S., Keefe, F. J., Garst, J., McBride, C. M., & Baucom, D. (2008). Self-efficacy for managing pain, symptoms, and function in patients with lung cancer and their informal caregivers: Associations with symptoms and distress. *Pain*, 137, 306–315. <https://doi.org/10.1016/j.pain.2007.09.010>

Porter, L. S., Keefe, F. J., McBride, C. M., Pollak, K., Fish, L., & Garst, J. (2002). Perceptions of

- patients' self-efficacy for managing pain and lung cancer symptoms: Correspondence between patients and family caregivers. *Pain*, 98, 169–178. [https://doi.org/10.1016/S0304-3959\(02\)00042-8](https://doi.org/10.1016/S0304-3959(02)00042-8)
- Pradeep, N., & Sutin, A. R. (2015). Spouses and depressive symptoms in older adulthood. *Scientific Reports*, 5, 8594. <https://doi.org/10.1038/srep08594>
- Prkachin, K. M., Solomon, P. E., & Ross, J. (2007). Underestimation of Pain by Health-Care Providers: Towards a Model of the Process of Inferring Pain in Others. *CJNR*, 39(2), 88–106.
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401. <https://doi.org/10.1177/014662167700100306>
- Radloff, L. S., & Teri, L. (1986). Use of the Center for Epidemiological Studies-Depression scale with older adults. *Clinical Gerontologist*, 5(1–2), 119–136. https://doi.org/10.1300/J018v05n01_06
- Revenson, T. A., & Pranikoff, J. R. (2005). A contextual approach to treatment decision making among breast cancer survivors. *Health Psychology*, 24, S93-98. <https://doi.org/10.1037/0278-6133.24.4.S93>
- Pension Benefits Act, (2017). <https://canlii.ca/t/551qh>
- Riemsma, R. P., Taal, E., & Rasker, J. J. (2000). Perceptions about perceived functional disabilities and pain of people with rheumatoid arthritis: Differences between patients and

- their spouses and correlates with well-being. *Arthritis Care and Research*, 13(5), 255–261.
[https://doi.org/10.1002/1529-0131\(200010\)13:5<255::aid-anr3>3.0.co;2-3](https://doi.org/10.1002/1529-0131(200010)13:5<255::aid-anr3>3.0.co;2-3)
- Riffin, C., Fried, T., & Pillemer, K. (2016). Impact of Pain on Family Members and Caregivers of Geriatric Patients. *Clinics in Geriatric Medicine*, 32(4), 663–675.
<https://doi.org/10.1016/j.cger.2016.06.010>
- Robinson, B. C. (1983). Validation of a caregiver strain index. *Journal of Gerontology*, 38, 344–348. <https://doi.org/10.1093/geronj/38.3.344>
- Robinson, M. E., & Wise, E. A. (2004). Prior pain experience: Influence on the observation of experimental pain in men and women. *Journal of Pain*, 5(5), 264–269.
<https://doi.org/10.1016/j.jpain.2004.04.003>
- Rodin, G., Walsh, A., Zimmermann, C., Gagliese, L., Jones, J., Shepherd, F. A., Moore, M., Braun, M., Donner, A., & Mikulincer, M. (2007). The contribution of attachment security and social support to depressive symptoms in patients with metastatic cancer. *Psycho-Oncology*, 16, 1080–1091. <https://doi.org/10.1002/pon.1186>
- Rogers, K. H., Wood, D., & Furr, R. M. (2018). Assessment of similarity and self-other agreement in dyadic relationships: A guide to best practices. *Journal of Social and Personal Relationships*, 35(1), 112–134. <https://doi.org/10.1177/0265407517712615>
- Rosenthal, R. (1982). Conducting Judgment Studies. In *Handbook of Methods in Nonverbal Behavior Research* (pp. 287–361).
<https://doi.org/10.1093/acprof:oso/9780198529620.003.0005>

- Schönbrodt, F. D., Humberg, S., & Nestler, S. (2018). Testing Similarity Effects with Dyadic Response Surface Analysis. *European Journal of Personality*.
<https://doi.org/10.1002/per.2169>
- Schopflocher, D., Taenzer, P., & Jovey, R. (2011). The prevalence of chronic pain in Canada. *Pain Research and Management*, 16(6), 445–450. <https://doi.org/10.1155/2011/876306>
- Schreiner, A. S., & Morimoto, T. (2003). The relationship between mastery and depression among Japanese family caregivers. *International Journal of Aging and Human Development*, 56(4), 307–321. <https://doi.org/10.2190/7ERL-TF1D-KW2X-3C7Y>
- Schroevers, M. J., Ranchor, A. V., & Sanderman, R. (2004). The role of age at the onset of cancer in relation to survivors' long-term adjustment: A controlled comparison over an eight-year period. *Psycho-Oncology*, 13(10), 740–752. <https://doi.org/10.1002/pon.780>
- Schulz, R., & Eden, J. (2016). Family Caregiving Roles and Impacts. In *Families Caring for an Aging America*. National Academies Press. <https://doi.org/10.17226/23606>
- Schulz, R., & Tompkins, C. A. (2010). Informal Caregivers in the United States: Prevalence, Caregiver Characteristics, and Ability to Provide Care. In *The Role of Human Factors in Home Health Care. Workshop Summary*.
- Schumm, W. R., Nichols, C. W., Schectman, K. L., & Grigsby, C. C. (1983). Characteristics of responses to the Kansas marital satisfaction scale by a sample of 85 married mothers. *Psychological Reports*, 53, 567–572. <https://doi.org/10.2466/pr0.1983.53.2.567>
- Schumm, W. R., Paff-Bergen, L. A., Hatch, R. C., Obiorah, F. C., Copeland, J. M., Meens, L. D.,

- & Bugaighis, M. A. (1986). Concurrent and Discriminant Validity of the Kansas Marital Satisfaction Scale. *Journal of Marriage and the Family*, 48, 381–387.
<https://doi.org/10.2307/352405>
- Sharma, N., Chakrabarti, S., & Grover, S. (2016). Gender differences in caregiving among family - caregivers of people with mental illnesses. *World Journal of Psychiatry*, 6(1), 7–17. <https://doi.org/10.5498/wjp.v6.i1.7>
- Shega, J. W., Hougham, G. W., Stocking, C. B., Cox-Hayley, D., & Sachs, G. A. (2004). Pain in community-dwelling persons with dementia: Frequency, intensity, and congruence between patient and caregiver report. *Journal of Pain and Symptom Management*, 28(6), 585–592.
<https://doi.org/10.1016/j.jpainsymman.2004.04.012>
- Shields, C. G., Travis, L. A., & Rousseau, S. L. (2000). Marital attachment and adjustment in older couples coping with cancer. *Aging and Mental Health*, 4, 223–233.
<https://doi.org/10.1080/713649921>
- Simpson, J. A., Oriña, M. M., & Ickes, W. (2003). When Accuracy Hurts, and When It Helps: A Test of the Empathic Accuracy Model in Marital Interactions. *Journal of Personality and Social Psychology*, 85(5), 881–893. <https://doi.org/10.1037/0022-3514.85.5.881>
- Smith, H. R. (2015). Depression in cancer patients: Pathogenesis, implications and treatment (review). *Oncology Letters*, 9(4), 1509–1514. <https://doi.org/10.3892/ol.2015.2944>
- Spence, R., Jacobs, C., & Bifulco, A. (2020). Attachment style, loneliness and depression in older age women. *Aging and Mental Health*, 24(5), 837–839.
<https://doi.org/10.1080/13607863.2018.1553141>

Statistics Canada. (2021). *Population Estimates on July 1st, by Age and Sex*. Statistics Canada.

<https://doi.org/https://doi.org/10.25318/1710000501-eng>

Stephens, M. A. P., Cremeans-Smith, J. K., Martire, L. M., Druley, J. A., & Wojno, W. C.

(2006). Older women with osteoarthritis and their caregiving husbands: Effects of pain and pain expression on husbands' well-being and support. *Rehabilitation Psychology*, 51(1), 3–12. <https://doi.org/10.1037/0090-5550.51.1.36>

Sullivan, M. J. L., Bishop, S. R., & Pivik, J. (1995). The Pain Catastrophizing Scale:

Development and Validation. *Psychological Assessment*, 7, 524–532.

<https://doi.org/10.1037/1040-3590.7.4.524>

Sullivan, M. J. L., Thorn, B., Haythornthwaite, J. A., Keefe, F., Martin, M., Bradley, L. A., &

Lefebvre, J. C. (2001). Theoretical perspectives on the relation between catastrophizing and pain. *Clinical Journal of Pain*, 17(1), 52–64. <https://doi.org/10.1097/00002508-200103000-00008>

Suso-Ribera, C., Martínez-Borba, V., Viciano, A., Cano-García, F. J., & García-Palacios, A.

(2019). Empathic accuracy in chronic pain: Exploring patient and informal caregiver differences and their personality correlates. *Medicina (Lithuania)*, 55(9), 539.

<https://doi.org/10.3390/medicina55090539>

Susser, S. R., McCusker, J., & Belzile, E. (2008). Comorbidity information in older patients at an emergency visit: self-report vs. administrative data had poor agreement but similar predictive validity. *Journal of Clinical Epidemiology*, 61, 511–515.

<https://doi.org/10.1016/j.jclinepi.2007.07.009>

- Tabachnick, B. G., & Fidell, L. S. (2012). Using multivariate statistics (6th ed.). In *New York: Harper and Row*.
- Tankha, H., Cano, A., Corley, A., Dillaway, H., Lumley, M. A., & Clark, S. (2020). A Novel Couple-Based Intervention for Chronic Pain and Relationship Distress: A Pilot Study. *Couple and Family Psychology*, 9(1), 13–32. <https://doi.org/10.1037/cfp0000131.A>
- Tegegn, H. G., & Gebreyohannes, E. A. (2017). Cancer Pain Management and Pain Interference with Daily Functioning among Cancer Patients in Gondar University Hospital. *Pain Research and Management*, 2017. <https://doi.org/10.1155/2017/5698640>
- Thielke, S., Sale, J., & Reid, M. C. (2012). Aging: Are these 4 pain myths complicating care? *Journal of Family Practice*, 61(11), 666–670.
- Thorn, B. E., Ward, L. C., Sullivan, M. J. L., & Boothby, J. L. (2003). Communal coping model of catastrophizing: Conceptual model building. *Pain*, 106(1–2), 1–2. [https://doi.org/10.1016/S0304-3959\(03\)00228-8](https://doi.org/10.1016/S0304-3959(03)00228-8)
- Turk, D. C., Sist, T. C., Okifuji, A., Miner, M. F., Florio, G., Harrison, P., Massey, J., Lema, M. L., & Zevon, M. A. (1998). Adaptation to metastatic cancer pain, regional/local cancer pain and non-cancer pain: Role of psychological and behavioral factors. *Pain*, 74, 247–256. [https://doi.org/10.1016/S0304-3959\(97\)00187-5](https://doi.org/10.1016/S0304-3959(97)00187-5)
- Vischers, J., Jaspert, E., & Vervaeke, G. (2017). Social Desirability in Intimate Partner Violence and Relationship Satisfaction Reports: An Exploratory Analysis. *Journal of Interpersonal Violence*, 32(9), 1401–1420. <https://doi.org/10.1177/0886260515588922>

- Wade, D. T., & Vergis, E. (1999). The Short Orientation-Memory-Concentration Test: A study of its reliability and validity. *Clinical Rehabilitation*, 13(2), 164–170.
<https://doi.org/10.1191/026921599673848768>
- Wells, N., Murphy, B., Wujcik, D., & Johnson, R. (2003). Pain-related distress and interference with daily life of ambulatory patients with cancer with pain. *Oncology Nursing Forum*, 30, 977–986. <https://doi.org/10.1188/03.ONF.977-986>
- Westman, M., Keinan, G., Roziner, I., & Benyamini, Y. (2008). The Crossover of Perceived Health Between Spouses. *Journal of Occupational Health Psychology*, 13, 168–180.
<https://doi.org/10.1037/1076-8998.13.2.168>
- Williamson, G. M., & Schulz, R. (1995). Activity Restriction Mediates the Association Between Pain and Depressed Affect: A Study of Younger and Older Adult Cancer Patients. *Psychology and Aging*, 10, 369–378. <https://doi.org/10.1037/0882-7974.10.3.369>
- Wilson, S. J., Martire, L. M., & Zhaoyang, R. (2019). Couples' day-to-day pain concordance and marital interaction quality. *Journal of Social and Personal Relationships*, 36(3), 1023–1040.
<https://doi.org/10.1177/0265407517752541>
- Xu, X., & Huang, Y. (2020). Objective pain assessment: A key for the management of chronic pain. *F1000Research*, 9, 1–7. <https://doi.org/10.12688/f1000research.20441.1>
- Yates, P. M., Aranda, S., Edwards, H., Nash, R. E., Skerman, H. M., & McCarthy, A. (2004). Family caregivers' experiences and involvement with cancer pain management. *Journal of Palliative Care*, 20, 287–296. <https://doi.org/10.1177/082585970402000404>

- Yates, P. M., Edwards, H. E., Nash, R. E., Walsh, A. M., Fentiman, B. J., Skerman, H. M., & Najman, J. M. (2002). Barriers to effective cancer pain management: A survey of hospitalized cancer patients in Australia. *Journal of Pain and Symptom Management*, 23(5), 393–405. [https://doi.org/10.1016/S0885-3924\(02\)00387-1](https://doi.org/10.1016/S0885-3924(02)00387-1)
- Youngcharoen, P., Aree-Ue, S., & Saraboon, Y. (2018). Validation of pain catastrophizing Scale-Thai version in older adults with knee osteoarthritis. *Pacific Rim International Journal of Nursing Research*, 1, 871. <https://doi.org/10.1093/geroni/igx004.3131>
- Zak, A., Armer, E., Edmunds, K., Fleury, T., Sarris, M., & Shatynski, B. (2001). Age-discrepant relationships: Do these romances fare well? *North American Journal of Psychology*, 3(1), 119–122.

APPENDICES

Appendix A: Informed Consent Forms



University Health Network
Toronto General Hospital Toronto Western Hospital Princess Margaret Hospital

CONSENT FORM FOR PARTICIPATION IN A RESEARCH STUDY

TITLE: Couples' adjustment to cancer pain across the adult lifespan

INVESTIGATOR: Dr. Lucia Gagliese (Telephone: 416-340-4296)

SPONSOR: National Cancer Institute of Canada

You are being asked to take part in a research study. Before agreeing to participate in this study, it is important that you read and understand the following explanation of the proposed study procedures. The following information describes the purpose, procedures, benefits, discomforts, risks, and precautions associated with this study. It also describes your right to refuse to participate or withdraw from the study at any time. In order to decide whether you wish to participate in this research study, you should understand enough about its risks and benefits to be able to make an informed decision. This is known as the informed consent process. Please ask the study doctor or study staff to explain any words you don't understand before signing this consent form. Make sure all your questions have been answered to your satisfaction before signing this document.

Background and Purpose

The purpose of this study is to develop an understanding of couples cope with cancer pain. We would like to know how spouses deal with their partner's pain and how pain impacts on the well being of the relationship. You have been identified by your partner as their primary caregiver and a potential participant in this study that will examine your experience of your partner's pain and its impact on your quality of life. If you consent, we will ask you to complete a set of questionnaires. A total of 100 participants of different ages are planned to take part in this study over the next 24 months.

Procedures

If you agree to participate in this study, you will be asked some questions about your memory. You will be given a questionnaire package that takes approximately 45 minutes to complete. This questionnaire asks about your physical health and any experiences of pain you may have had, how your partner's pain impacts on your life, and your relationship. Other parts of the questionnaire will ask you about personal information, such as your marital status and personal relationships. You have the option to complete the questionnaires on your own, or with the help from a research team member. You may complete the questionnaires at the hospital or if you prefer, you may take the questionnaire package home and return them by mail once they are completed (we will provide postage and an envelope for this purpose). If you do choose to participate and take the questionnaire package home, we will telephone you in two weeks to remind you to mail your completed questionnaire package..

Risks

Beyond the period of time required to complete the survey, there are no known risks to you for participation in this study. Some of the questions you will be asked are personal. You are under no obligation to answer questions that you do not wish to answer, and you may feel free to take breaks as required. You may also stop answering the questionnaire at any time if you experience any discomfort.

Benefits

This study may not benefit you directly but it may improve future pain management for individuals experiencing cancer pain and their caregivers.

Confidentiality

All information collected during this study, including your personal health information, will be kept confidential and will not be shared with anyone outside the study unless required by law. You will not be named in any reports, publications, or presentations that may come from this study.

The information that is collected for the study will be kept in a locked and secure area by the study doctor for 7 years.

Representatives of the University Health Network Research Ethics Board may look at the study records to check that the information collected for the study is correct and to make sure the study followed proper laws and guidelines.

If you decide to leave the study, the information about you that was collected before you left the study will still be used. No new information will be collected without your permission.

Participation

Your participation in this study is voluntary. You can choose not to participate or you may withdraw at any time without affecting your spouse's medical care at Princess Margaret Hospital.

Payment

You will be reimbursed for any additional parking fees or transportation costs you might incur as a result of participation in this study.

Compensation for Injury

If you become ill or are physically injured as a result of participation in this study, medical treatment will be provided. The reasonable costs of such treatment will be covered for any injury or illness that is directly a result of participation in this study. In no way does signing this consent form waive your legal rights nor does it relieve the investigators, sponsors or involved institutions from their legal and professional responsibilities.

Questions

If you suffer any side effects or other injuries during this study, or if you have any general questions about the study, please call Dr. Lucia Gagliese at 416-340-4296.

If you have any questions about your rights as a research participant, please call Ronald Heslegrave, Ph. D., Chair of the University Health Network Research Ethics Board (REB) or the Research Ethics office number at 416-946-4438. The REB is a group of people who oversee the ethical conduct of research studies. These people are not part of the study team. Everything that you discuss will be kept confidential

Consent

This study has been explained to me and any questions I had have been answered.

I know that I may leave the study at any time. I agree to take part in this study.

Print Study Participant's Name Signature Date

(You will be given a signed copy of this consent form)

My signature means that I have explained the study to the participant named above. I have answered all questions.

Print Name of Person Signature Date
Obtaining Consent

Participant ID: _____

RA: _____

MOUNT SINAI HOSPITAL
Joseph and Wolf Lebovic Health Complex



CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title Couples' adjustment to cancer pain across the adult lifespan

Investigator Dr. Lucia Gagliese (Telephone: 416-340-4296)

Co-Investigators Dr. G. Rodin, Dr. C. Zimmermann, Dr. M. Moore, Dr. F. Shepherd,
Dr. L. Librach

Sponsor Canadian Cancer Society – Research Institute

Introduction

You are being asked to take part in a research study. Before agreeing to participate in this study, it is important that you read and understand the following explanation of the proposed study procedures. The following information describes the purpose, procedures, benefits, discomforts, risks, and precautions associated with this study. It also describes your right to refuse to participate or withdraw from the study at any time. In order to decide whether you wish to participate in this research study, you should understand enough about its risks and benefits to be able to make an informed decision. This is known as the informed consent process. Please ask the study doctor or study staff to explain any words you don't understand before signing this consent form. Make sure all your questions have been answered to your satisfaction before signing this document.

Background and Purpose

The purpose of this study is to develop an understanding of how couples cope with cancer pain. We would like to know how spouses deal with their partner's pain and how pain impacts on the well being of the relationship. You have been identified by your partner as their primary caregiver and a potential participant in this study that will examine your experience of your partner's pain and its impact on your quality of life. If you consent, we will ask you to complete a set of questionnaires. A total of 100 participants of different ages are planned to take part in this study over the next 24 months. About 50 people will come from Mount Sinai Hospital.

Study Design and Procedure

If you agree to participate in this study, you will be asked some questions about your memory. You will be given a questionnaire package that takes approximately 45 minutes to complete. This questionnaire asks about your physical health and any experiences of pain you may have had, how your partner's pain impacts on your life, and your relationship. Other parts of the questionnaire will ask you about personal information, such as your marital status and personal relationships. You have the option to complete the questionnaires on your own, or with the help from a research team member. You may complete the questionnaires at the hospital or if you prefer, you may take the questionnaire package home and return them by mail once they are completed (we will provide postage and an envelope for this purpose). If you do choose to participate and take the questionnaire package home, we will telephone you in two weeks to remind you to mail your completed questionnaire package.

Risks Related to Being in the Study

Beyond the period of time required to complete the survey, there are no known risks to you for participation in this study. Some of the questions you will be asked are personal. You are under no obligation to answer questions that you do not wish to answer, and you may feel free to take breaks as required. You may also stop answering the questionnaire at any time if you experience any discomfort.

Benefits to Being in the Study

This study may not benefit you directly but it may improve future pain management for individuals experiencing cancer pain and their caregivers.

Confidentiality

All information collected during this study, including your personal health information, will be kept confidential and will not be shared with anyone outside the study unless required by law. You will not be named in any reports, publications, or presentations that may come from this study.

The information that is collected for the study will be kept in a locked and secure area by the study doctor for 7 years.

Representatives of the Mount Sinai Hospital Research Ethics Board may look at the study records to check that the information collected for the study is correct and to make sure the study followed proper laws and guidelines.

If you decide to leave the study, the information about you that was collected before you left the study will still be used. No new information will be collected without your permission.

Voluntary Participation

Your participation in this study is voluntary. You can choose not to participate or you may withdraw at any time without affecting your spouse's medical care with the Temmy Latner Centre for Palliative Care, Mount Sinai Hospital.

In Case You Are Harmed in the Study

If you become ill or are physically injured as a result of participation in this study, medical treatment will be provided. The reasonable costs of such treatment will be covered for any injury or illness that is directly a result of participation in this study. In no way does signing this consent form waive your legal rights nor does it relieve the investigators, sponsors or involved institutions from their legal and professional responsibilities.

Expenses Associated with Participating in the Study

You will be reimbursed for any additional parking fees or transportation costs you might incur as a result of participation in this study.

Questions About the Study

If you suffer any side effects or other injuries during this study, or if you have any general questions about the study, please call Dr. Lucia Gagliese at 416-340-4296.

If you have any questions about your rights as a research participant, please call Ronald Heslegrave, Ph. D., Chair of the Mount Sinai Hospital Research Ethics Board (REB) or the Research Ethics office number at 416-586-4875. The REB is a group of people who oversee the ethical conduct of research studies. These people are not part of the study team. Everything that you discuss will be kept confidential

Consent

This study has been explained to me and any questions I had have been answered.

I know that I may leave the study at any time. I agree to take part in this study.

Print Study Participant's Name Signature Date

(You will be given a signed copy of this consent form)

My signature means that I have explained the study to the participant named above. I have answered all questions.

Print Name of Person Signature Date
Obtaining Consent

Appendix B: Questionnaires

Short Orientation-Memory-Concentration Test (SOMC)

Short Orientation-Memory-Concentration Test (SOMC)

Ask each question. Score 0 for incorrect answer, and indicated score for each correct answer or part of answer correct. Self-correction is allowed. Indicate date of test at top.

Question	Scoring if correct		Score
What year is it now?	4		
Answer			
What month is it now?	3		
Answer			
Repeat this address			
Address chosen (A, B, C, D)			
About what time is it now? (Correct if within one hour)	3		
Answer			
Count backwards from 20 to 1 <i>Two points off for each error</i>	4 or 2		
Say the months in reverse order <i>Two points off for each error</i>	4 or 2		
Repeat the address given <i>Two points off for each error</i>	10, 8, 6, 4, or 2		
TOTAL SCORE			

Address A	Address B	Address C	Address D
Mr. John / Brown, 42 / West Street, Gateshead	Mr. Joe / Smith, 34 / Church Road Banbury	Mr. Tom / White, 26 / Station Road, Aylesbury	Mr. Philip / Jones, 18 / North Way, Oxford

/ = marks separate items within address

Researcher's Initials: _____

Brief Pain Inventory (BPI)

Note. BPI Pain Severity Scale consists of Questions #3-6; BPI Pain Interference Scale consists of Questions #9A-G.

Participant ID: _____
Date: ____/____/____

RA: _____

Brief Pain Inventory

- 1). Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today?

_____ YES _____ NO

- 2). Attached to this questionnaire is an outline of the human body. On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.

- 3). Please rate your pain by circling the one number that best describes your pain at its worst in the past 24 hours.

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

- 4). Please rate your pain by circling the one number that best describes your pain at its least in the past 24 hours.

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

- 5). Please rate your pain by circling the one number that best describes your pain on the average in the past 24 hours.

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

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

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

- 9). Please circle the one number that describes how, during the past 24 hours, pain has interfered with your:

A. General activity

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

B. Mood

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

C. Walking ability

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

D. Normal work (includes both work outside the home and housework).

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

E. Relations with other people.

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

F. Sleep

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

G. Enjoyment of life

0	1	2	3	4	5	6	7	8	9	10
Does Not Interfere										Completely Interferes

Brief Pain Inventory – Significant other version (BPIso)

Note. SCs have been asked to respond regarding their significant other's pain. BPI Pain Severity Scale consists of Questions #3-6; BPI Pain Interference Scale consists of Questions #9A-G.

Participant ID: _____
Date: ____/____/____

RA: _____

Please respond to the following questions about your spouse/partner's pain. For these questions, please respond based on what YOU THINK he/she feels.

Brief Pain Inventory

- 1). Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Has *your spouse* had pain other than these everyday kinds of pain today?

_____ YES _____ NO

- 2). Attached to this questionnaire is an outline of the human body. On the diagram, shade in the areas where *your spouse* feels pain. Put an X on the area that hurts the most.

- 3). Please rate *your spouse's* pain by circling the one number that best describes *your spouse's* pain at its worst in the past 24 hours.

0 1 2 3 4 5 6 7 8 9 10

No pain

Pain as bad
as you can
imagine

- 4). Please rate *your spouse's* pain by circling the one number that best describes *your spouse's* pain at its least in the past 24 hours.

0 1 2 3 4 5 6 7 8 9 10

No pain

Pain as bad
as you can
imagine

- 5). Please rate *your spouse's* pain by circling the one number that best describes *your spouse's* pain on the average in the past 24 hours.

0 1 2 3 4 5 6 7 8 9 10

No pain

Pain as bad
as you can
imagine

Participant ID: _____
Date: ____/____/____

RA: _____

- 6). Please rate **your spouse's** pain by circling the one number that tells how much pain **your spouse** has right now.

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

- 7). What treatments or medications is **your spouse** receiving for pain?

- 8). In the past 24 hours, how much relief has **your spouse's** pain treatments or medications provided? Please circle the one percentage that most shows how much relief **your spouse** have received.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No relief					Complete relief					

- 9). Please circle the one number that describes how, during the past 24 hours, pain has interfered with **your spouse's**:

A. General activity

0	1	2	3	4	5	6	7	8	9	10
Does not interfere					Completely interferes					

B. Mood

0	1	2	3	4	5	6	7	8	9	10
Does not interfere					Completely interferes					

Participant ID: _____
Date: __/__/__

RA: _____

C. Walking ability

0	1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely interferes	

I. Normal work (includes both work outside the home and housework)

0	1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely interferes	

J. Relations with other people

0	1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely interferes	

K. Sleep

0	1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely interferes	

I. Enjoyment of life

0	1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely interferes	

Charlson Comorbidity Index (CCI)

Charlson Comorbidity Index (CCI) (Charlson et al., 1987)

Patient Age: _____ years

Does the Patient Have: (check appropriate response)

AIDS?	☐ YES	☐ NO
Cerebrovascular Disease?	☐ YES	☐ NO
Chronic Pulmonary Disease?	☐ YES	☐ NO
Congestive Heart Failure?	☐ YES	☐ NO
Connective Tissue Disease?	☐ YES	☐ NO
Dementia?	☐ YES	☐ NO
Hemiplegia?	☐ YES	☐ NO
Leukemia?	☐ YES	☐ NO
Malignant Lymphoma?	☐ YES	☐ NO
Myocardial Infarction?	☐ YES	☐ NO
Peripheral Vascular Disease?	☐ YES	☐ NO
Ulcer Disease?	☐ YES	☐ NO

Select the appropriate column for each condition; give only 1 answer per row

Diabetes Mellitus	☐ NONE	☐ Without End Organ Damage	☐ With End Organ Damage	
Liver Disease	☐ NONE	☐ MILD	☐ MODERATE	☐ SEVERE
Renal Disease	☐ NONE	☐ MILD	☐ MODERATE	☐ SEVERE
Malignant Solid Tumour	☐ NONE	☐ MILD	☐ MODERATE	☐ SEVERE

Centre for Epidemiologic Studies – Depression Scale (CES-D)

CES-D

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

Rarely or none of the time (less than 1 day)
 Some or a little of the time (1-2 days)
 Occasionally or a moderate amount of the time (3-4 days)
 Most or all of the time (5-7 days)

During the Past Week	Rarely	A little	Moderate	Most
1. I was bothered by things that usually don't bother me.....	0	1	2	3
2. I did not feel like eating; my appetite was poor.....	0	1	2	3
3. I felt that I could not shake off the blues Even with help from my family or friends....	0	1	2	3
4. I felt that I was just as good as other people...	0	1	2	3
5. I had trouble keeping my mind on what I was doing.....	0	1	2	3
6. I felt depressed.....	0	1	2	3
7. I felt that everything I did was an effort.....	0	1	2	3
8. I felt hopeful about the future.....	0	1	2	3
9. I thought my life had been a failure.....	0	1	2	3
10. I felt fearful.....	0	1	2	3
11. My sleep was restless.....	0	1	2	3
12. I was happy.....	0	1	2	3
13. I talked less than usual.....	0	1	2	3
14. I felt lonely.....	0	1	2	3
15. People were unfriendly.....	0	1	2	3
16. I enjoyed life.....	0	1	2	3
17. I had crying spells.....	0	1	2	3
18. I felt sad.....	0	1	2	3
19. I felt that people disliked me.....	0	1	2	3
20. I could not get "going".....	0	1	2	3

Caregiver Mastery Scale (CMS)

Participant ID: _____
Date: ____/____/____

RA: _____

Please respond to the following questions, considering YOUR feelings and actions when your spouse/partner is in pain.

Caregiving Mastery Survey

Please indicate how strongly you agree or disagree with the following statements concerning the assistance that you give your spouse, using the following scale:

1	2	3	4	5	6
Strongly disagree					Strongly agree

1. I am uncertain about how to help my spouse.

1	2	3	4	5	6
---	---	---	---	---	---

2. I am reassured knowing that as long as I am helping my spouse, (he/she) is getting proper care.

1	2	3	4	5	6
---	---	---	---	---	---

3. I should be doing more for my spouse.

1	2	3	4	5	6
---	---	---	---	---	---

4. I am pretty good at figuring out when my spouse wants my help.

1	2	3	4	5	6
---	---	---	---	---	---

5. I can tell when my spouse prefers encouragement and a listening ear rather than physical assistance.

1	2	3	4	5	6
---	---	---	---	---	---

6. In general, I feel able to handle most problems in the care of my spouse.

1	2	3	4	5	6
---	---	---	---	---	---

7. I am not able to provide the moral support that my spouse needs to cope with pain.

1	2	3	4	5	6
---	---	---	---	---	---

8. I am pretty good at figuring out what my spouse needs.

1	2	3	4	5	6
---	---	---	---	---	---

9. My spouse usually feels better when I offer (him/her) encouragement and support for coping with pain.

1	2	3	4	5	6
---	---	---	---	---	---

10. I am uncertain about how much help to give my spouse with activities.

1	2	3	4	5	6
---	---	---	---	---	---

Chronic Pain Acceptance Questionnaire (CPAQ)

Participant ID: _____
Date: ____/____/____

RA: _____

CPAQ

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	1	2	3	4	5	6
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	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. _____

Caregiver Strain Index (CSI)

Participant ID: _____
Date: ____/____/____

RA: _____

Please respond to the following questions, considering YOUR feelings and actions when your spouse/partner is in pain.

CSI

The following is a list of things that other people have found to be difficult. Please indicate if any of these apply to you?

	Yes	No
Sleep is disturbed (e.g., because my spouse is in and out of bed or wanders around at night)		
It is inconvenient (e.g., because helping takes so much time or it's a long drive over to help)		
It is a physical strain (e.g., because of lifting in and out of a chair; effort or concentration is required)		
It is confining (e.g., helping restricts free time or cannot go visiting)		
There have been family adjustments (e.g., because helping has disrupted routine; there has been no privacy)		
There have been changes in personal plans (e.g., had to turn down a job; could not go on vacation)		
There have been other demands on my time (e.g., from other family members)		
There have been emotional adjustments (e.g., because of severe arguments)		
Some behavior is upsetting (e.g., because of incontinence; my spouse has trouble remembering things; or my spouse accuses people of taking things)		
It is upsetting to find my spouse has changed so much from his/her former self (e.g., he/she is a different person than he/she used to be)		
There have been work adjustments (e.g., because of having to take time off)		
It is a financial strain		
Feeling completely overwhelmed (e.g., because of worry about my spouse; concerns about how I will manage)		

Experiences in Close Relationships Inventory (ECR)

Participant ID: _____
Date: ____/____/____

RA: _____

Experiences in Close Relationships Inventory

The following statements concern how you feel in close relationships with others. In the following statements the term “other people” refers to people with whom you feel close to. We are interested in how you generally experience relationships, not just what you experience in your current relationship. Using the following rating scale, respond to each statement by indicating how much you agree or disagree with it, by circling **one (1) number per line**.

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. I prefer not to show other people how I feel deep down. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I worry about being abandoned. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I am very comfortable being close to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. I worry a lot about my relationships. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Just when other people start to get close to me I find myself pulling away. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. I worry that other people won't care about me as much as I care about them. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. I get uncomfortable when other people want to be very close to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. I worry a fair amount about losing people with whom I feel close. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. I don't feel comfortable opening up to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. I often wish that other people's feelings for me were as strong as my feeling for them. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Participant ID: _____
 Date: ____/____/____

RA: _____

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| 11. I want to get close to other people, but I keep pulling back. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. I often want to merge completely with other people, and this sometimes scares them away. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. I am nervous when other people get too close to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. I worry about being alone. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. I feel comfortable sharing my private thoughts and feelings with other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. My desire to be very close sometimes scares people away. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. I try to avoid getting too close to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. I need a lot of reassurance that I am loved by people with whom I feel close. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. I find it relatively easy to get close to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. Sometimes I feel that I force other people to show more feeling, more commitment. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. I find it difficult to allow myself to depend on other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. I do not often worry about being abandoned. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 23. I prefer not to be too close to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. If I can't get other people to show interest in me, I get upset or angry. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Participant ID: _____
 Date: ____/____/____

RA: _____

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

25. I tell people with whom I feel close just about everything. 1 2 3 4 5 6 7
26. I find that other people don't want to get as close as I would like. 1 2 3 4 5 6 7
27. I usually discuss my problems and concerns with people with whom I feel close. 1 2 3 4 5 6 7
28. When I'm not involved in a relationship, I feel somewhat anxious and insecure. 1 2 3 4 5 6 7
29. I feel comfortable depending on other people. 1 2 3 4 5 6 7
30. I get frustrated when other people are not around as much as I would like. 1 2 3 4 5 6 7
31. I don't mind asking other people for comfort, advice, or help. 1 2 3 4 5 6 7
32. I get frustrated if other people are not available when I need them. 1 2 3 4 5 6 7
33. It helps to turn to other people in times of need. 1 2 3 4 5 6 7
34. When other people disapprove of me, I feel really bad about myself. 1 2 3 4 5 6 7
35. I turn to other people for many things, including comfort and reassurance. 1 2 3 4 5 6 7
36. I resent it when people with whom I feel close to spend time away from me. 1 2 3 4 5 6 7

Kansas Marital Satisfaction Scale (KMS)

Participant ID: _____
Date: ____/____/____

RA: _____

KANSAS MARITAL SATISFACTION (KMS) SCALE

Using the following rating scale, please respond to each question by indicating how much you are satisfied or dissatisfied (circle one number per question).

1	2	3	4	5	6	7
<i>Extremely Dissatisfied</i>	<i>Very Dissatisfied</i>	<i>Somewhat Dissatisfied</i>	<i>Mixed</i>	<i>Somewhat Satisfied</i>	<i>Very Satisfied</i>	<i>Extremely Satisfied</i>

1. How satisfied are you with your relationship? 1 2 3 4 5 6 7
2. How satisfied are you with your spouse/partner as a spouse/partner? 1 2 3 4 5 6 7
3. How satisfied are you with your relationship with your partner? 1 2 3 4 5 6 7

Multidimensional Pain Inventory (MPI)

Note. Patients were asked to respond regarding their spouse's behaviours towards their pain.

Participant ID: _____
Date: ____/____/____

RA: _____

Multidimensional Pain Inventory

University of Washington Medical Center
Seattle, Washington

INSTRUCTIONS: An important part of our evaluation includes examination of pain from **YOUR** perspective. You know your pain better than anyone, so the information you give is very helpful in planning a treatment program for you.

Please read each question carefully and then do your best to answer each one. **Do not skip any questions.** If there is a question that you think does not apply to you, please **circle the number** of that question. After you have completed the questionnaire, check your responses to make sure that you have answered each question.

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

- ☐ Spouse ☐ Partner/Companion
- ☐ Housemate/Roommate
- ☐ Friend ☐ Neighbor
- ☐ ☐ Parent/child/other relative
- ☐ Other (please describe): _____

B. Do you currently live with this person? ☐ YES ☐ NO

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

Please continue on the next page

SECTION 2

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

PLEASE ANSWER ALL OF THE 14 QUESTIONS.

1. Ignores me.

0	1	2	3	4	5	6
Never						Very often
 2. Asks me what he/she can do to help.

0	1	2	3	4	5	6
Never						Very often
 3. Reads to me.

0	1	2	3	4	5	6
Never						Very often
 4. Gets irritated with me.

0	1	2	3	4	5	6
Never						Very often
 5. Takes over my jobs or duties.

0	1	2	3	4	5	6
Never						Very often
 6. Talks to me about something else to take my mind off the pain.

0	1	2	3	4	5	6
Never						Very often
 7. Gets frustrated with me.

0	1	2	3	4	5	6
Never						Very often
 8. Tries to get me to rest.

0	1	2	3	4	5	6
Never						Very often
- Please continue on the next page
9. Tries to involve me in some activity.

0	1	2	3	4	5	6
Never						Very often
 10. Gets angry with me.

0	1	2	3	4	5	6
Never						Very often
 11. Gets me pain medication.

0	1	2	3	4	5	6
Never						Very often
 12. Encourages me to work on a hobby.

0	1	2	3	4	5	6
Never						Very often
 13. Gets me something to eat or drink.

0	1	2	3	4	5	6
Never						Very often
 14. Turns on the T.V. to take my mind off my pain.

0	1	2	3	4	5	6
Never						Very often

Multidimensional Pain Inventory – Significant other version (MPIso)

Note. SCs were asked to respond regarding their own behaviours towards the patient's pain.

Participant ID: _____
Date: ____/____/____

RA: _____

Please respond to the following questions, considering YOUR feelings and actions when your spouse/partner is in pain.

MPI Caregiver Responses – Significant Other Version

When you know your partner is in pain (or experiencing increased pain) how are *you* likely to respond? Mark how frequently *you* are likely to do each of the following.

1. Ask what I can do to help.

0	1	2	3	4	5	6
Never						Very often

2. Express sympathy.

0	1	2	3	4	5	6
Never						Very often

3. Give him/her a massage.

0	1	2	3	4	5	6
Never						Very often

4. Leave the room.

0	1	2	3	4	5	6
Never						Very often

5. Take over his/her job or duties.

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

0	1	2	3	4	5	6
Never						Very often

15. Express anger at him/her.

0 1 2 3 4 5 6

Never Very often

0 1 2 3 4 5 6

Never Very often

0 1 2 3 4 5 6

Never Very often

Pain Catastrophizing Scale (PCS)

Pain Catastrophizing Scale (PCS)

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

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

0	1	2	3	4
<i>Not at all</i>	<i>To a slight degree</i>	<i>To a moderate degree</i>	<i>To a great degree</i>	<i>All the time</i>

When I am in pain...

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

Pain Catastrophizing Scale – Significant other version (PCS-S)

Participant ID: _____
Date: ____/____/____

RA: _____

Please respond to the following questions, considering YOUR feelings and actions when your spouse/partner is in pain.

Pain Catastrophizing Scale – Significant other version

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

Instructions:

We are interested in the types of thoughts and feelings that you have when **your significant other** is 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 **your significant other** is experiencing pain.

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

When my significant other is in pain ...

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