ABSTRACT

Title of dissertation: ATTACHMENT AND PAIN CATASTROPHIZING FROM A COMMUNAL COPING PERSPECTIVE IN WOMEN WITH CHRONIC PAIN

Elizabeth Reeves, Doctor of Philosophy, 2021

Dissertation directed by: Professor Mary Ann Hoffman, PhD
Department of Counseling, Higher Education, and Special Education

Chronic pain is a devastating public health problem particularly in women, who are at increased risk for chronic conditions and report more depression and disability secondary to pain relative to men. The impact of relationships, which are critical to the experience and management of pain as well as central to the female gender role, may help to explain gender disparities. The present study uses the Communal Coping Model of Pain Catastrophizing (CCM) and the Attachment-Diathesis Model of Chronic Pain (ADMoCP) to investigate how relationship patterns influence coping responses in women with chronic pain. It seeks to clarify the mechanisms by which unmet attachment needs contribute to pain catastrophizing and influence perceptions of others' responses to pain and pain-related behaviors. Furthermore, it seeks to examine how insecure attachment might contribute to lower levels of adaptive, intrapersonal responses to pain such as self-compassion, and whether addressing these deficits might represent a viable target for intervention. A total of 355 women with generalized chronic pain conditions (Fibromyalgia, Rheumatoid Arthritis, and/or Myofascial Pain Syndrome) completed an

online survey. Exploratory analyses examine relationships between attachment, pain appraisals, pain catastrophizing, self-compassion, depression, and disability. Additional analyses test the CCM and the ADMoCP by investigating: (1) two possible mechanisms by which attachment needs might influence pain catastrophizing, depression, and disability; and (2) the role of attachment and pain catastrophizing in shaping perceptions of others' responses to pain and pain-related behaviors. Findings have implications for conceptualization and treatment from an attachment perspective.

ATTACHMENT AND PAIN CATASTROPHIZING FROM A COMMUNAL COPING PERSPECTIVE IN WOMEN WITH CHRONIC PAIN

by

Elizabeth Reeves

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2021

Advisory Committee:

Professor Mary Ann Hoffman, PhD, Chair
Professor Emerita Elaine Anderson, PhD, Dean's Representative
Professor Robert Lent, PhD
Associate Professor Jonathan Mohr, PhD
Katherine Wright, PhD

Table of Contents

Chapter 1: Introduction to the Problem

According to one recent epidemiological survey, about twenty percent of people in the United States (50 million) suffer from chronic pain (Dahlhamer, 2018). Defined as pain lasting beyond three to six months, chronic pain represents one of the most common reasons adults seek medical care (Schappert & Burt, 2006) and contributes to at least $635 billion each year in direct medical costs, lost productivity, and disability programs (Institute of Medicine, 2011). Although chronic pain is generally associated with poorer psychological well-being and reduced quality of life (Gureje et al., 1998), women with chronic pain report a greater incidence of depression (Keogh et al., 2005; Munce & Stewart, 2007) and physical disability (Keefe et al., 2000) than do men. Relative to their male counterparts, women are at higher risk for many common pain conditions (Dahlhamer, 2018; Fillingim et al., 2009), report higher pain severity (Munce & Stewart, 2007), and have higher rates of healthcare utilization secondary to pain (Taylor & Curran, 1985). These disparities are particularly noteworthy in the context of widespread, generalized chronic pain conditions, such as fibromyalgia, rheumatoid arthritis, and myofascial pain syndrome, which are the focus of the present study (Arout et al., 2018; Hunter et al., 2017; Klotz et al., 2020).

Biopsychosocial models of chronic pain provide a useful framework for understanding gender differences in pain-related adjustment. These models emerged from Engel's (1977) challenge to a purely biomedical approach to disease and postulate that chronic pain can best be conceptualized, understood, and treated from a perspective that considers the relationship among physical, psychological, and social factors that impact its development and maintenance (Gatchel et al., 2007). They argue that although pain

can be thought of as an "objective" biological event involving anatomical, pathological, and physiological changes, chronic pain might be better thought of as the "subjective" perception of these changes as they are filtered through biological, psychological, and social-environmental influences (Blyth et al., 2007; Loeser, 1982/2000; Melzack & Wall, 1965).

Physical-Social Theory of Pain

One biopsychosocial perspective that may be particularly pertinent to gender differences in chronic pain is the physical-social theory of pain, which is based on the idea that physical pain and social pain (experienced when social relationships are threatened, damaged or lost) represent a shared system with overlapping neural circuitry and computational mechanisms (Eisenberger & Lieberman, 2004; MacDonald & Leary, 2005). This shared system, which has been highlighted in behavioral and functional neuroimaging studies involving pain induction and social exclusion (for review, see Eisenberger, 2011), is believed to have evolved as a survival mechanism to detect and prevent social separation in infancy and early childhood, when humans are dependent upon nurturance and protection for safety, growth, and development.

Because the social attachment system has "co-opted" pain mechanisms involved in detecting and preventing physical danger, Eisenberger (2011) hypothesizes that individuals who are dispositionally more sensitive to one kind of pain should also be more sensitive to the other. As such, factors that increase or decrease one kind of pain should influence the other kind of pain in a similar manner. Put another way, MacDonald and Leary (2005) postulate that the emotional unpleasantness that often accompanies

physical injury may serve as a signal of social exclusion, and as such, contribute to attachment regulation in a way that facilitates more anxiety and emotional distress.

Implications of the Female Gender Role

This interpersonal approach to physical pain may help to clarify unique aspects of pain-related suffering in women, whose gender role is traditionally defined as one striving for interpersonal connection (Spence, 1984) and growth-fostering relationships (Jordan, 2001). The consequences of this emphasis on affiliation and communion are multifold. One important implication is that women are more likely to adopt a communally oriented and expressive approach in their efforts to cope with stress and pain (Austenfeld & Stanton, 2004; Racine et al., 2012; Tamres et al., 2002). This idea is supported by what is known about feminine norms, which are more permissive of pain and emotional expression than masculine norms (Unruh, 1996), as well as evidence from laboratory pain research suggesting that gender role expectations related to pain and emotional vulnerability explain significant variance in pain threshold, tolerance, and unpleasantness (Myers et al., 2003). This also means that women may be more vulnerable to engaging in coping strategies that heighten distress as a means of soliciting support, such as pain catastrophizing (e.g., Sullivan, 2012).

Another critical implication of the female gender role's emphasis on affiliation and communion is that women report experiencing relatively more interpersonal stressors involving relationships and social networks (Helgeson, 2010), suggesting that they may also be more sensitive to social pain. In accordance with the idea that responsivity to social pain may heighten responsivity to physical pain, a large body of literature suggests that women have greater pain sensitivity, lower pain tolerance, and less efficient

modulation of responses to pain-related stimuli than men (for reviews, see Bartley & Fillingim, 2013; Mogil, 2012; Popescu et al., 2010; Wiesenfeld-Hallin, 2005). Though researchers have several hypotheses regarding the mechanisms behind these gender differences, an abundance of research supports the physical-social theory of pain. For instance, researchers have found that the interpersonal context may be especially critical in shaping women's experiences of painful stimuli (for review, see Racine et al., 2012) and that coping alone (i.e., in the absence of social support) may significantly reduce pain tolerance and increase pain intensity in women, but not among men (e.g., Jackson et al., 2005). The physical-social theory of pain is also supported by research documenting increased rates of self-reported physical or sexual abuse in women with chronic pain syndromes and vice versa (e.g., Walsh et al., 2007; Wuest et al., 2009). Indeed, research has found heightened associations between abuse and pain sensitivity, affective distress, fatigue, and disability in these populations (e.g., Alexander et al., 1998). Taken together, these findings suggest that women's orientation towards affiliation and communion may increase their sensitivity to physical pain and render them more vulnerable to adverse outcomes in the context of chronic pain.

An Interpersonal Perspective on Chronic Pain

Given that physical and social pain are thought to represent a shared system and that this system may be particularly pertinent to women's well-being, conceptual models of coping with chronic pain that emphasize interpersonal factors may be particularly useful in understanding women's greater pain-related vulnerability and morbidity. These models, including the Communal Coping Model of Pain Catastrophizing (CCM; Sullivan et al., 2001) and the Attachment-Diathesis Model of Chronic Pain (ADMoCP; Meredith

et al., 2008), explain how internal working models of relationships influence pain-related coping processes. While the CCM focuses on maladaptive responses to chronic pain involving social communication (namely, pain catastrophizing), the ADMoCP explains the role of insecure attachment as a diathesis, or vulnerability, to problematic adjustment to pain. When utilized synergistically, these theoretical models provide a useful framework to examine pain catastrophizing from an attachment-oriented, interpersonal perspective. Using them as a guide, the present study seeks to elucidate the mechanisms by which women's relational needs influence pain catastrophizing and adjustment to chronic pain; evaluate how attachment and pain catastrophizing may influence perceptions of others' responsiveness to pain; and examine whether attachment-related reductions in healthy intrapersonal responses, such as self-compassion, may contribute to these phenomena.

Chapter 2: Review of the Literature

As explained in chapter one, chronic pain represents a significant public health problem due its prevalence, individual impact, and overall burden that it places on the healthcare system (e.g., Dahlhamer, 2018). Chronic pain syndromes affect men and women and both experience pain-related stress such as fatigue, negative affect, and disability. However, women are at higher risk for many common pain conditions, report a greater incidence of depression and disability than men in the context of these conditions, and have higher rates of healthcare utilization secondary to pain and pain-related sequelae (Keogh et al., 2005; Munce & Stewart, 2007). This is especially true in the context of generalized chronic pain conditions, such as fibromyalgia, rheumatoid arthritis, and myofascial pain syndrome, which are the focus of the present study (Arout et al., 2018; Hunter et al., 2017; Klotz et al., 2020).

As described above, biopsychosocial models of chronic pain that consider the impact of interpersonal processes may be particularly useful for understanding poorer outcomes in chronic pain in women, whose gender role typically emphasizes social affiliation and communion. In accordance with the physical-social theory of pain, multiple models considering interpersonal perspectives on chronic pain have emerged. The present study uses two of these, namely the Communal Coping Model of Pain Catastrophizing (CCM; Sullivan et al., 2001) and the Attachment-Diathesis Model of Chronic Pain (ADMoCP; Meredith et al., 2008), to examine potential mechanisms by which working models associated with the attachment system influence women's cognitive, affective, and behavioral responses to chronic pain. First, it examines how the attachment system shapes appraisals of pain threat and self-efficacy, and in turn, how

these appraisals contribute to pain catastrophizing and ultimately, adjustment. Second, it evaluates whether relationships between these appraisals, pain catastrophizing, and adjustment may differ depending upon the extent to which attachment anxiety and/or avoidance are present. Third, it examines the role of insecure attachment and pain catastrophizing in shaping perceptions of others' responses to pain and pain-related behaviors, taking into account the duration of chronic pain. Finally, it explores whether reductions in self-compassion, an adaptive intrapersonal response that is also known to be influenced by the attachment system, might represent a viable treatment target for women who catastrophize in the context of chronic pain.

In this chapter, I will present the two aforementioned theoretical models that provide support for the physical-social model of pain: The Communal Coping Model of Pain Catastrophizing and the Attachment-Diathesis Model of Chronic Pain. I will review empirical evidence from studies of laboratory-induced pain, community surveys, and individuals with chronic pain that provide support for each of these models, while paying close attention to the ways by which vulnerability to social pain, discussed in terms of insecure attachment, may influence vulnerability to and coping with chronic physical pain. First, I will define and review literature pertinent to pain catastrophizing and the CCM with a focus on literature pertinent to women with chronic pain. Next, I will present the ADMoCP and discuss evidence that supports the critical importance of the attachment system in shaping pain appraisals, pain catastrophizing, and perceptions of others' responses to pain and pain-related behaviors. Finally, I will introduce self-compassion, explore its association with the attachment system, and review evidence supporting its viability as a treatment target for women with chronic pain.

Communal Coping Model of Pain Catastrophizing

The Communal Coping Model of Pain Catastrophizing (CCM; Sullivan et al., 2001), which focuses on maladaptive responses to chronic pain involving social communication, provides a useful framework to examine the impact of insecure attachment on pain catastrophizing from an interpersonal perspective. In this section, I will introduce the model, define pain catastrophizing, and highlight relevant literature pertinent to women, who demonstrate a greater propensity towards catastrophizing than men in response to acute and chronic pain. I will also discuss literature pertinent to pain catastrophizing and the social environment in the context of acute versus chronic pain.

Overview of the CCM. The Communal Coping Model (Sullivan et al., 2001) argues that pain catastrophizing – the tendency to dwell on, and consequently, magnify, negative aspects of one's pain experience – serves a social communicative function; i.e., to maximize the probability of managing distress within a social/interpersonal context by soliciting emotional and/or tangible support from others (Sullivan et al., 2001). This is supported by cross-sectional research demonstrating associations between catastrophizing and solicitous responses from close others in the context of chronic pain (Buenaver et al., 2007; Gauthier et al., 2012; Pence et al., 2006), daily diary studies documenting increases in pain catastrophizing in the presence of a spouse and subsequent changes in spouse behavior as a result (Burns et al., 2015), and research in experimental contexts demonstrating positive associations between ratings of pain intensity and perceived empathy from significant others (Hurter et al., 2014). It is also consistent with findings that pain catastrophizing is concomitant with more pain and illness behavior, which

convey information to observers about one's internal state, pain-related limitations, and needs for assistance (Burns et al., 2015; Craig et al., 2010; Williams, 2002).

A substantial body of literature demonstrates that passive communal coping (i.e., pain catastrophizing) is associated with negative outcomes in patients with chronic pain, including greater pain severity, increased disability, more significant alterations in social support networks, and poorer responses to intervention (for review, see Quartana et al., 2009; Sullivan, 2012). For example, in patients with chronically painful rheumatic diseases, researchers have found that catastrophizing negatively influences outcomes through several different mechanisms. These include reductions in the likelihood of exercise and other health-promoting behaviors, interference with the use of potentially effective coping strategies, contributions to discordance between patient and provider perceptions of disease severity, hyper-vigilance to pain-related stimuli, and hypothalamic-pituitary-adrenal axis dysfunction (Edwards et al., 2011). Among patients with chronic back pain, catastrophizing has been found to predict surgical outcomes, including persistent pain intensity, pain interference, and disability, even when controlling for other variables (Coronado et al., 2015). Consistent with this, research on cognitive-behavioral treatments for chronic back pain has highlighted that reductions in pain catastrophizing explain improvements in pain intensity and disability over time (Smeets et al., 2006).

In accordance with the idea that women are more likely than men to adopt a communally oriented and expressive approach in their efforts to cope with stress and pain, research has found that women are more likely to engage in pain catastrophizing and that this may partially explain their relatively poorer outcomes. Indeed, healthy

women have been found to engage in pain catastrophizing more than men in their daily lives (e.g., Fillingim et al., 1999; Osman et al., 2000) as well as in response to laboratory pain induction (e.g., Sullivan et al., 2000). This has been found to explain gender differences in pain intensity and pain behavior (Sullivan et al., 2000), endogenous pain modulation (Weissman-Fogel et al., 2008), and daily pain levels (Edwards et al., 2004). Women also report more catastrophizing than men in the context of chronic pain (e.g., Jensen et al., 1994) and this has been found to explain relationships between gender and pain intensity, pain behavior, and physical disability (e.g., Keefe et al., 2000). In sum, this research suggests that pain catastrophizing is a critical factor in understanding differences in pain-related experiences by gender. However, more research is needed that examines the unique mechanisms behind the use and maintenance of this strategy in women with chronic pain.

Three dimensions of pain catastrophizing. One way to better understand gendered mechanisms associated with pain catastrophizing is to break down the construct into its unique dimensions. Pain catastrophizing is believed to consist of three separate components – rumination, magnification, and helplessness (Sullivan et al., 1995). Each dimension is thought to represent its own unique construct and as such, explain unique variance in pain-related outcomes. This has been confirmed by recent research, including one study of 844 heterogeneous patients who were admitted to a chronic pain rehabilitation program, which found that magnification and helplessness explained unique variance in mental and physical health-related quality of life and depressed mood (Craner et al., 2016). Helplessness also explained unique variance in pain severity and

pain-related interference, while rumination did not explain unique variance in any outcome measure beyond what was accounted for by the other dimensions.

Importantly, research with community samples and chronic pain populations has consistently found gender differences in the three dimensions of pain catastrophizing. Most commonly, researchers have reported more rumination and helplessness in women as compared to men, but little to no difference in magnification (Osman et al., 1997; Sullivan et al., 1995; Sullivan et al., 2000). Consistent with this, one study of a community sample found that gender explained 6.0% of variance in rumination and 10.9% of the variance in helplessness, but only 1.1% of the variance in magnification (D'Eon et al., 2004). Another study of laboratory-induced pain found that low pain tolerance in women as compared to men was explained by greater rumination, but not magnification or helplessness, in this group (Meints et al., 2017). Despite the significance of these findings, little research has sought to tease apart the implications of each dimension of pain catastrophizing in women with chronic pain. More investigation may help to better understand discrepancies in outcomes by gender.

Social responses to pain catastrophizing. Pain catastrophizing may be adaptive in the context of acute pain, as it is often associated with more social support in the short-term (e.g., Cano, 2004). However, several studies have found that it may elicit more punishing, invalidating, and negative responses in the long term as others become irritated, frustrated, and/or learn that catastrophizing does not necessarily signal important information (Boothby et al., 2004; Buenaver et al., 2007; Cano et al., 2008; Cano et al., 2012). This may lead to even more distress, catastrophizing, and pain behavior over time (Cano et al., 2000; Forsythe et al., 2012). For example, in a mixed group of pain patients,

Buenaver and colleagues (2007) found that higher catastrophizing was associated with greater perceived solicitous responses from significant others in the context of pain of short duration, supporting the idea that catastrophizing may serve a communal coping function (i.e., to solicit social support). However, in the long term, catastrophizing was more strongly associated with perceived punishing responses, and consequently, predicted more pain-related disability and depression. This idea that pain catastrophizing may represent an adaptive response to acute pain, but a maladaptive way of coping with chronic pain, may help to explain conflicting findings in regard to the CCM and relationships between catastrophizing and solicitous responses from others (e.g., Boothby et al., 2004; Romano et al., 2016).

The finding that pain catastrophizing may lead to perceptions of more punishing responses in the long term, and that this may be associated with more negative outcomes, is consistent with findings in other studies. For example, one by McCracken (2005), which examined a heterogeneous sample of chronic pain patients, found that angry, irritated, frustrated, and ignoring responses to pain behavior were associated with less activity engagement and acceptance of pain. McCracken hypothesizes that these perceived punishing responses may serve to invalidate the feelings of the pain sufferer, increase the emotional averseness of the pain experience, and lead the sufferer to demonstrate that they are "right" in the way that they feel by avoiding activities and more obstinately refusing to accept their pain. This may be particularly relevant for women with generalized chronic pain, whose symptoms are relatively "invisible" and who are more likely to report experiencing illness invalidation from family, friends, colleagues, and healthcare providers (e.g., Hassouneh-Phillips et al., 2005; Kool & Geenen, 2012).

This kind of invalidation has been shown to contribute significantly to poorer mental well-being, physical health, and social functioning in women with rheumatoid arthritis and fibromyalgia (Kool et al., 2010; Kool et al., 2013), particularly when combined with other risk factors such as helplessness or low self-efficacy (Blom et al., 2012).

Taken together, the existing literature supports the idea that pain catastrophizing may serve a social communicative function and that its impact on social responses, or perceptions thereof, may evolve over time. It also supports the notion that this may be particularly relevant for women with chronic pain, who are more likely to catastrophize and who may be more vulnerable to invalidating and negative responses from others. More research is needed to clarify mechanisms behind these relationships, particularly in regard to heterogeneity of social responses to pain catastrophizing over time. Other relational factors, such as attachment anxiety and avoidance, may help to explain conflicting findings and paint a clearer picture of how women perceive the responsiveness of their environment in the context of longstanding, generalized pain. In the next section, I will review and use the Attachment-Diathesis Model of Chronic Pain as a model to discuss what is known about attachment and pain catastrophizing, including the ways by which attachment may influence this response and shape perceptions of the social environment.

Attachment-Diathesis Model

While the CCM explains the social communicative functions of pain catastrophizing, the Attachment-Diathesis Model of Chronic Pain (ADMoCP; Meredith et al., 2008; see Figure 1) explores how relational factors, namely attachment anxiety and avoidance, may contribute to and influence use of this strategy. In the following section, I

will introduce the ADMoCP and review an extensive body of research that supports attachment as a vulnerability factor and a moderator of adjustment in the context of chronic pain. I will also discuss the importance of pain appraisals known to be critically associated with attachment and pain catastrophizing, including pain threat and pain self-efficacy. Finally, I will explain what is known about relationships between attachment, pain catastrophizing, and perceptions of the social environment, including pertinent gaps in the literature that may help to better our understanding of the CCM.

Overview of the ADMoCP. As Eisenberger (2011) explains, the shared system of physical and social pain most likely evolved as a means of developing and maintaining relationships that facilitate survival. Attachment theory explains how mental representations (i.e., internal working models) formed through interactions with caregivers early in life shape the attachment system, or the ways by which we seek the proximity and support of others during times of stress (Bowlby, 2008a; 2008b). These models consist of beliefs and expectations about the self and others, including whether we think that we are worthy of support and whether we trust that others will be reliable and responsive (Bowlby, 2008a; 2008b). They explain how our approach to relationships is influenced by the ways that we attempt to regulate our emotions, including whether we believe, consciously or unconsciously, that seeking proximity to others is a viable option for support and safety during times of distress (Mikulincer et al., 2003).

Attachment theory illustrates how internal working models inform the specific strategies that we use for affective self-regulation, particularly when we learn that a reliable and responsive caregiver bond may not always be available (Gillath et al., 2016). In general, individuals with high attachment anxiety have more negative working models

of themselves, including low self-confidence and greater perceptions of themselves as incapable of coping independently. These kinds of schemata are typically associated with fears of abandonment, including worries about whether others will be available in times of need, as well as perseverative efforts to establish and maintain proximity in order to feel safe. As such, attachment anxiety is generally associated with hyper-activating responses to distress as a means of soliciting support, such as exaggerating one's distress to pull others closer.

Individuals with high attachment avoidance, on the other hand, generally have more negative working models of others that stem from evaluations of proximity seeking as a nonviable option for safety and security. These kinds of schemata are typically associated with discomfort with closeness, including attempts to maintain interpersonal distance in order to avoid distress associated with attachment-figure unavailability. As such, it is generally associated with deactivating responses to distress as a means to avoid intimacy, such as rationalizing or downplaying one's feelings to push others away (Shaver & Mikulincer, 2008; Teyber & Teyber, 2010).

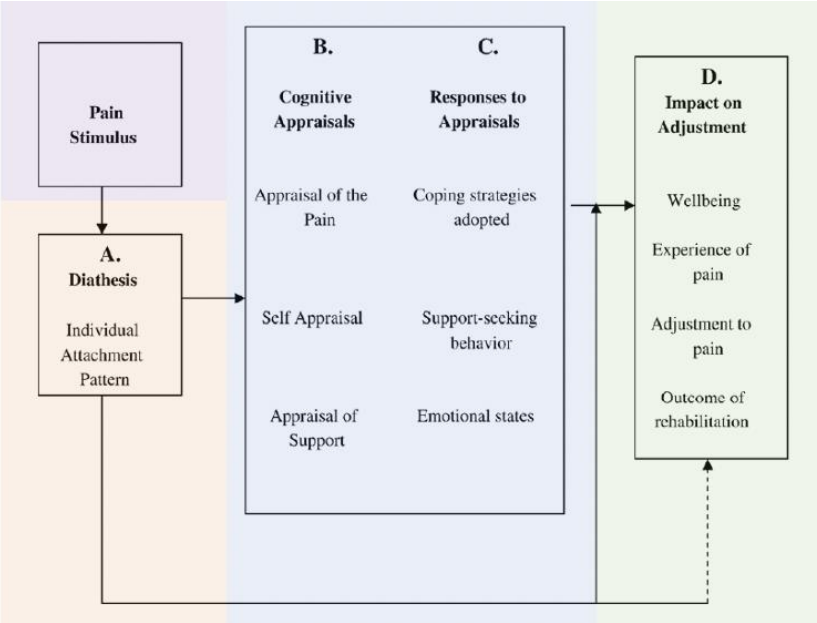
The relative absence of attachment anxiety and avoidance is typically referred to as more secure attachment. Critically, research has documented that insecure attachment is more prevalent among individuals with chronic pain as compared to healthy adults (Davies et al., 2009; McWilliams, 2017; McWilliams & Bailey, 2010), and researchers have postulated that insecure attachment may increase women's likelihood of developing chronic pain (e.g., Granot et al., 2010) as well as the extent of their functional limitations in the context of related conditions (e.g., Blanco et al., 2018).

The ADMoCP explains the role of insecure attachment as a diathesis, or vulnerability, to problematic adjustment to pain (Meredith et al., 2008). Given that pain is often distressing, it is hypothesized to activate attachment-related processes, including cognitive appraisals of threat, self-efficacy, and social support. Consistent with the stress appraisal and coping framework advanced by Lazarus and Folkman (1984) and applied to chronic pain by Thorn and Dixon (2007), attachment-related appraisals are believed to shape cognitive, behavioral, and emotional responses to pain that serve to communicate interpersonal needs in this context. These responses have a profound impact on pain-related adjustment including disability, somatization, health-related anxiety, and mental and physical health (Andersen, 2012; Andersen et al., 2011; Davies et al., 2009; Oliveira & Costa, 2009).

In addition to explaining how insecure attachment may predispose individuals to more negative appraisals of pain, self-efficacy, and social support, the ADMoCP also illustrates how the impact of appraisals and coping responses may vary depending upon the extent to which attachment anxiety and/or avoidance are present. Examples of this will also be discussed in sections below.

Figure 1

Attachment-Diathesis Model of Chronic Pain (ADMoCP) from Meredith, Ownsworth & Strong, 2008



Attachment and pain catastrophizing. From the perspective of attachment theory (and consistent with the CCM), pain catastrophizing can be conceptualized as a passive, hyper-activating response to stress, which would typically be associated with anxious attachment and be designed to elicit caretaking behavior in others (Kolb, 1982). Consistent with this, research has reliably demonstrated associations between attachment anxiety and all three dimensions of catastrophizing in chronic pain populations (Ciechanowski, Sullivan, Jensen, Romano, & Summers, 2003; Forsythe et al., 2012), convenience samples (McWilliams & Holmberg, 2010), and laboratory settings (for review, see Meredith, 2013). Studies have also demonstrated that attachment anxiety is associated with more pain and illness behavior, such as activity avoidance, verbal complaints, and healthcare utilization. Researchers explain that these findings are a reflection of pain catastrophizing as a mechanism to increase and maintain proximity to

attachment figures (Andrews et al., 2014; Ciechanowski et al., 2003), particularly when pain is perceived as threatening (e.g., Meredith et al., 2006).

Some studies of attachment avoidance and pain catastrophizing are consistent with attachment theory, while others are not. For example, during laboratory pain induction, individuals with greater attachment avoidance, which is typically associated with deactivating responses to distress, are less likely than their more secure and anxious counterparts to report heightened pain intensity in the context of more empathic, or solicitous responses from significant others (Hurter et al., 2014). Consistent with this, in community samples, attachment avoidance has been found to explain unique variance in less rumination related to pain (e.g., McWilliams & Holmberg, 2010). In some studies of individuals with chronic pain, however, attachment avoidance has been associated with more pain catastrophizing (e.g., Gauthier et al., 2012). Researchers hypothesize that the goals of catastrophizing may differ across attachment dimensions in ways that have yet to be understood. To tease this apart, more research is needed that considers relationships between attachment and pain catastrophizing from a communal coping perspective.

Attachment and pain appraisals. Research guided by the ADMoCP has highlighted several possible mechanisms of relationships between attachment and pain catastrophizing. Most notably, it has demonstrated the importance of cognitive appraisals that are shaped by internal working models of relationships. Indeed, pain catastrophizing is known to be more likely when pain is appraised as more threatening (Jackson et al., 2005; Meredith et al., 2005), when the self is evaluated as less capable of coping with it (Chen & Jackson, 2018), and when others are perceived as less supportive (Buenaver et al., 2007). Each of these appraisals will be discussed, in turn, below.

Pain threat. One of the most critical appraisals associated with pain catastrophizing involves an evaluation of whether pain represents a threat to one's well-being (Meredith et al., 2005). Research has found that elevated threat appraisals are associated with more catastrophic thinking about pain, pain-related fear, and hyper-vigilance to pain-related stimuli, and that these relationships may facilitate patterns of passive coping behaviors and withdrawal from meaningful activities like work, hobbies, and relationships (i.e., fear-avoidance model of chronic pain; Asmundson et al., 2004; Keogh & Chaloner, 2002). Not surprisingly, pain threat has been consistently linked to negative outcomes in laboratory studies of pain as well as in chronic pain populations, including increased pain intensity, affective distress, and functional impairment (for review and meta-analysis, see Jackson et al., 2014). Significant effect sizes for appraisal-coping relations illuminated by Jackson, Wang and Fan in their meta-analysis (2014) demonstrate how more defensive or protective coping approaches are adopted when pain sensations are viewed as signs of potential tissue damage, such that otherwise useful, proactive strategies may be no longer be beneficial.

According to attachment theory, individuals vary in their tendency to appraise events as threatening depending upon their internal working models and whether proximity to others is perceived as a viable and/or necessary option for regulating distress. Individuals with higher attachment anxiety, who have more negative models of the self and who may be more likely to over depend on others for affective regulation, tend to be hypervigilant and perceive events as more threatening; individuals with higher attachment avoidance, whose primary goals are to maintain interpersonal distance and avoid any further distress associated with attachment-figure unavailability, may be more

likely to avoid signs of threat in order to maintain emotional balance (Bartholomew et al., 1997; Shaver & Mikulincer, 2008). Interestingly, some researchers hypothesize that women's relatively greater use of catastrophizing may be due to their greater propensity to negatively interpret bodily sensations and pain as threatening (e.g., Keogh et al., 2004; Unruh et al., 1999), which could serve to more strongly activate processes driven by the attachment system. This is supported by research of experimental pain (e.g., Keogh & Chaloner, 2002), as well as research in women with osteoarthritis and fibromyalgia, which has found that attachment anxiety predicts daily levels of catastrophizing as well as greater increases in this response on days when pain is more intense (e.g., Kratz et al., 2012).

Attachment anxiety and pain threat. The research findings on attachment anxiety and pain threat are consistent with attachment theory; in general, attachment anxiety is associated with perceptions of pain as more threatening and emotionally distressing (e.g., Mikulincer & Florian, 1998). This is true among healthy adults, who are more likely to report more pain-related fear and hyper-vigilance to pain-related stimuli if they also report high attachment anxiety (McWilliams & Asmundson, 2007), as well as samples of patients with chronic pain, which demonstrate consistent associations between attachment anxiety, elevated threat appraisals, and pain-related fear (e.g., patients with arthritis, Sirois & Gick, 2016). There is some evidence to suggest that elevated threat appraisals represent a primary mechanism by which attachment anxiety contributes to pain catastrophizing and poorer adjustment. For example, in one study of heterogeneous chronic pain patients, Meredith and colleagues (2005) found that elevated threat fully explained relationships between attachment anxiety and stress, partially explained

relationships between attachment anxiety and catastrophic thinking about pain, and partially explained relationships between attachment anxiety and depressive symptoms.

Some research provides support for the idea that attachment anxiety may exacerbate relationships between pain appraisals, catastrophizing, and adjustment. For example, in one cross-sectional study with a community sample of women, relationships between pain hyper-vigilance, pain catastrophizing, and illness behavior were stronger among individuals with more attachment anxiety (Martínez et al., 2012). This suggests that women with more negative models of the self may be more likely to be distressed, and to amplify signals of their distress, when they perceive a greater degree of threat due to pain. However, these findings have yet to be replicated in a clinical sample.

Attachment avoidance and pain threat. The relationship between attachment avoidance and pain threat is less clear cut. In the same study of pain patients conducted by Meredith and colleagues described above (2005), the authors found no relationship between continuous measures of attachment avoidance and elevated threat appraisals. However, they did find that those who endorsed having an attachment style characterized by more avoidance (i.e., dismissing or fearful styles) were more likely to report greater pain threat and that more comfort with closeness (i.e., less attachment avoidance) was associated with a greater likelihood of appraising pain as a challenge, or opportunity for growth. These findings suggest that attachment avoidance may also be associated with increased pain threat; however, more research using continuous measures is needed.

Some research has highlighted interactions between attachment avoidance and pain threat. For instance, in a study of patients with arthritis, Sirois and Gick (2016) found evidence to support a dynamic model of attachment avoidance and pain appraisal,

such that bidirectional and recursive relationships between pain threat and perceived social support explained relationships between attachment avoidance and coping self-efficacy. These findings suggest that individuals with avoidant attachment may appraise pain as more threatening when they realize a need to rely on others but feel uncomfortable having to do so. This may be particularly important for women, who are generally more likely to rely on their social networks in their efforts to cope.

In sum, the existing research demonstrates that attachment anxiety may increase vigilance and reactivity to pain threat and that this may heighten pain-related distress and pain catastrophizing, particularly in women. It also suggests that pain threat may be pertinent to outcomes in women with high attachment avoidance, although the mechanisms are less clear. Research in clinical samples that considers pain threat and pain catastrophizing from a communal coping perspective may help to clarify these relationships and the unknowns related to their underlying mechanisms.

Pain self-efficacy. Pain self-efficacy – an appraisal of one's ability to cope – is another important factor in determining individual responses to pain (Nicholas, 2007). In heterogeneous samples of chronic pain patients, low self-efficacy has been shown to predict more catastrophizing, complaining, help-seeking, and activity avoidance in response to pain (Newton-John et al., 2014). It is also predictive of higher pain intensity, more affective distress, and higher levels of functional impairment and disability (for review, see Jackson et al., 2014). Not surprisingly, self-efficacy has been identified as a critical target of multidisciplinary pain treatment programs (e.g., Jia & Jackson, 2016). Importantly, research has found consistent gender differences in self-efficacy, such that women tend to have lower self-efficacy than their male counterparts with the same

chronic pain conditions (e.g., chronic musculoskeletal pain; Stubbs et al., 2010). In laboratory studies, low self-efficacy has also been found to explain women's heightened perceptions of pain intensity (e.g., Jackson et al., 2002; Vierhaus et al., 2011).

Given that internal working models provide a blueprint for beliefs and expectations about the self and affective self-regulation, the attachment system critically influences appraisals of whether one is capable of coping with chronic pain and pain-related distress. According to attachment theory, individuals with higher attachment anxiety are generally more likely to report lower self-efficacy, while individuals with higher attachment avoidance are less likely to do so (Bartholomew et al., 1997).

Attachment anxiety and pain self-efficacy. The research on attachment anxiety and self-efficacy is consistent with attachment theory; greater attachment anxiety has been consistently associated with less self-efficacy in patients with chronic pain (e.g., Meredith et al., 2006) and in some pain populations, there is evidence to suggest that self-efficacy may explain relationships between attachment anxiety and maladaptive, socially communicative coping behaviors. For example, in a sample of young adults with functional abdominal pain, Laird and colleagues (2015) found that attachment anxiety was associated with more passive coping strategies such as catastrophizing, behavioral disengagement, and self-isolation, and that lower self-efficacy explained these relationships. These findings reflect how attachment anxiety may make it difficult to generate positive views of the self as capable of coping, and as a result, may lead to responses that require help from others. However, these findings have yet to be replicated in an adult sample.

Attachment avoidance and pain self-efficacy. The findings on attachment avoidance and self-efficacy are more mixed. Like attachment anxiety, attachment avoidance has been associated with less improvement in self-efficacy in response to multidisciplinary treatment that emphasizes facilitation of self-management through cognitive and behavioral techniques (Kowal, McWilliams, Péloquin, et al., 2015). Experts hypothesize that this may be related to difficulty forming effective relationships with treatment providers, such that those with high attachment anxiety may feel overly dependent on their providers, while those with high attachment avoidance may feel somewhat distrustful of, or less connected to, their providers and thus, less likely to engage in their recommendations. More research is needed to test this hypothesis.

Some research has found interesting interactions between attachment avoidance and self-efficacy. For example, one study found that in the context of high attachment avoidance, low self-efficacy was more strongly associated with increased pain intensity and disability (Meredith et al., 2006). This suggests that low self-efficacy may be particularly devastating in the context of discomfort with closeness, such that individuals who have low expectations for their ability to cope independently may be more impaired when they also feel uncomfortable relying on others. It remains unclear, however, the ways that interactions between attachment and self-efficacy may influence coping responses that aim to solicit social support.

Taken together, the extant literature suggests that attachment anxiety and avoidance are important to development of self-efficacy in the context of chronic pain and that perceptions of others' availability may be critical to understanding its implications for adjustment. More research is needed to understand the mechanisms and

implications of deficits in self-efficacy associated with attachment anxiety and avoidance in women with chronic pain.

Perceptions of the social environment. The implications of others' responsiveness to pain-related distress are complex. Although positive evaluations of the availability and quality of social support are generally associated with lower pain intensity, less passive coping and fewer depressive symptoms in patients with chronic pain (López-Martínez et al., 2008), behavioral models of chronic pain (e.g., Fordyce, 1976) posit that well-meaning and solicitous responses may serve to reinforce, and thus increase, pain catastrophizing and pain behaviors despite reducing depressive symptoms. This is supported by research that demonstrates positive associations between perceived solicitous responses to pain and pain behavior, pain intensity, and disability (e.g., Forsythe et al., 2012).

The consequences of perceiving more negative and punishing responses from others, such as feeling invalidated or ignored, are more clear; these kinds of responses have been consistently associated with worse mood, increased distress, and poorer psychological adjustment to living with chronic pain (Cano, 2004; Cano et al., 2000; Forsythe et al., 2012). As reviewed above, these effects may be particularly critical for women with chronic pain, who may be more likely to utilize strategies that solicit social support, more sensitive to stressors in their social networks, and more likely to perceive invalidating responses related to pain and/or illness.

Attachment and perceptions of the social environment. When considering the influence of insecure attachment on pain catastrophizing from a communal coping perspective, it is crucial to consider the ways that it might shape perceptions of others

responses to distress. Attachment theory suggests that both attachment anxiety and avoidance would be associated with more negative perceptions of proximal others, albeit through different mechanisms. While attachment avoidance is defined as having negative beliefs and expectations for others that are typically associated with a preference for self-reliance or independence, attachment anxiety may increase negative perception of others due to the fear of rejection that is typically associated with negative models of the self and preoccupation with maintaining proximity and support (Bartholomew et al., 1997).

Indeed, both attachment anxiety and avoidance have been associated with perceptions of less social support (Sirois & Gick, 2016) as well as more negative or punishing responses from a spouse (Forsythe et al., 2012; Gauthier et al., 2012). Interestingly, attachment anxiety in individuals with chronic pain has been associated with greater self-perceived burden on others (Kowal et al., 2012) as well as feelings of helplessness in supportive partners (McWilliams & Holmberg, 2010). MacDonald and Kingsbury (2006) hypothesize that this may be due to heightened concerns over rejection, which increase sensitivity to perceiving others' responses to pain as more negative. This is consistent with research by Forsythe and colleagues (2012), which found that perceptions of more negative responses partially mediate positive relationships between anxious attachment and self-reported pain behavior, as well as inverse relationships between secure attachment and depressive symptoms.

Evidence from laboratory pain studies suggests that attachment also interacts with the social context to predict pain-related outcomes. For example, a study by Sambo and colleagues (2010) found that higher scores on attachment anxiety predicted higher pain ratings among individuals who perceived relatively less empathy from others while

exposed to noxious thermal stimuli, and that attachment avoidance predicted lower pain ratings when participants were alone as compared in the presence of another person, irrespective of perceived empathy. The researchers explain that this is consistent with neuroimaging findings that show increased reactivity to negative social feedback among those with higher attachment anxiety (Vrtička et al., 2008). This also provides support for the idea that perceptions of less empathy from others worsens the pain experience of individuals with higher attachment anxiety, while the presence of other people during pain stimulation may result in increased anxiety for those with higher attachment avoidance, who tend to prefer independence and self-reliance. Of note, these laboratory findings are inconsistent with research by Forsythe and colleagues on chronic pain (2012), which has found no significant moderation effects for attachment on the relationship between spouse responses and outcomes.

Overall, these findings suggest that attachment anxiety and avoidance may influence how individuals in pain perceive and evaluate responses from proximal others, and that these perceptions dictate pain behavior and depressive symptomatology. However, little research has examined this phenomenon in women with chronic pain, who may be particularly sensitive to interpersonal stressors. Furthermore, no study has considered the implications of these relationships for coping strategies with social communicative functions, such as pain catastrophizing. More research is needed to clarify the complex relationships between these variables in women with chronic pain.

Integration of the CCM and ADMoCP

The evidence reviewed above explains how the CCM and ADMoCP, when utilized synergistically, may help to fill gaps in the literature on mechanisms of pain

catastrophizing in women with chronic pain. To date, only one study of adults with chronic pain has examined the effects of attachment on the CCM. In this study of patients with cancer, Gauthier and colleagues (2012) found that pain catastrophizing, attachment anxiety, and relationship status interacted to predict perceptions of punishing responses to pain, such that higher pain catastrophizing was related to perceptions of less frequent punishing responses but only in anxiously attached patients who identified their spouse/partner as their significant other. This supports conceptualization of pain catastrophizing as a mechanism for soliciting social support among this subset of patients, who may have a "support- and caretaking-demanding" interpersonal style (Gauther et al., 2012). However, it does not address questions of whether and how perceptions of social support differ in acute versus chronic pain, or whether they evolve depending upon how long the patient has been experiencing pain. Furthermore, it is unclear whether these effects are generalizable beyond samples of patients with cancer.

Gauthier and colleagues' findings (2012) are also inconsistent with research by Vervoot and colleagues (2010) on pain in school-aged children, which found pain catastrophizing to be associated with greater perceptions of positive parental responses among more securely attached children but greater perceptions of negative parental responses among less securely attached children. These findings suggest that pain catastrophizing may be more effective in soliciting support when used by those with more secure attachments to their caregivers. The inconsistency in these findings highlights the importance of teasing apart the mechanisms by which attachment influences coping responses with social communicative functions, including the underlying goals of these responses and their relative effectiveness.

Of note, gender differences in the study by Vervoot and colleagues (2010) indicated that girls reported receiving less negative parental attention to pain than boys. This is consistent with the idea that girls may be permitted, and perhaps even encouraged, to be more expressive in their experience of physical and social pain (Vingerhoets & Bylsma, 2015). This highlights the importance of studying attachment and pain catastrophizing from a communal coping perspective in women with chronic pain, whose gender role socialization may reinforce these kinds of strategies to solicit support.

Self-Compassion

Understanding the ways that individuals respond to themselves in the context of negative events may also help to understand pain catastrophizing through the lens of the ADMoCP and the CCM. Self-compassion, defined as the extent to which a person treats themselves with kindness and concern, involves being open to and moved by one's own suffering, experiencing feelings of caring and kindness toward oneself, taking a balanced, understanding and nonjudgmental attitude toward one's inadequacies and failures, and recognizing that one's own experience is part of the common human experience (Neff, 2003a; 2003b). Considering that it represents responsiveness to oneself in the context of pain and suffering, some researchers conceptualize self-compassion as an internalization of caregiver responsiveness in early childhood (García-Campayo et al., 2016). This is of particular relevance to attachment anxiety, which is believed to develop in the context of inconsistently available caregivers that facilitate negative models of the self as unworthy of care and attention.

Self-compassion is believed to shape how individuals cope with stress and pain, such that those who have more self-compassion are more likely to demonstrate

psychological flexibility, which facilitates a greater focus on the positive aspects of situations and a lesser experience of negative affect (Allen & Leary, 2010). Lower levels of self-compassion associated with attachment anxiety may be particularly relevant to understanding hyperactivating strategies like pain catastrophizing, which seek external sources of kindness, care, and concern. Pertinent research supporting relationships between attachment anxiety, self-compassion, and pain catastrophizing will be discussed below.

Self-compassion from an attachment perspective. Consistent with the idea that self-compassion represents internalization of a responsive caregiver, research has found that, compared with those who have more secure attachment, people with more attachment anxiety are less likely to practice self-compassion (Neff & McGehee, 2010), and these deficits have been found to predict poorer mental health (Raque-Bogdan et al., 2011) and subjective well-being (Wei et al., 2011). Similar results have been found in samples of women with chronic illness. For instance, in women with breast cancer, less self-compassion due to insecure attachment has been found to predict more self-reported stress and perceived negative impact of illness (Arambasic et al., 2019).

Recent interventions focused on increasing self-compassion also provide support for the idea that insecure attachment represents a potential diathesis, or vulnerability to, lower levels of self-compassion as well as a potential barrier to this response in the context of chronic pain. For example, studies in women with fibromyalgia have shown that interventions focused on self-compassion from an attachment-based perspective reduce depression and anxiety symptoms (Montero-Marin et al., 2020), improve quality of life (D'Amico et al., 2020), and even reduce inflammatory markers (Montero-Marin et

al., 2019). In healthy people, this type of intervention has been shown to facilitate more secure attachment, underscoring the importance of internal working models to these results (Navarro-Gil et al., 2020).

Taken together, research on attachment anxiety and self-compassion are consistent with the ADMoCP and suggest that negative internal working models may predispose individuals to practice less self-compassion in the context of chronic pain. However, they also highlight that self-compassion represents a malleable response that might change the impact of preexisting attachment schemata on coping responses. More research examining this phenomenon within a communal coping framework may be helpful in illuminating these effects.

Self-compassion from a communal coping perspective. A large body of literature suggests that the benefits of self-compassion in the context of chronic pain correspond with reduced reliance on hyperactivating strategies designed to solicit social support, including pain catastrophizing. Indeed, several studies have demonstrated that self-compassion is associated with fewer depression and anxiety symptoms, less stress, and less disability among individuals with chronic pain (Costa & Pinto-Gouveia, 2011; Costa & Pinto-Gouveia, 2013), and researchers have highlighted that this may be due to negative associations between self-compassion and pain catastrophizing, pain-related fear, and activity avoidance (Costa & Pinto-Gouveia, 2013; Wren et al., 2012). Furthermore, increases in self-compassion associated with interventions for chronic pain have been found to explain treatment-related improvements in pain catastrophizing and illness behavior that reduce depression and disability (Vowles et al., 2009).

Despite findings that increases in self-compassion are associated with decreases in pain catastrophizing, little to no research has directly examined whether lower levels of self-compassion are responsible for relationships between attachment anxiety and pain catastrophizing. Furthermore, no study to date has examined whether attachment anxiety interferes with the effectiveness of self-compassion in reducing hyperactivating responses like pain catastrophizing.

Implications of female gender. Research in women with chronic pain provides additional support for examining self-compassion from the perspective of the ADMoCP and CCM. A study by Carvalho, Pinto-Gouveia, Gillanders and Castilho (2019) demonstrated that women with chronic pain who reported more self-compassion also demonstrated less fear of compassion from others, and that this allowed them to experience more pleasurable emotions as well as feelings of safeness, social contentedness, and connectedness. This study highlights the importance of cultivating self-compassion in order receive compassion and care from others, which underscores the theoretical rationale that self-compassion is rooted in attachment-related systems. Furthermore, it echoes the contextual importance of the female gender role, which emphasizes interpersonal connection and growth-fostering relationships as crucial to coping with negative events.

Interestingly, women exercise less self-compassion than men do, meaning they are more likely to engage in self-judgment, feel isolated when confronted with painful situations, and over-identify with their negative emotions (Neff, 2003a; 2003b). Given that self-compassion is associated with less self-criticism, a greater sense of social connectedness, and reduced negativity bias in the context of emotional *and* physical

discomfort, it may represent a critical means of attenuating relationships between attachment and negative responses to chronic pain in women. Indeed, interventions focused on compassion in samples of women with chronic pain have demonstrated effectiveness in reducing pain severity and affective distress, as well as increasing pain acceptance and improving emotional communication with significant others (Chapin et al., 2014). Chapin and colleagues (2014) hypothesize that improvements in interpersonal relationships associated with increases in self-compassion may explain some of the benefits of these interventions, such that better communication may allow supportive others to provide more emotionally attuned support.

Chapter 3: Statement of the Problem

Chronic pain represents a significant public health problem that is particularly devastating in women, who are at higher risk for many common pain conditions, have higher rates of healthcare utilization secondary to pain, and report a greater incidence of depression and disability in the context of chronic pain (e.g., Dahlhamer, 2018). Biopsychosocial models, which conceptualize chronic pain as related to physical, psychological, and social factors that influence its development and maintenance, may be particularly useful for understanding women's greater pain vulnerability and morbidity (e.g., Gatchel et al., 2007). In particular, the physical-social theory of pain (Eisenberger & Lieberman, 2004) may help to explain the ways that women, whose gender role is traditionally defined as one striving for interpersonal connection, affiliation, and communion, respond to painful stimuli in the development and maintenance of chronic pain.

Sullivan's (2001) Communal Coping Model of Pain Catastrophizing (CCM) provides a useful framework for understanding adjustment to chronic pain from an interpersonal perspective. The CCM explains how pain catastrophizing, an exaggerated, negative mental set associated with rumination, magnification, and helplessness in response to or in anticipation of pain, may serve a social communicative function aimed towards managing distress by soliciting emotional and/or tangible support from others. Although there is ample literature supporting the CCM and the idea that pain catastrophizing is successful in soliciting support in the context of acute pain, the motivations and implications of this response for women with chronic pain, who are known to catastrophize more than their male counterparts, is unclear.

The Attachment-Diathesis Model of Chronic Pain (ADMoCP; Meredith et al., 2008) may help to address these unknowns. Consistent with Eisenberger and Lieberman's theory, the ADMoCP postulates that pain-related coping processes like pain catastrophizing may be influenced by internal working models of relationships and patterns of self-regulation formed through interactions with early caregivers. The findings reviewed above illustrate how unmet attachment needs, defined in terms of attachment anxiety and avoidance, may contribute to pain catastrophizing directly and indirectly through evaluations of pain threat, self-efficacy, and social support. Closer examination of these relationships, as well as relationships between insecure attachment, pain catastrophizing, and perceptions of the social environment, is needed to elucidate the motivations underlying pain catastrophizing and the effectiveness of this strategy in women with chronic pain.

Furthermore, in addition to providing a useful framework for evaluation of pain catastrophizing from an attachment-based perspective, the CCM and the ADMoCP offer a theoretical rationale for investigating whether increases in pain catastrophizing associated with unmet attachment needs might also be associated with decreases in healthy intrapersonal responses, such as self-compassion. Though there is considerable evidence to support self-compassion as an attachment-related construct, little to no research has examined relationships between attachment anxiety (i.e., negative working models of the self), self-compassion, and pain catastrophizing in women with chronic pain, who are known to underutilize this strategy.

Present Study

In sum, the extant literature suggests that attachment is critical in shaping the ways that women think about and respond to chronic pain and that these relationships may be essential to understanding gender disparities in outcomes such as depression and disability. However, little research has examined coping responses in women with generalized chronic pain conditions using an interpersonal, attachment-based framework. To address this gap in the literature, the present study uses the Communal Coping Model of Pain Catastrophizing (CCM) and the Attachment-Diathesis Model of Chronic Pain (ADMoCP) to investigate how relationship patterns influence coping responses in women with chronic pain. More specifically, it examines the mechanisms by which unmet attachment needs (i.e., attachment anxiety and avoidance) influence maladaptive, socially communicative coping responses (i.e., pain catastrophizing) and explain differences in adjustment (i.e., depression and disability). It also evaluates how insecure attachment and pain catastrophizing influence women's perceptions of their social environment and the extent to which this may evolve over time. Finally, it assesses whether attachment-based reductions in healthy intrapersonal responses, such as self-compassion, may be associated with greater use of hyperactivating strategies like pain catastrophizing.

Hypotheses

In this section, I will discuss the aims of the present study as they relate to my research hypotheses.

Aim #1. Attachment, pain appraisals, and pain catastrophizing. Consistent with the idea postulated by the Communal Coping Model (CCM; Sullivan et al., 2001) that pain catastrophizing has a social communicative function, the Attachment-Diathesis

Model of Chronic Pain (ADMoCP; Meredith et al., 2008) explains how internal working models of relationships (i.e., attachment patterns) may influence pain catastrophizing as a mechanism for soliciting support and therefore satisfying interpersonal needs. In accordance with this, the first aim of the present study was to examine mechanisms of relationships between attachment and pain catastrophizing, including the extent to which relationships between attachment and pain catastrophizing are explained by relationships between attachment and pain appraisals (see Figure 2). Given mixed findings in the literature in regard to attachment avoidance, analyses regarding this variable were exploratory in nature. However, in accordance with what is known about attachment anxiety, my first set of hypotheses was as follows:

Hypothesis 1a. Attachment anxiety would be positively associated with pain catastrophizing (see Ciechanowski et al., 2003).

Hypothesis 1b. (i) Pain threat would be positively associated with pain catastrophizing (see Meredith et al., 2005); and (ii) pain self-efficacy would be negatively associated with pain catastrophizing (see Shelby et al., 2009).

Hypothesis 1c. Attachment anxiety would be: (i) positively associated with pain threat (see Mikulincer & Florian, 1998); and (ii) negatively associated with pain self-efficacy (see Meredith, Strong & Feeney, 2006); and (iii) these relationships would mediate the positive relationship between attachment anxiety and pain catastrophizing.

In addition to examining attachment as a predisposition towards greater pain catastrophizing, the present study also aimed to evaluate the extent to which attachment anxiety and avoidance interact with pain appraisals to influence this response (see Figure 3). Findings from previous research suggest that attachment anxiety and avoidance may

be associated with heightened relationships between negative responses to pain and pain-related coping behaviors. For example, in an experimental context, Meredith and colleagues (2006) found that participants were more likely to catastrophize in response to greater pain intensity if they also reported having more attachment anxiety. Furthermore, among a community sample, Martinez and colleagues (2011) found that women with more attachment anxiety demonstrated stronger, more positive relationships between pain catastrophizing and illness behavior than their more secure counterparts. These findings are consistent with the idea that hyper-activating responses to pain may represent a mechanism by which individuals attempt to communicate unmet attachment needs, and that this process may be heightened in the context of more attachment anxiety.

Research also supports the idea that attachment avoidance may lead to poorer outcomes in the context of more negative responses to pain; for instance, research has found that individuals with more attachment avoidance are more likely to report greater pain intensity and disability in the context of lower pain-related self-efficacy (Meredith et al., 2006), and that they are less likely to report use of social coping strategies in the context of more pain catastrophizing (e.g., Kratz et al., 2012). These findings suggest that attachment avoidance may make it more difficult to cope adaptively when feeling helpless or incapable of coping with pain. As such, I hypothesized the following:

Hypothesis 2a. Attachment anxiety would exacerbate relationships between pain appraisals and pain catastrophizing such that relationships between (i) pain threat and pain catastrophizing and (ii) pain self-efficacy and pain catastrophizing would be stronger in the context of greater attachment anxiety.

Hypothesis 2b. Attachment avoidance would exacerbate relationships between pain appraisals and pain catastrophizing such that relationships between (i) pain threat and pain catastrophizing and (ii) pain self-efficacy and pain catastrophizing would be stronger in the context of greater attachment avoidance.

Figure 2

Pain Appraisals as Mediators of the Relationship Between Attachment Anxiety and Pain Catastrophizing (Hypothesis 1)

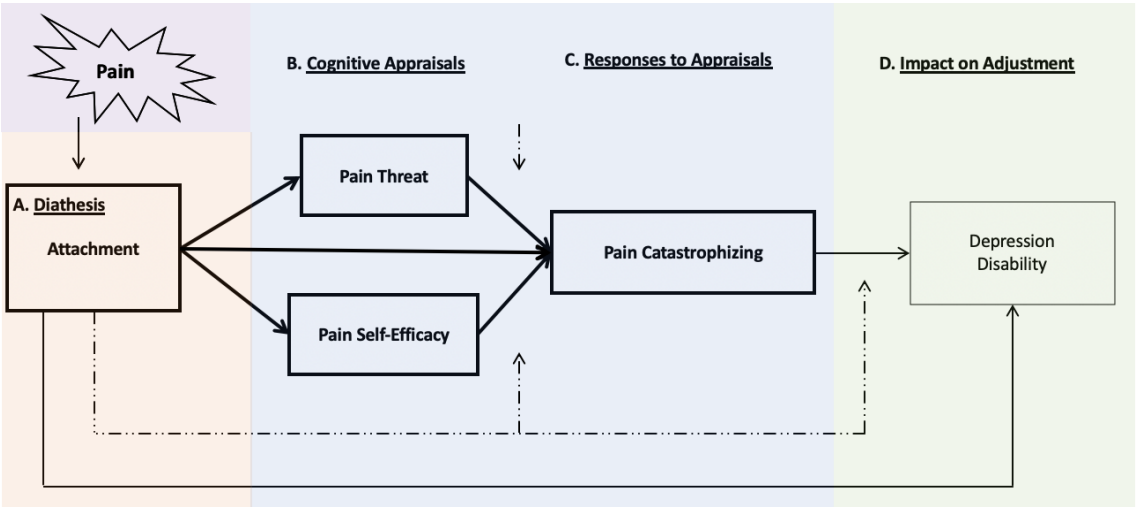
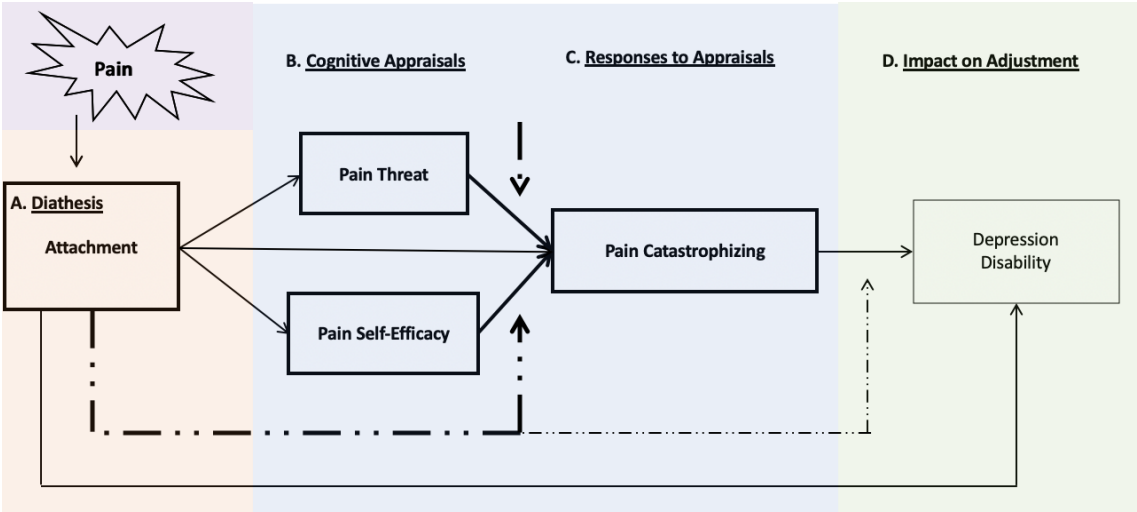


Figure 3

Attachment as a Moderator of the Relationship Between Pain Appraisals and Pain Catastrophizing (Hypothesis 2)



Aim #2. Attachment, pain catastrophizing, and adjustment. The next step to better understanding the social communicative functions of pain catastrophizing was to examine relationships between attachment, pain catastrophizing, and adjustment. In accordance with the idea that attachment represents a diathesis, or vulnerability towards maladaptive coping responses in the context of chronic pain and that these responses negatively impact adjustment, I sought to examine pain catastrophizing as a mediator of relationships between attachment and adjustment, including depression and disability (see Figure 4). Given mixed findings in the literature in regard to attachment avoidance, analyses regarding this variable were exploratory in nature. However, consistent with the theory of the ADMoCP (outlined above) and previous findings in the literature regarding attachment anxiety, my next set of hypotheses was as follows:

Hypothesis 3a. Attachment anxiety would be (i) positively associated with depression (see Marganska et al., 2013) and (ii) positively associated with disability (see McWilliams et al., 2000).

Hypothesis 3b. Pain catastrophizing would be (i) positively associated with depression (see Buenaver et al., 2007) and (ii) positively associated with disability (see McWilliams et al., 2000).

Hypothesis 3c. Attachment anxiety would be positively associated with pain catastrophizing (see Hypothesis 1a) and this relationship would partially mediate positive relationships between (i) attachment anxiety and depression and (ii) attachment anxiety and disability.

In addition to examining attachment as a predisposition towards greater pain catastrophizing and poorer adjustment, the present study also aimed to evaluate the extent

to which attachment anxiety and avoidance interact with pain catastrophizing to influence outcomes (see Figure 5). Consistent with the ADMoCP and the idea that insecure attachment represents a vulnerability to poorer adjustment, my hypotheses were as follows:

Hypothesis 4a. Attachment anxiety would exacerbate relationships between pain catastrophizing and adjustment such that relationships between (i) pain catastrophizing and depression and (ii) pain catastrophizing and disability would be stronger in the context of greater attachment anxiety.

Hypothesis 4b. Attachment avoidance would exacerbate relationships between pain catastrophizing and adjustment such that relationships between (i) pain catastrophizing and depression and (ii) pain catastrophizing and disability would also be stronger in the context of greater attachment avoidance.

Figure 4

Pain Catastrophizing as a Mediator of the Relationship Between Attachment Anxiety and Adjustment (Hypothesis 3)

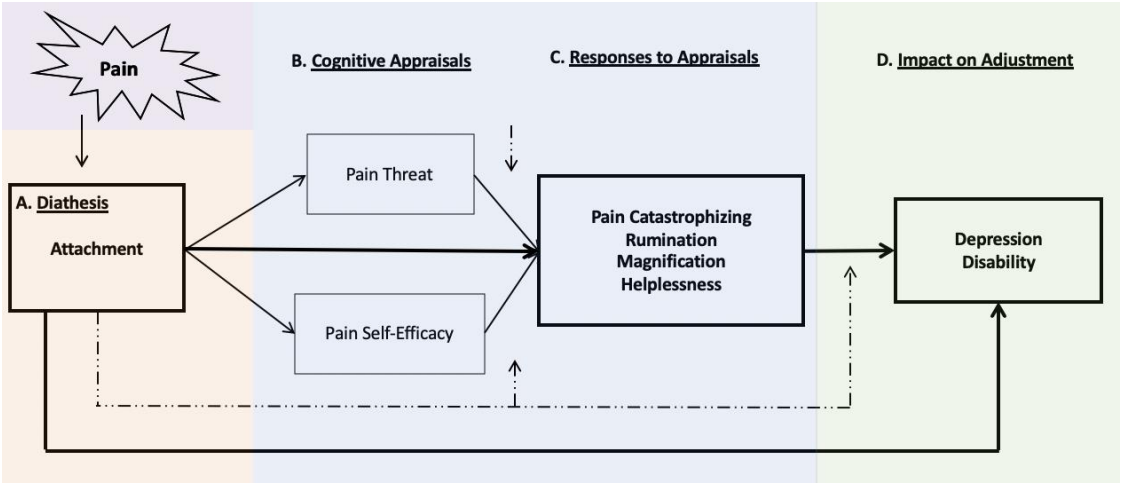
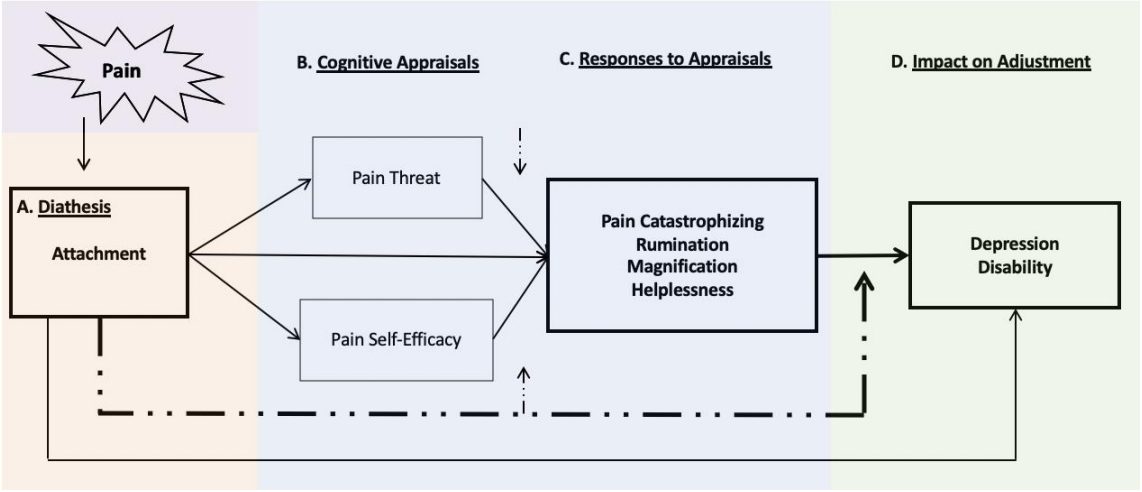


Figure 5

Attachment as a Moderator of Relationships between Pain Catastrophizing and Adjustment (Hypothesis 4)



Aim #3. **Attachment and the Communal Coping Model.** As outlined above, the Communal Coping Model of Pain Catastrophizing (CCM; Sullivan et al., 2001) postulates that pain catastrophizing serves a social communicative function (i.e., to solicit social support), and that others' responses to pain may impact adjustment by either reinforcing or punishing associated pain-related behavior. Given the conflicting findings regarding relationships between pain catastrophizing and others' responses to pain-related behaviors in the context of experimentally induced and chronic pain, the third aim of the present study was to test the CCM in women with chronic pain and to examine whether interactions between pain catastrophizing, attachment, and duration of chronic pain might be able to provide some clarity to mechanisms of relationships underlying mixed results in the literature. This aim was consistent with prior research documenting moderating effects of attachment on the CCM (e.g., Gauthier et al., 2012) as well as findings that responses to pain catastrophizing may change over time (e.g., McCracken,

2005). Although analyses regarding the nature of these relationships were largely exploratory, I anticipated that:

Hypothesis 5a. Consistent with the CCM and prior research (reviewed above), perceptions of solicitous responses to pain would be: (i) negatively associated with attachment anxiety; (ii) negatively associated with attachment avoidance; (iii) positively associated with pain catastrophizing; and (iv) negatively associated with duration of chronic pain.

Hypothesis 5b. Significant interactions between pain catastrophizing, attachment, and duration of chronic pain would emerge, such that relationships between pain catastrophizing and perceptions of solicitous responses to pain would vary at different levels of attachment anxiety and/or avoidance, and these effects would differ based on the duration of chronic pain.

Hypothesis 6a. Consistent with the CCM and prior research (reviewed above), perceptions of negative responses to pain would be: (i) positively associated with attachment anxiety; (ii) positively associated with attachment avoidance; (iii) positively associated with pain catastrophizing; and (iv) positively associated with duration of chronic pain.

Hypothesis 6b. Significant interactions between pain catastrophizing, attachment, and duration of chronic pain would emerge, such that relationships between pain catastrophizing and perceptions of negative responses to pain would vary at different levels of attachment anxiety and/or avoidance, and these effects would differ based on the duration of chronic pain.

Aim #4. Self-compassion. The fourth and final aim of the present study was to explore relationships between self-compassion and variables pertinent to the ADMoCP and CCM. More specifically, I sought to assess self-compassion as a mediator of the relationship between attachment anxiety and pain catastrophizing (see Figure 6) and to evaluate interactions between attachment anxiety and self-compassion in predicting pain catastrophizing (see Figure 7). Consistent with findings that attachment anxiety is associated with lower levels of self-compassion (Neff & McGehee, 2010) and more pain catastrophizing (see Hypothesis 1a), and studies demonstrating that self-compassion and pain catastrophizing have an inverse relationship (e.g., Vowles et al., 2009), I hypothesized that:

Hypothesis 7. Attachment anxiety would be negatively associated with self-compassion and this relationship would partially mediate the positive relationship between attachment anxiety and pain catastrophizing.

Finally, I examined whether attachment anxiety would moderate the relationship between self-compassion and catastrophizing (see Figure 7). Consistent with findings that attachment anxiety is associated with hyperactivating coping strategies like pain catastrophizing in the context of chronic pain (see Hypothesis 1a), I predicted:

Hypothesis 8. Attachment anxiety would moderate relationships between self-compassion and pain catastrophizing, such that reductions in pain catastrophizing associated with more self-compassion would be attenuated, or buffered, by attachment anxiety.

Figure 6

Self-Compassion as a Mediator of the Relationship between Attachment Anxiety and Pain Catastrophizing (Hypothesis 7)

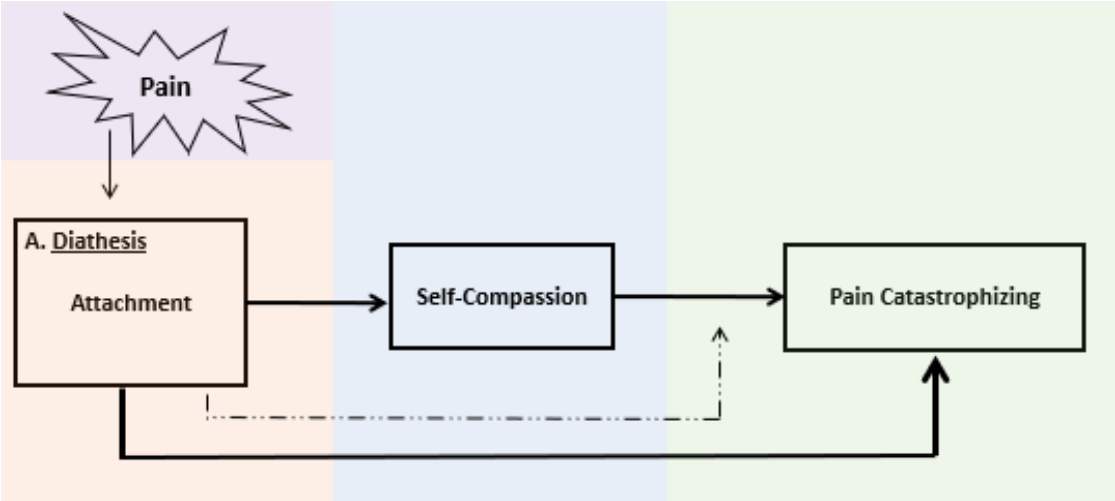
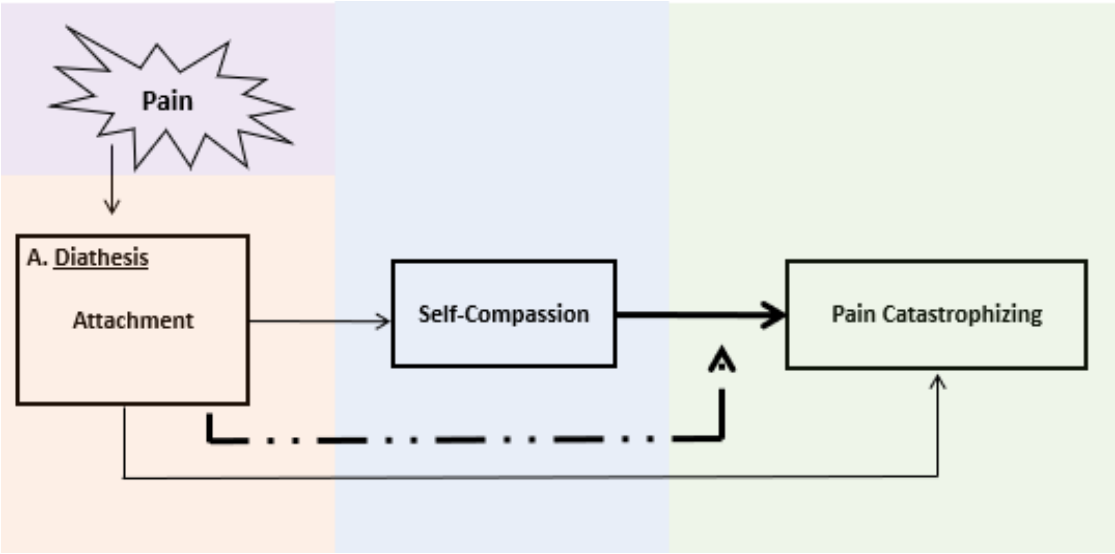


Figure 7

Self-Compassion as a Moderator of the Relationship between Attachment Anxiety and Pain Catastrophizing (Hypothesis 8)



Chapter 4: Method

Design

The present study was designed as a correlational field study. It used an online survey method with open-ended questions and select measures, outlined below.

Participants

Participants were women over the age of 18 with diagnoses of chronic pain disorders characterized by widespread pain, including fibromyalgia, rheumatoid arthritis, and myofascial pain syndrome, who reported being in chronic pain for at least 3 months. A total of 405 participants responded to the survey by completing the online consent form. Of these, 8 (2.0%) reported having a chronic pain condition that did not meet eligibility criteria (e.g., chronic migraine, specific neuropathy) and were removed from analyses. Of the remaining 397 participants, 42 (10.6%) had more than 15% missing data due to exiting the survey prematurely and thus were eliminated due to attrition (George & Mallery, 2019). The final survey included 355 participants, indicating an 89.4% completion rate.

Of the 355 participants who completed over 85% of survey items, 324 (91.3%) endorsed a diagnosis of fibromyalgia, 46 (13.0%) endorsed a diagnosis of rheumatoid arthritis, and 16 (4.5%) endorsed a diagnosis of Myofascial Pain Syndrome. These statistics include 62 (17.5%) participants who endorsed more than one of these diagnoses. The average age of participants was 37.43 years (*SD*=13.37, range=18-75). Average age of pain onset was 23.97 years (*SD*=11.35, range=0-61). Participants varied in the duration of chronic pain, from less than one year (2.0%) to over 15 years (36.3%), with an average duration of pain of 13.34 years (*SD*=10.10, range=0-56). Most endorsed having tried

multiple forms of treatment for their pain, with the most common being medications (95.2%), physical or occupational therapy (72.7%), and massage (68.5%).

The large majority of participants identified as White (91.5%) and most were either married or in a relationship (70.1%). Employment status was varied across participants: 54.7% reported some form of employment or schooling, while 35.0% indicated that they were not currently working, including 16.1% of total participants who reported that they were receiving disability. Household income and education were also varied across participants. For a complete picture of participants' demographic information, see Table 1.

Table 1

Demographics

Diagnosis	*N*	*Percentage*
Fibromyalgia	324	91.3%
Rheumatoid Arthritis	46	13.0%
Myofascial Pain Syndrome	16	4.5%

*Percentages exceed 100% because participants could endorse more than one diagnosis

Length of Time in Pain	*N*	*Percentage*
6 months – 1 year	7	2.0%
1-3 years	36	10.1%
4-8 years	91	25.6%
9-15 years	92	25.9%
15+ years	129	36.3%

Pain Treatment	*N*	*Percentage*
Medications	338	95.2%
Injections or Ablations	165	45.6%
Surgery	46	13.0%
Physical or Occupational Therapy	258	72.7%
Acupuncture	130	36.6%
Chiropractor	162	45.6%
Massage	243	68.5%
Psychotherapy	157	44.2%
Meditation/Mindfulness Practice	243	68.5%
Biofeedback	43	12.1%
Other	218	61.4%

*Percentages exceed 100% because participants could list multiple pain treatments

Race/Ethnicity	*N*	*Percentage*
Biracial/Multiracial	3	0.8%
Black/African American	5	1.4%
East Asian/Pacific Islander	9	2.5%
Middle Eastern/Arab	1	0.3%
Native American/Native Alaskan	1	0.3%
South Asian	4	1.1%
White/Caucasian	325	91.5%
Hispanic/Latina	15	4.2%

*Percentages exceed 100% because participants could list multiple races/ethnicities

Relationship Status	*N*	*Percentage*
Married/Partnered	186	52.4%
In a relationship < 6 months	63	17.7%
Divorced	18	5.1%
Single	80	22.5%
Separated	4	1.1%
Widowed	4	1.1%

Employment Status	*N*	*Percentage*
Not employed but receiving disability	57	16.1%
Not employed or on disability	67	18.9%
Employed part-time	59	16.6%
Employed full-time	100	28.2%
Student	35	9.9%
Other	37	10.4%

Family Household Income	*N*	*Percentage*
Less than $30,000	108	30.4%
$30,000 - $59,999	82	23.1%
$60,000 - $99,999	70	19.7%
$100,000 - $149,999	35	9.9%
$150,000+	21	5.9%
Would rather not say	39	11%

Education	*N*	*Percentage*
Less than high school	6	1.7%
High school graduate	33	9.3%
Some college	110	31.0%
two-year degree or technical degree	45	12.7%
four-year degree	91	25.6%
Graduate degree	69	19.4%

Procedure

Participants were recruited through advertisements in local specialty clinics, postings on online support websites, advertisements on popular social media sites,

advertisements through the University of Maryland FYI listserv, flyers posted in local communities, and snowball sampling (see Appendix A). The survey was administered online through the Qualtrics system. Participants were provided with a link to the survey. Once participants clicked on the link to access the survey, they immediately viewed an informed consent page and endorsed that they identify as female, were at least 18 years of age, had chronic pain for at least the past three months, had received a diagnosis of Fibromyalgia, Rheumatoid Arthritis, and/or Myofascial Pain Syndrome, and agreed with the parameters of the survey. The survey included measures pertinent to demographic information, close relationships, attachment anxiety and avoidance, pain appraisals, pain catastrophizing, pain intensity, depressive symptoms, and disability. The total survey took participants approximately 30 minutes.

Measures

Demographics (see Appendix B). Information regarding age, race/ethnicity, and socioeconomic variables such as education and employment history were included on the demographic form. In addition, the form had items pertaining to medical and mental health diagnoses, pain onset, pain-related treatment, medication use, and healthcare utilization.

Pain intensity (see Appendix C). The Visual Analogue Scale (VAS; Turk & Melzack, 2011) is a common instrument for measuring pain intensity. It consists of a serious of four 10cm horizontal lines, anchored at each end and labeled 0 = “no pain” at one end and 10 = “pain as bad as it can be” at the other. Patients are asked to make a mark on each respective line at the point corresponding to their pain now, their highest level of pain, their lowest level of pain, and their average pain, over the past week. The

length of these lines is then measured in centimeters from the no pain end, and the final result divided by four as an indicator of average pain intensity.

Disability (see Appendix D). The Pain Disability Index (PDI; Pollard, 1984; Tait, Chibnall, & Krause, 1990) was developed at St. Louis University Medical Center to measure the impact that pain has on the ability of a person to participate in essential life activities. The scale assesses disability in seven domains: family and home responsibilities (e.g., chores, errands, favors for family members), recreation (e.g., hobbies, sports, leisure activities), social activity (e.g., activities with friends and acquaintances), occupation (e.g., activities related to jobs and non-pay jobs), sexual behavior (e.g., intimacy with a spouse), self-care (e.g., personal maintenance, independent daily living), and life-support activity (e.g., eating, sleeping, breathing). Participants are asked to rate the level of disability that they experience overall (i.e., not just when pain is worst) on an 11-point scale (0 = "no disability" to 10 = "worst disability"). In any given domain, a score of 2 indicates mild disability, a score of 5 indicates moderate disability, and a score of 8 or above indicates severe disability. Total scores are calculated by summing each domain and range from 0 to 70, with higher scores indicating greater pain-related disability. This measure has demonstrated good internal consistency and reliability, as well correlations with objective measures of disability, in samples of patients with chronic pain (e.g., $\alpha = .86$; Tait et al., 1987). In the present study, internal consistency was good ($\alpha = .86$).

Close relationships (Appendix E). Information regarding close interpersonal relationships will also be included in the survey, which will have open and closed questions about the pain sufferer's primary sources of support and how chronic pain has

changed and/or impacted these relationships. Participants will be asked to identify their closest relationship partners (e.g., spouse, partner, child, parent, or friend), about whom measures involving perceptions of social support will later refer to.

Attachment anxiety and avoidance (see Appendix F). The Experiences in Close Relationships Scale – General Version (ECR; Brennan et al., 1998) assesses attachment anxiety and avoidance in relationships generally (i.e., items refer to thoughts about "close relationships" and behavior toward "other people"), rather than focusing on romantic relationships specifically. The ECR is a 36-item questionnaire with 18 items tapping attachment anxiety and 18 items tapping attachment avoidance. Participants indicate their level of agreement with a series of statements on a 7-point Likert scale (1 = "strongly disagree" to 7 = "strongly agree"). Sample items include, "When I show my feelings for other people, I'm afraid they will not feel the same about me" (anxiety) and "I don't feel comfortable opening up to other people" (avoidance). Scale scores are calculated by taking the average score of the items from each scale and range from 1 to 7. Higher values indicate a greater degree of attachment anxiety or attachment avoidance (i.e., more negative models of the self or others, respectively). Each subscale has demonstrated strong internal consistency ($\alpha > .90$). Researchers have deemed the ECR to be the most precise self-report measure of attachment available (Fraley et al., 2000) and have recommended it be used in samples of patients with chronic pain, as it has been well validated in this population (e.g., Porter et al., 2007). In the present study, internal consistency for the avoidance subscale was good ($\alpha = .85$) and for the anxiety subscale was excellent ($\alpha = .92$).

Appraisal of social support (see Appendix G). The Spouse Response Inventory (SRI; Schwartz et al., 2005) assesses perceptions of spouse responses (from the perspective of the individual with chronic pain) to pain behaviors, including subscales assessing solicitous responses to pain behaviors (19 items) and negative responses to pain behaviors (7 items). Participants rate how often their significant other responded in the past two weeks in each area on a 5-point Likert scale (1 = "never" to 5 "always"). Sample items for negative responses include "seemed to criticize me more" and "seemed to get irritated with me"; sample items for solicitous responses include "tried to comfort me by talking to me" and "got me something to eat." Subscale scores are obtained by averaging the responses given for each item in that subscale and range from 1 to 6, with higher scores indicating more perceived solicitous or negative responses to pain from spouses. The subscales of the SRI have demonstrated strong internal consistency (range $\alpha = 0.81$ to 0.93) and high test-retest reliability over a two-week period (range $r = .73$ to .84) in samples of mixed chronic pain patients (Pence et al., 2006; Schwartz et al., 2005). In the present study, the measure will be modified to assess the pain sufferer's perceptions of their close relationship partners (e.g., romantic partners, close friends, or family members). In the present study, internal consistency for both scales was excellent ($\alpha = .91$; $\alpha = .94$).

Appraisal of pain (see Appendix H). The Pain Appraisal Inventory (PAI; Unruh & Ritchie, 1998) measures cognitive appraisals of pain. The 16-item scale consists of two 8-item subscales, on which participants rate the extent to which they agree with statements describing pain as a threat or challenge on a 6-point Likert scale (1 = "strongly disagree" to 6 = "strongly agree"). Sample items on the threat subscale include, "I am

concerned that the pain might mean something is wrong with me" and "I am concerned about how much more pain I can take"; sample items on the challenge subscale include, "I think the pain is a chance to prove myself" and "I think the pain makes me a stronger person." Subscale scores are obtained by averaging the responses given for each item in that subscale and range from 1 to 6, with higher scores indicating greater perceived threat or challenge. In the present study, only the PAI threat subscale will be used in analyses. It has demonstrated good internal consistency ($\alpha > .85$) and validity in samples of chronic pain patients (e.g., Unruh & Ritchie, 1998; Meredith et al., 2005). In the present study, internal consistency was good ($\alpha = .89$).

Appraisal of pain self-efficacy (see Appendix I). The Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 2007) was developed to assess the individual's belief in their ability to cope effectively despite pain. Participants rate how confident they are in performing 10 day-to-day activities, despite the presence of their pain, on a 7-point Likert scale (0 = "not confident" to 6 = completely confident"). Sample items include "I can enjoy things, despite the pain" and "I can cope with my pain in most situations." Scores are calculated by summing individual items and range from 0 to 60, with higher scores indicating higher perceived pain self-efficacy. The PSEQ has demonstrated good psychometric properties in samples of patients with chronic pain, including strong internal consistency ($\alpha > .90$) and validity (e.g., Sardá et al., 2007). In the present study, internal consistency was good ($\alpha = .89$).

Pain catastrophizing (see Appendix J). The Pain Catastrophizing Scale (PCS; Sullivan et al., 1995) was developed to assess pain catastrophizing in clinical and nonclinical populations. The 13-item scale asks participants to rate how often they

respond to pain in this way on a 5-point Likert scale (0 = "not at all" to 4 = "all the time"). The PCS includes three subscales, reflecting three separate dimensions of pain catastrophizing: (1) rumination; (2) magnification; and (3) helplessness. Sample items include "I keep thinking about how much it hurts" (rumination), "I wonder whether something serious may happen" (magnification), and "There's nothing I can do to reduce the intensity of the pain" (helplessness). Total subscale and scale scores are calculated by summing scores on individual items. Total scores range from 0 to 52, and higher scores indicate more catastrophizing. The PCS has been found to be reliable ($\alpha > .90$), to have good test-retest reliability when administered over periods ranging from 8 to 12 weeks (Sullivan et al., 1995), and to have good construct validity in laboratory induced and chronic pain (Sullivan et al., 1995; Osman et al., 2000). In the present study, internal consistency was excellent for the total scale ($\alpha = .94$) and the rumination subscale ($\alpha = .90$), good for the helplessness subscale ($\alpha = .89$), and acceptable for the magnification subscale ($\alpha = .76$).

Distress (see Appendix K). The Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977) is a brief scale designed to measure self-reported symptoms associated with depression experienced in the past week, including depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. The 20-item scale asks participants to rate the frequency of symptoms in the past week on a 4-point Likert scale (0 = "rarely or none of the time" to 3 = "most or all of the time"). Sample items include "I felt depressed," "I felt lonely," and "I had crying spells." Scores are calculated by summing scores on individual items and range from 0 to 60, with higher scores indicating

the presence of more symptomatology. Researchers often choose the CES-D for use in samples of chronic pain because it does not include somatic items, and is therefore less likely to be artificially inflated. In samples of patients with chronic pain, the CES-D has demonstrated good internal consistency (e.g., range α = .85 - .90), reliability, validity, and consistent factor structure (Geisser et al., 1997). In the present study, internal consistency was acceptable (α = .72).

Self-Compassion (see Appendix L). The Self-Compassion Scale – Short Form (SCS-SF; Raes et al., 2011) is a self-reported, 12-item measure developed to assess six facets of self-compassion. Participants are asked to rate on a 5-point Likert scale (1 = "almost never" to 5 = "almost always") how frequently they engage in (1) self-kindness (e.g., "I try to be understanding and patient towards those aspects of my personality I don't like"); (2) self-judgment (e.g., "I am disapproving and judgmental about my own flaws and inadequacies"); (3) common humanity (e.g., "I try to see my failings are part of the human condition"); (4) isolation (e.g., "when I fail at something that's important to me, I tend to feel alone in my failure"); (5) mindfulness (e.g., "when something upsets me I try to keep my emotions in balance"); and (6) over identification (e.g., "when I am feeling down I tend to obsess and fixate on everything that is wrong"). Raes et al. (2011) recommend that a total score be used. After reverse scoring items related to self-judgment, isolation, and over-identification, total scores are calculated by averaging each individual item and range from 1 to 5, with higher scores indicated higher levels of self-compassion. The SCS-SF has demonstrated near perfect correlation with the long scale (SCS; Neff, 2003), which has demonstrated reliability in samples of women (e.g., α = .95; Albertson et al., 2015). In the present study, internal consistency was good (α = .88).

Chapter 5: Data Analysis and Results

Power and Sample Size

A power analysis was conducted for each of the planned tests in order to determine the number of participants needed for the study. The sample size was largest for the mediation analysis; according to Fritz and MacKinnon's (2007) recommendations, at least 148 participants were needed achieve a power of .80 to detect mediation with small to medium effect sizes using non-parametric bootstrapping at a significance level of .05. The effect sizes were based on previous estimates of the strength of the relationships between the predictors and outcomes of interest demonstrated in the literature (e.g., see Meredith et al., 2008). In order to conduct multiple mediation analyses while retaining power, a sample size of at least 250 participants was sought and exceeded (total N=335). This is comparable to sample sizes in similar studies (e.g., Forsythe et al., 2012).

Preliminary Analyses and Data Preparation

Each variable was checked for whether it met statistical assumptions of correlation and regression analyses (e.g., normality, linearity, homogeneity of variance). Skewness and kurtosis were not observed and variables appeared to be normally distributed. Outliers were identified by converting raw scores to z-scores; values that were three or more standard deviations away from the mean were considered outliers (Tabachnick, 2007). Four outliers were identified on the Spouse Response Inventory and these were examined closely for data entry errors, implausible values, and measurement errors; none of these were found. In order to represent the full range of scores endorsed by participants but avoid any distortion of results, analyses were performed using the non-parametric bootstrapping method, which demonstrates robustness in the presence of

outliers (MacKinnon et al., 2002; Mallinckrodt et al., 2006; Shrout & Bolger, 2002). As an additional check, analyses were conducted both with and without the outliers to see if the statistical estimates were comparable; inclusion of outliers did not result in any significant changes in results. In the case of missing data, the expectation maximization method was used to impute missing individual items (Schlomer et al., 2010).

All the scales yielded acceptable internal consistency as indicated by Cronbach's alphas ranging from .70 to .94. Reliability estimates, range, means, and standard deviations of all scales are presented in Table 2. Upon examining prior research with each of these variables, the means and standard deviations reported in this study were comparable to those in other samples of patients with chronic pain, including women with generalized chronic pain (see introduction for review of these studies). However, there was one notable exception; depression scores in the present study were higher than in other samples of patients with chronic pain conditions (e.g., *M*=21.21, *SD*=10.92; Forsythe et al., 2012), women with generalized pain disorders (e.g., *M*=19.79, *SD*=11.53; Bigatti et al., 2008), and women with non-pain chronic illness (e.g., *M*=7.24, *SD*=6.93; Zauszniewski et al., 2008). The literature suggests that among patients with chronic pain, a score over 19 indicates clinically significant depression warranting a referral for more thorough evaluation (e.g., Smarr & Keefer, 2011). As such, the average score in the present sample (*M*=29.69, *SD*=7.30) suggests significant clinical depression among survey participants. Examined more closely, 93.8% of participants in the current sample would meet criteria for further screening of depressive symptoms, which is much higher than in other studies with similar eligibility criteria (e.g., 49.7%; Bigatti et al., 2008).

Table 2

Reliability Estimates, Range, Means and Standard Deviations for Study Variables

Measure	*N*	*Possible Range*	*Scoring*	*Alpha*	*Sample Range*	*Mean*	*SD*
ECR-Anxiety	355	1-7	Scale 1-7 (higher=more anxiety)	.92	1.1-6.8	3.88	1.21
ECR-Avoidance	355	1-7	Scale 1-7 (higher=more avoidance)	.85	1.7-6.3	4.14	.93
PAI-Threat	355	1-6	Scale 1-6 (higher=greater perceived threat)	.89	1.4-6.0	4.61	1.04
PSEQ	355	0-60	Scale 0-6 (higher=more self-efficacy)	.89	0-49	20.96	10.28
SRI-Negative	340	1-5	Scale 1-5 (higher=more negative responses)	.91	1-5	1.98	.87
SRI-Solicitous	309	1-5	Scale 1-5 (higher=more solicitous responses)	.94	1-5	2.95	.88
PCS	355	0-52	Scale 0-4 (higher=more pain catastrophizing)	.94	2-52	28.54	11.68
PCS-Rumination	355	0-16	Scale 0-4 (higher=more rumination)	.90	0-16	9.02	4.19
PCS-Magnification	355	0-12	Scale 0-4 (higher=more magnification)	.76	0-12	6.26	2.99
PCS-Helplessness	355	0-24	Scale 0-4 (higher=more helplessness)	.89	0-24	13.27	5.65
SCS-SF	337	1-5	Scale 1-5 (higher=more self-compassion)	.88	1.0-4.7	2.71	.77
Pain-VAS	355	0-100	Scale 0-100 (higher=greater pain intensity)	N/A	10.5-98.5	55.15	16.39
PDI	355	0-70	Scale 0-10 (higher=more disability)	.86	5-70	43.24	13.35
CES-D	340	0-60	Scale 0-3 (higher=more depressive symptoms)	.70	10-49	29.69	7.30

Note. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire; SRI-Negative = Spouse Response Inventory (Negative Responses Subscale); SRI-Solicitous = Spouse Response Inventory (Solicitous Responses Subscale); PCS = Pain Catastrophizing Scale; SCS-SF = Self-Compassion Scale (Short-Form); Pain-VAS = Pain Visual Analogue Scale; PDI = Pain Disability Index; CES-D = Center for Epidemiological Studies – Depression Scale.

Of note, attachment anxiety and avoidance were moderately correlated with one another (r = .41, p<.01; see Table 3). This is consistent with some (e.g., Sibley et al., 2005), but not all (e.g., McWilliams & Asmundson, 2007) prior research using the same measure to evaluate adult romantic attachment. The correlation between these two

constructs in the present study is suggestive of some convergence between these two variables (Swank & Mullen, 2017).

Pain threat and pain catastrophizing were also strongly correlated with one another (r =.73, p <.01; see Table 3). However, this finding was expected and is consistent with results in other studies of chronic (e.g., Meredith et al., 2005) and acute pain (Cunningham, 2011). The validity of these measures as representing two distinct constructs is supported by studies demonstrating that they are closely related, yet tap into different aspects of pain-related cognitions with unique predictive value (e.g., Cunningham, 2011). Pain threat is believed to represent a primary, or initial, evaluation of pain, while pain catastrophizing is believed to represent a secondary, or subsequent, evaluation of the negative impact of pain and one's ability to manage it.

Relationships Between Demographic Variables and Variables of Interest

Relationships between demographic variables and criterion variables were examined using one-way ANOVAs and Tukey post hoc tests to compare group means for relationship status, household income, education level, employment status, and length of time since pain onset. Due to the homogeneity of the sample (91.5% White/Caucasian), differences based on race and ethnicity were not examined. Pearson correlations were calculated to determine relationships between age, duration of chronic pain, and criterion variables; significant relationships were determined by performing *t*-tests at the .05 level.

Pain appraisals. Pain threat did not differ based on demographic variables. Pain self-efficacy did not differ based on relationship status or duration of chronic pain. However, there were statistically significant differences in pain self-efficacy associated with household income ($F(3,315)=5.78$, $p<.01$), such that pain self-efficacy was

significantly lower among those with a household income below $30,000 (17.88 ± 9.25) than among those with a household income between $30,000 and $60,000 (22.29 ± 10.01), $60,000 and $100,000 (21.77 ± 9.76) and over $100,000 (23.86 ± 10.88). There were also statistically significant differences in pain self-efficacy by education level ($F(2,353)=4.57$, $p<.05$), such that pain self-efficacy was significantly higher among those with a four-year or graduate degree (22.63 ± 10.27) than among those with only some college or a two-year degree (19.86 ± 10.04) and those with only a high school education (18.13 ± 20.29). Furthermore, there were statistically significant differences in pain self-efficacy by employment status ($F(3,317)=26.93$, $p<.05$), such that pain self-efficacy was significantly lower among those who were not employed (15.62 ± 9.00) than among those who were employed part-time (22.02 ± 8.13), full-time (26.27 ± 10.15), or as a student (23.69 ± 7.57). Pain self-efficacy was also significantly lower among those employed part-time as compared to those employed full-time. It was also significantly correlated with age, such that older participants reported lower pain self-efficacy than younger participants ($r=-.17$).

Appraisals of solicitous responses to pain from others did not differ significantly based on household income, education level, employment status, or duration of chronic pain, but were significantly correlated with age, such that older participants reported fewer solicitous responses to pain from others ($r=-.12$). There were also statistically significant differences in appraisals of solicitous responses based on relationship status ($F(1,308)=24.23$, $p<.01$), such that appraisals of solicitous responses were significantly greater among those in a committed relationship (3.10 ± .83) as compared to those who were not (2.57 ± .91). Appraisals of negative responses to pain from others did not differ

based on most demographic variables, but did have a significant, positive relationship with age (r=.15) and were significantly greater among those not in a committed relationship (2.21 ± .99) as compared to those who were (1.89 ± .80).

Pain catastrophizing. Pain catastrophizing did not differ based on age, relationship status, employment status, or duration of chronic pain. However, there were statistically significant differences in pain catastrophizing associated with household income (F(3,315)=2.90, p<.05), including a trend towards lower pain catastrophizing among those with a household income above $100,000 (25.29 ± 11.07) as compared to those with a household income below $30,000 (29.89 ± 12.70) and those between $30,000 and $60,000 (30.10 ± 10.82). These results are displayed in Figure 8.

There were also statistically significant differences in pain catastrophizing based on education level (F(2,353)=7.07, p<.01), such that pain catastrophizing was significantly lower among those with a four-year or graduate degree (26.38 ± 10.94) than among those with only some college or a two-year degree (29.61 ± 12.07) and those with only a high school education (33.46 ± 11.26). These results are displayed in Figure 9.

Figure 8

Means Plot of Pain Catastrophizing by Household Income

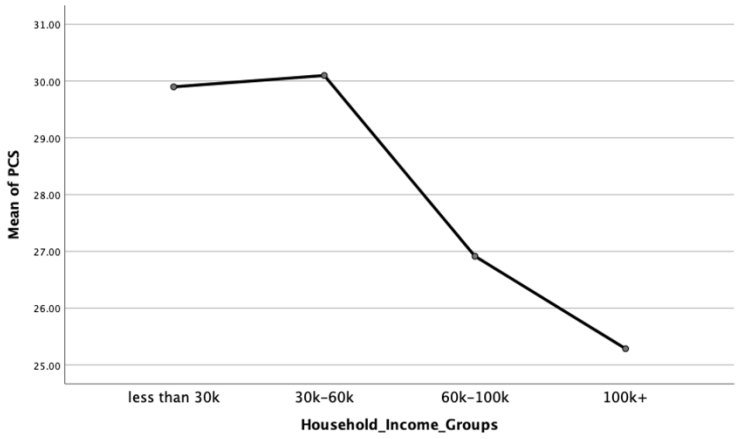
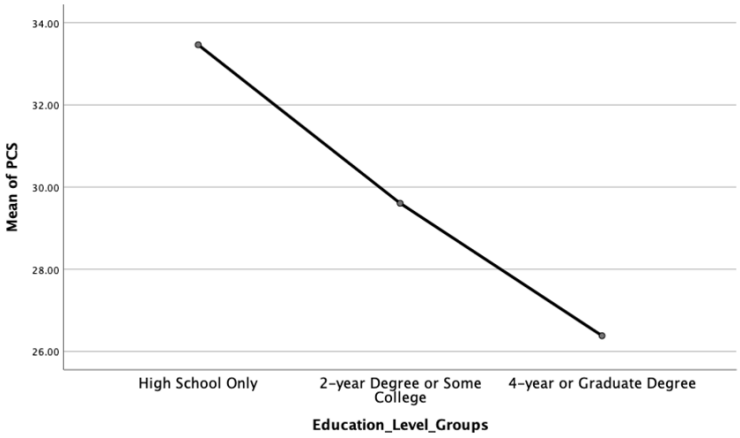


Figure 9

Means Plot of Pain Catastrophizing by Education Level



Depression. Depression scores did not differ based on duration of chronic pain but were positively associated with age (r=.12). Statistically significant differences in depression scores were also found based on relationship status (F(1,339)=10.96, p<.01), such that those who were in a committed relationship had lower depression scores (28.86 ± 7.37) than those who were not (31.70 ± 6.75). Significant differences were also found based on household income (F(3,302)=7.39, p<.01), such that those with a household income less than $30,000 reported higher depression scores (32.03 ± 6.52) as compared to those with a household income between $60,000 and $100,000 (27.55 ± 6.96) and above $100,000 (27.75 ± 7.43). These results are displayed in Figure 10.

There were also statistically significant differences in depression scores based on education level (F(2,338)=8.65, p<.01), such that depression scores were significantly lower among those with a four-year or graduate degree (28.26 ± 6.82) than among those with only some college or a two-year degree (30.31 ± 7.50) and those with only a high school education (33.44 ± 7.11). Depression scores were also significantly lower among

those with some college or a two-year degree as compared to those with only a high school education. These results are displayed in Figure 11.

Finally, there were statistically significant differences in depression scores based on employment status ($F(3,305)=3.96$, $p<.01$), such that depression scores were significantly lower among those employed full-time (27.94 ± 6.75) as compared to those not employed (30.45 ± 7.87) or working as a student (32.32 ± 5.16).

Figure 10

Means Plot of Depression Scores by Household Income

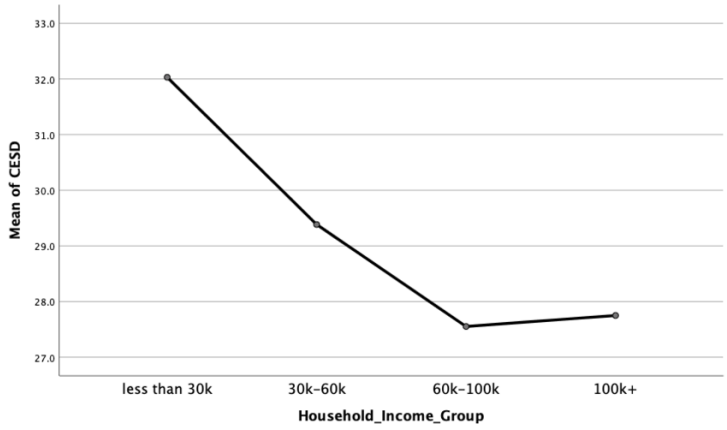
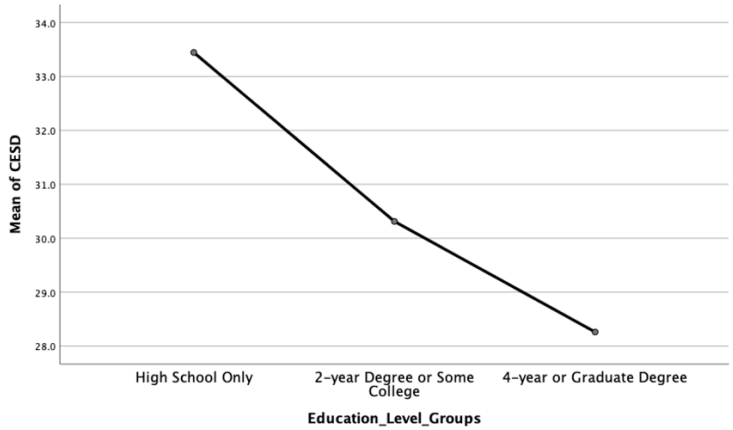


Figure 11

Means Plot of Depression Scores by Education Level



Disability. Statistically significant differences in disability were found based on employment status ($F(4,313)=10.57$, $p<.01$), such that self-reported disability was significantly greater amongst those not employed, with disability payment (48.81 ± 10.10) or without (48.14 ± 14.61), as compared to those employed part-time (41.93 ± 12.64), full-time (38.65 ± 13.05), or as a student (38.17 ± 10.30). There were also significant differences in disability based on household income ($F(3,312)=6.51$, $p<.01$), such that self-reported disability was significantly higher among those with a household income below $30,000 (47.02 ± 13.53) as compared to those with a household income between $30,000-$60,000 (41.93 ± 13.40), between $60,000-$100,000 (42.29 ± 11.66), and above $100,000 (43.03 ± 13.44); and based on education $F(2,351)=6.10$, $p<.01$), such that those with a four-year or graduate degree reported less disability (40.59 ± 13.04) than those with some college or a two-year degree (45.31 ± 13.09) and those with only a high school education (46.15 ± 13.97). Disability also had significant, positive correlations with duration of chronic pain ($r=.12$) and age ($r=.13$).

Pain intensity. Statistically significant differences in pain intensity were found based on employment status ($F(3,314)=3.87$, $p<.05$), such that pain intensity was significant higher among those not employed (59.10 ± 16.02) as compared to those employed part-time (52.22 ± 15.42) or full-time (53.13 ± 15.66). There were also significant differences in pain intensity based on household income ($F(3,312)=4.00$, $p<.01$), such that pain intensity was significantly higher among those with a household income below $30,000 (58.51 ± 17.13) than among those with a household income above $100,000 (49.51 ± 17.24); and based on education ($F(2,351)=5.59$, $p<.01$), such that pain intensity was significantly higher among those with only a high school education (62.44

± 14.40) as compared to those with some college or a two-year degree (55.72 ± 17.72) and those with a four-year or graduate degree (52.90 ± 14.99). Pain intensity did not significantly differ based duration of chronic pain but was significantly correlated with age (r=.13).

Relationships Between Variables of Interest

Pearson correlations among study variables were calculated and significant relationships were determined by performing *t*-tests at the .05 level. A summary of correlations between variables can be seen in Table 3.

Table 3

Relationships Between Study Variables

	1	2	3	4	5	6	7	7a	7b	7c	8	9	10	11	12
1. ECR-Anx	-														
2. ECR-Avoid	.41*	-													
3. PAI-Threat	.33*	.33*	-												
4. PSEQ	-.10	-.26*	-.38*	-											
5. SRI-Neg	.40*	.30*	.29*	-.18*	-										
6. SRI-Sol	-.18*	-.18*	-.02	-.01	-.46*	-									
7. PCS	.37*	.32*	.73*	-.45*	.23*	.03	-								
7a. Rum	.24*	.26*	.62*	-.38*	.13*	.10	.91*	-							
7b. Mag	.43*	.31*	.69*	-.31*	.17*	.04	.84*	.69*	-						
7c. Helpless	.34*	.31*	.67*	-.50*	.28*	-.03	.94*	.77*	.70*	-					
8. SCS-SF	-.54*	-.48*	-.43*	.27*	.24*	.01	-.48*	-.40*	-.45*	-.47*	-				
9. Pain-VAS	.02	.04	.34*	-.36*	.05	.13*	.44*	.40*	.26*	.43	-.08	-			
10. Duration	-.19*	.07	-.08	-.03	.10	-.07	-.11	-.09	-.14*	-.07	.13*	.11	-		
11. PDI	.11	.15*	.42*	-.61*	.22*	.01	.45*	.36*	.33*	.49*	-.16*	.52*	.12*	-	
12. CES-D	.50*	.36*	.43*	-.28*	.43*	-.08	.49*	.36*	.45*	.48*	-.46*	.23*	-.08	.32*	-

Note. N=309-355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire; SRI-Negative = Spouse Response Inventory (Negative Responses Subscale); SRI-Solicitous = Spouse Response Inventory (Solicitous Responses Subscale); PCS = Pain Catastrophizing Scale; SCS-SF = Self-Compassion Scale (Short-Form); Pain-VAS = Pain Visual Analogue Scale; Duration Pain = Number of years since pain began; PDI = Pain Disability Index; CES-D = Center for Epidemiological Studies – Depression Scale. *p<.01

Research Questions

Aim #1. **Attachment, pain appraisals, and pain catastrophizing.** The first aim of the present study was to examine mechanisms of relationships between attachment and pain catastrophizing. To test Hypothesis 1, pain appraisals were evaluated as mediators of the relationship between attachment and pain catastrophizing in a multiple mediation model (Figure 2a). In a multiple mediation model, the overall mediation effect for all mediators can be tested, which indicates the total indirect effect. Additionally, the effects of each mediator can be estimated independently (i.e., specific indirect effects) and are interpreted as the indirect (i.e., mediation) effect of the independent variable on a dependent variable, through a mediator, while controlling for all other mediator(s) in the model.

First, Pearson correlations between attachment, appraisals, and pain catastrophizing variables were calculated and significant relationships were determined by performing *t*-tests at the .05 level. Next, mediation analyses were performed. For each mediation analysis, Baron and Kenny's criteria for mediation (Baron & Kenny, 1986) were evaluated. Next, mediation was tested using the non-parametric bootstrapping procedure (50000 re-samples, Hayes' PROCESS model v3.6) to estimate the indirect effects (Preacher & Hayes, 2004); mediation is indicated if the 95% confidence interval for the indirect effect does not include 0. Consistent with prior research (e.g. Gauthier et al., 2012), attachment avoidance was included as a covariate in analyses of attachment anxiety and vice versa. Pain intensity was included as a covariate in all analyses to examine effects above and beyond any effect of pain. Finally, mediation analyses were performed with and without covariates based on preliminary analyses (i.e., household

income, education level); results did not differ with and without these covariates, so results without these covariates are displayed for simplicity.

To test Hypothesis 2, attachment was evaluated as a moderator of relationships between pain appraisals and pain catastrophizing (Figure 3a). Moderation was tested using non-parametric bootstrapping (50000 re-samples, Hayes' PROCESS model v3.6). Consistent with prior research (e.g. Gauthier et al., 2012), attachment avoidance was included as a covariate in analyses of attachment anxiety and vice versa. Pain intensity was included as a covariate in all analyses to examine effects above and beyond any effect of pain. Results did not differ with pertinent demographic variables (i.e., household income, education level) as covariates, so results without these covariates are displayed for simplicity.

Attachment anxiety and pain catastrophizing (mediation). Consistent with Hypothesis 1a, attachment anxiety was positively correlated with pain catastrophizing (r=.37, p<.01). Effect size was moderate. Consistent with Hypothesis 1b, pain catastrophizing was also positively correlated with pain threat (r=.73, p<.01) and negatively correlated with pain self-efficacy (r=-.45, p<.01). Effect sizes were moderate to large. Consistent with Hypothesis 1c, attachment anxiety was positively correlated with pain threat (r=.33, p<.01) and the effect size was moderate. However, contrary to expectations, attachment anxiety had no significant association with pain self-efficacy (r=-.09, p>.05). Therefore, pain self-efficacy did not meet Baron and Kenny's (1986) criteria for mediation and was not included in the final model.

Attachment anxiety was positively associated with pain threat (a_1(SE)=.20 (.04), ß=.24, p<.01) and pain threat was associated with pain catastrophizing after adjustment

for attachment anxiety (b_1(SE)=6.65 (.44), *ß*=.59, *p*<.01). The indirect effect of pain threat was also significant (a_1*b_1=1.34 (.32), 95% CI=.73-1.99; *ß*=.14, 95% CI=.08-.20), indicating a significant mediation effect. The total effect of attachment anxiety on pain catastrophizing was significant (c_1(SE)=2.66 (.46), *ß*=.23, *p*<.01) and the direct effect of attachment anxiety on pain catastrophizing was reduced but remained significant after adjustment for mediation (c_1'(SE)=1.32 (.37), *ß*=.11, *p*<.01), indicating partial mediation by pain threat. Results are presented in Table 4 and Figure 12.

Table 4

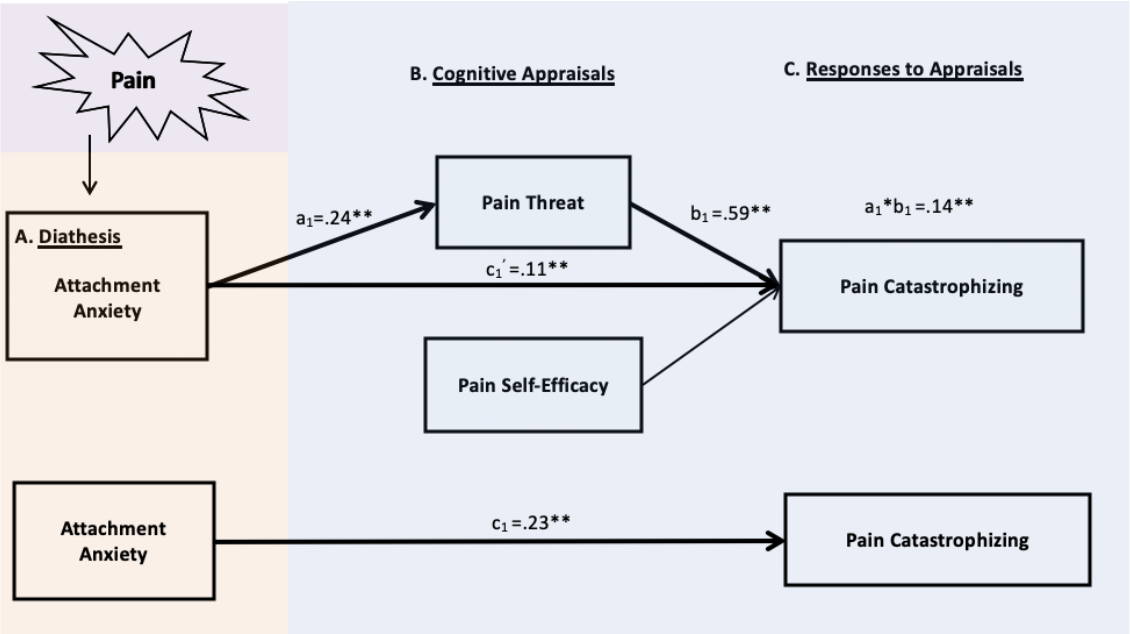
Pain Threat as a Mediator of the Relationship Between Attachment Anxiety and Pain Catastrophizing

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
PAI-Threat	.20 (.04)	4.70	<.01	.12	.29	.24		
b_1								
PAI-Threat	6.65 (.44)	15.11	<.01	5.78	7.51	.59		
c_1 (*Total Effect)*	2.66 (.46)	5.84	<.01	1.76	3.56	.23		
c_1' (*Direct Effect)*	1.32 (.37)	3.60	<.01	.60	2.04	.11		
a_1*b_1 (*Indirect effects)*								
PAI-Threat	1.34 (.32)			.73	1.99	.14 (.03)	.08	.20

Note. *N*=355. Results control for the effects of attachment avoidance and pain intensity. PAI-Threat = Pain Appraisal Inventory (Threat Subscale). LLCI = Lower-level Confidence Interval; ULCI = Upper-level Confidence Interval.

Figure 12

Pain Threat as a Partial Mediator of the Relationship Between Attachment Anxiety and Pain Catastrophizing (includes standardized values)



Note. Results control for the effect of pain intensity and attachment avoidance **p<.01

Attachment avoidance and pain catastrophizing (exploratory mediation).

Attachment avoidance was positively correlated with pain catastrophizing (r=.32, p<.01). Effect size was moderate. It was also positively correlated with pain threat (r=.33, p<.01) and negatively correlated with pain self-efficacy (r=-.26, p<.01). Effect sizes were moderate. Therefore, pain threat and pain self-efficacy met Baron and Kenny's (1986) criteria for mediation and were included in the final model.

The total effect of attachment avoidance on pain catastrophizing was significant (c_1(SE)=2.39 (.59), *ß*=.20, p<.01). Attachment avoidance was associated with pain threat (a_1(SE)=.24 (.06), *ß*=.22, p<.01) and pain threat was associated with pain catastrophizing after adjustment for attachment avoidance (b_1(SE)=6.22 (.44), *ß*=.55, p<.01). The indirect effect was also significant (a_1*b_1=1.51 (.38); *ß*=.12, 95% CI=.10-.22), indicating a

significant mediation effect for pain threat. Attachment avoidance was also associated with pain self-efficacy (a_1(SE)=-2.84 (.58), *ß*=-.26, *p*<.01) and pain self-efficacy was associated with pain catastrophizing after adjustment for attachment avoidance (b_1(SE)=-.17 (.04), *ß*=-.15, *p*<.01). The indirect effect was also significant (a_1*b_1=.50 (.17); *ß*=.04, 95% CI=.02-.06), indicating a significant mediation effect for pain self-efficacy. The direct effect of attachment avoidance on pain catastrophizing was no longer significant after adjustment for pain appraisals (c_1'(SE)=.38 (.48), *ß*=.03, *p*=.42), indicating full mediation by pain threat and pain self-efficacy. See results in Table 5 and Figure 13.

Table 5

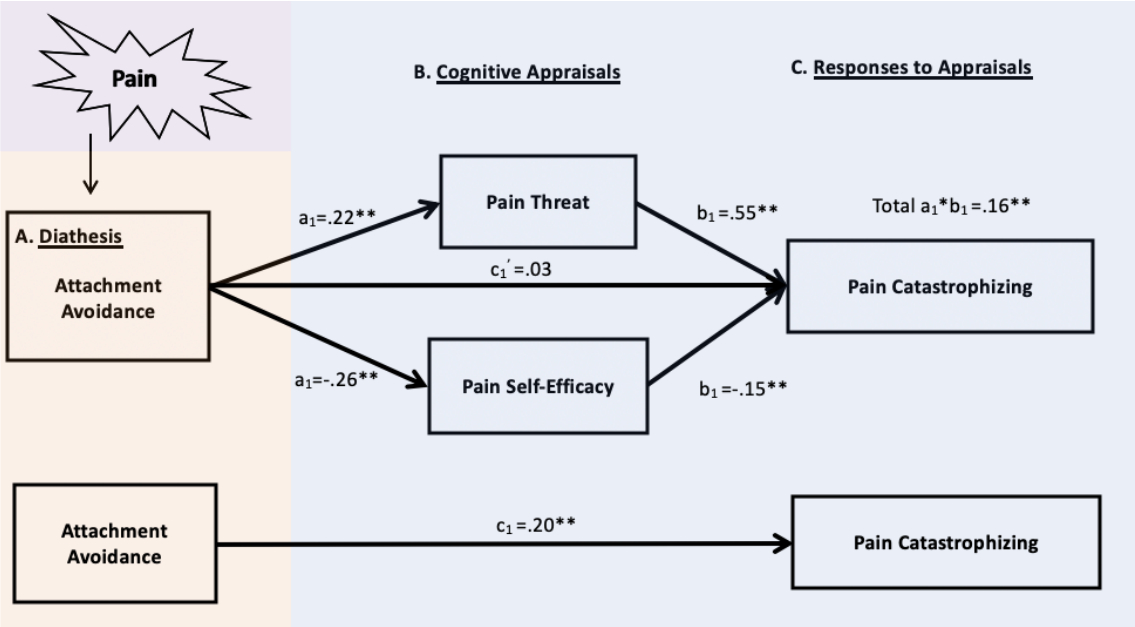
Pain Appraisals as Mediators of the Relationship Between Attachment Avoidance and Pain Catastrophizing

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
PAI-Threat	.24 (.06)	4.29	<.01	.13	.35	.22		
PSEQ	-2.84 (.58)	-4.87	<.01	-4.00	-1.70	-.26		
b_1								
PAI-Threat	6.22 (.44)	14.06	<.01	5.35	7.09	.55		
PSEQ	-.17 (.04)	-4.08	<.01	-.26	-.09	-.15		
c_1 (*Total Effect)*	2.39 (.59)	4.00	<.01	1.22	3.57	.20		
c_1' (*Direct Effect)*	.38 (.48)	.80	.42	-.56	1.33	.03		
a_1*b_1 (*Indirect Effects)*								
PAI-Threat	1.51 (.38)			.80	2.29	.12 (.03)	.10	.22
PSEQ	.50 (.17)			.21	.85	.04 (.01)	.02	.06
Total	2.01 (.41)			1.25	2.84	.16 (.03)	.10	.22

Note. *N*=355. Results control for the effects of attachment anxiety and pain intensity. PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire; LLCI = Lower-level Confidence Interval; ULCI = Upper-level Confidence Interval.

Figure 13

Pain Threat and Pain Self-Efficacy as Full Mediators of the Relationship Between Attachment Avoidance and Pain Catastrophizing (includes standardized values)



Note. Results control for the effect of pain intensity and attachment anxiety **p<.01

Attachment anxiety and pain catastrophizing (moderation). Contrary to Hypothesis 2a, attachment anxiety was not found to be a significant moderator of relationships between pain threat and pain catastrophizing or pain self-efficacy and pain catastrophizing (see Table 6).

Table 6

Attachment Anxiety as a Moderator of the Effects of Pain Appraisals on Pain Catastrophizing

	Estimate (SE)	*t*	*F*	*df*	*p*	adj. R^2
PAI-Threat	7.84 (1.14)	-4.79			<.01	
ECR-Anxiety	2.82 (1.38)	2.04			<.01	
ECR-Avoidance	.75 (.48)	1.57			.12	
Pain Intensity	.17 (.48)	1.57			<.01	
PAI*ECR-Anxiety	-.33 (.29)	-1.13			.26	
Overall model			107.12	5, 349	<.01	.61
PSEQ	-.32 (.15)	-2.16			<.05	
ECR-Anxiety	2.70 (.90)	2.98			<.01	

ECR-Avoidance	1.49 (.59)	2.53			<.05	
Pain Intensity	.23 (.03)	7.29			<.01	
PSEQ*ECR-Anxiety	.00 (.04)	.03			.98	
Overall model			48.12	5,349	<.01	.41

Note. N=355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire.

Attachment avoidance and pain catastrophizing (moderation). Contrary to Hypothesis 2b, attachment avoidance was not found to be a significant moderator of relationships between pain threat and pain catastrophizing or pain self-efficacy and pain catastrophizing (see Table 7).

Table 7

Attachment Avoidance as a Moderator of the Effects of Pain Appraisals on Pain Catastrophizing

	Estimate (SE)	*t*	*F*	*df*	*p*	adj. R^2
PAI-Threat	5.48 (1.57)	3.49			<.01	
ECR-Anxiety	1.33 (.37)	3.63			<.01	
ECR-Avoidance	-.59 (1.81)	-.32			.75	
Pain Intensity	.17 (.03)	6.46			<.01	
PAI*ECR-Avoidance	.30 (.39)	.78			.44	
Overall model				5, 349	<.01	.60
PSEQ	-.25 (.20)	-1.30			.20	
ECR-Anxiety	2.73 (.44)	6.26			<.01	
ECR-Avoidance	1.81 (1.14)	1.59			.11	
Pain Intensity	.23 (.03)	7.31			<.01	
PSEQ*ECR-Avoidance	-.02 (.05)	-.32			.75	
Overall model				5, 349	<.01	.41

Note. N=355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire.

Summary of results for Aim #1. Results pertinent to the first aim (hypotheses 1 and 2) are summarized in Table 8.

Table 8

Summary of Results for Aim #1

Hypothesis 1. Appraisals will explain positive relationships between attachment and pain catastrophizing.	Attachment anxiety was positively correlated with pain threat. It was not correlated with pain self-efficacy. Attachment anxiety was positively correlated with pain catastrophizing. Pain threat partially mediated the relationship between attachment anxiety and pain catastrophizing.
	Attachment avoidance was positively correlated with pain threat and negatively correlated with pain self-efficacy. Attachment avoidance was positively correlated with pain catastrophizing. Pain threat and pain self-efficacy fully mediated the relationship between attachment avoidance and pain catastrophizing.
Hypothesis 2. Attachment will exacerbate relationships between appraisals and pain catastrophizing.	Not supported.

Aim #2. Attachment, pain catastrophizing, and adjustment. The second aim of the present study was to examine relationships between attachment, pain catastrophizing, and adjustment (i.e., depression and disability). To test Hypothesis 3, pain catastrophizing was evaluated as a mediator of relationships between (i) attachment and depression and (ii) attachment and disability (Figure 14). Following the steps outlined for mediation analyses related to aim #1, correlations between attachment, pain catastrophizing, depression, and disability were calculated and mediation analyses using the non-parametric bootstrapping procedure (50000 re-samples, Hayes' PROCESS model v3.6) were performed when Baron & Kenny's (1986) criteria were met. Attachment avoidance was included as a covariate in analyses of attachment anxiety and vice versa. Pain intensity was included as a covariate in all analyses to examine effects above and beyond

any effect of pain. Finally, mediation analyses were performed with and without covariates based on preliminary analyses (i.e., household income, education level, relationship status, and age); results did not differ with and without these covariates, so results without these covariates are displayed for simplicity.

To test Hypothesis 4, attachment was evaluated as a moderator of relationships between pain catastrophizing and adjustment (Figure 15). Following steps outlined for moderation analyses related to Aim #1, moderation was tested using non-parametric bootstrapping (50000 re-samples, Hayes' PROCESS model v3.6). Attachment avoidance was included as a covariate in analyses of attachment anxiety and vice versa. Pain intensity was included as a covariate in all analyses to examine effects above and beyond any effect of pain. Results did not differ with pertinent demographic variables (i.e., household income, education level, relationship status, and age for depression; household income, education level; duration of chronic pain for disability) as covariates; results did not differ with and without these covariates, so results without these covariates are displayed for simplicity.

Attachment anxiety and adjustment (mediation). Consistent with Hypothesis 3a, attachment anxiety was positively correlated with depression (r=.50, p<.01) and the effect size was moderate. However, contrary to Hypothesis 3a, the association between attachment anxiety and disability was not significant (r=.11, p>.05). Therefore, mediation for this outcome variable was not tested. Consistent with Hypothesis 3b, pain catastrophizing was positively correlated with depression (r=.49, p<.01) and disability (r=.45, p<.01). Effect sizes were moderate. Consistent with Hypothesis 3c (and

Hypothesis 1a), attachment anxiety was positively correlated with pain catastrophizing (r=.37, p<.01) and the effect size was moderate.

Attachment anxiety and depression. Attachment anxiety was positively associated with pain catastrophizing (a_1(SE)=2.66 (.47), ß=.28, p<.01) and pain catastrophizing was associated with depression after adjustment for attachment anxiety (b_1(SE)=.18 (.03), ß=.29, p<.01). The indirect effect of pain catastrophizing was also significant (a_1*b_1=.47 (.12); ß=.08, 95% CI=.04-.12), indicating a significant mediation effect. The total effect of attachment anxiety on depression was significant (c_1(SE)=2.52 (.30), ß=.35, p<.01) and the direct effect of attachment anxiety on depression remained significant after adjustment for mediation (c_1'(SE)=2.05 (.30), ß=.28, p<.01), indicating partial mediation by pain catastrophizing. See results in Table 9 and Figure 14.

Table 9

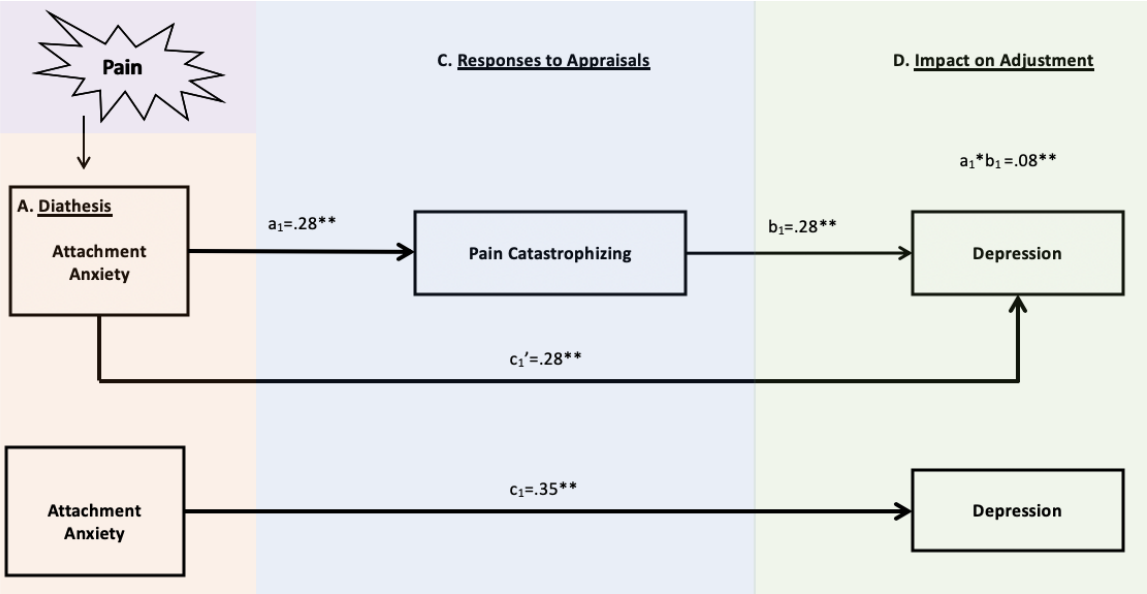
Pain Catastrophizing as a Mediator of the Relationship Between Attachment Anxiety and Depression

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
PCS	2.66 (.47)	5.71	<.01	1.75	3.58	.28		
b_1								
PCS	.18 (.03)	5.32	<.01	.11	.24	.28		
c_1 (*Total Effect)*	2.52 (.30)	8.50	<.01	1.94	3.11	.35		
c_1' (*Direct Effect)*	2.05 (.30)	6.85	<.01	1.46	2.64	.28		
a_1*b_1 (*Indirect Effects)*								
PCS	.47 (.12)			.12	.26	.08 (.02)	.04	.12

Note. N=355. Results control for the effects of attachment avoidance and pain intensity. PCS=Pain Catastrophizing Scale. LLCI = Lower-level Confidence Interval; ULCI = Upper-level.

Figure 14

Pain Catastrophizing as a Partial Mediator of the Relationship Between Attachment Anxiety and Depression (includes standardized values)



Note. Results control for the effect of pain intensity and attachment avoidance **p<.01

Attachment avoidance and adjustment (exploratory mediation). Attachment avoidance was positively correlated with depression (r=.36, p<.01) and disability (r=.15). Effect sizes were small to moderate.

Attachment avoidance and depression. Attachment avoidance was positively associated with pain catastrophizing (a_1(SE)=2.31 (.61), *ß*=.19, p<.01) and pain catastrophizing was associated with depression after adjustment for attachment avoidance (b_1(SE)= .18 (.03), *ß*=.13, p<.01). The indirect effect of pain catastrophizing was also significant (a_1*b_1=.41 (.14); *ß*=.06, 95% CI=.02-.09), indicating a significant mediation effect. The total effect of attachment avoidance on depression was significant (c_1(SE)=1.43 (.39), *ß*=.20, p<.01) and the direct effect of attachment avoidance on depression remained significant after adjustment for mediation (c_1'(SE)=1.02 (.38),

ß=.14, *p*<.01), indicating partial mediation by pain catastrophizing. See results in Table 10 and Figure 15.

Table 10

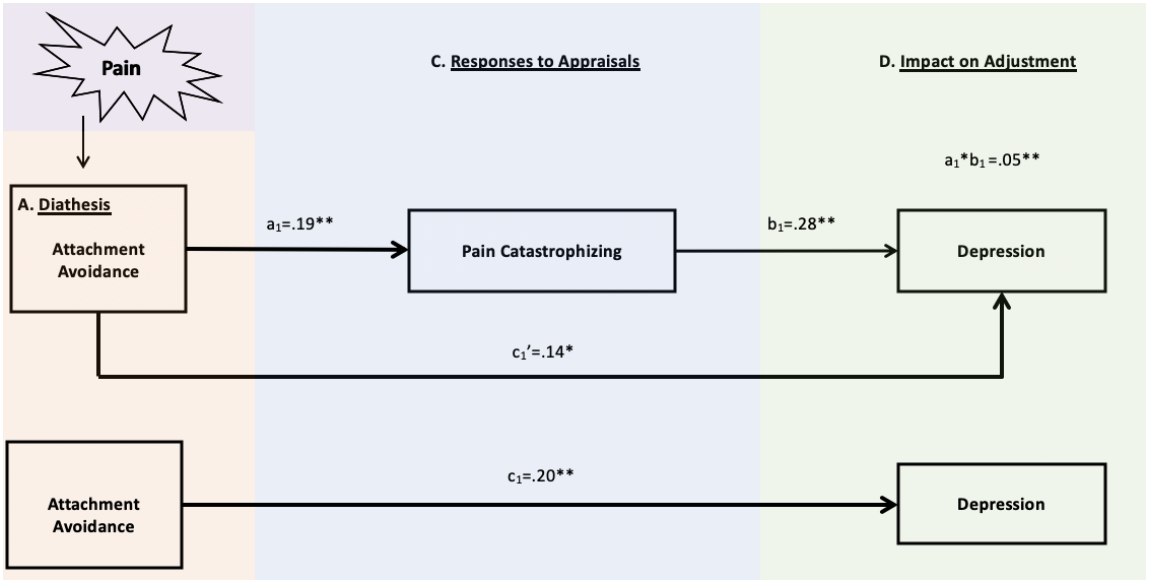
Test of Pain Catastrophizing as a Mediator of the Relationship Between Attachment Avoidance and Depression

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
PCS	2.31 (.61)	3.82	<.01	1.12	3.50	.19		
b_1								
PCS	.18 (.03)	5.32	<.01	.11	.24	.28		
c_1 (*Total Effect)*	1.43 (.39)	3.71	<.01	.67	2.19	.20		
c_1' (*Direct Effect)*	1.02 (.38)	2.69	<.05	.27	1.76	.14		
a_1*b_1 (*Indirect Effects)*								
PCS	.41 (.14)			.18	.70	.05 (.02)	.02	.09

Note. N=355. Results control for the effects of attachment anxiety and pain intensity. PCS=Pain Catastrophizing Scale. LLCI = Lower-level Confidence Interval; ULCI = Upper-level.

Figure 15

Pain Catastrophizing as a Partial Mediator of the Relationship Between Attachment Avoidance and Depression (includes standardized values)



Note. Results control for the effect of pain intensity and attachment anxiety **p<.01. *p<.05.

Attachment avoidance and disability. Attachment avoidance was positively associated with pain catastrophizing (a_1(SE)=2.31 (.61), *ß*=.19, *p*<.01) and pain catastrophizing was associated with disability after adjustment for attachment avoidance (b_1(SE)= .31 (.06), *ß*=.27, *p*<.01). The indirect effect of pain catastrophizing was also significant (a_1*b_1=.73 (.26); *ß*=.05, 95% CI=.02-.09), indicating a significant mediation effect. The total effect of attachment avoidance on disability was significant (c_1(SE)=1.58 (.72), *ß*=.12, *p*<.01), but the direct effect of attachment avoidance on disability was no longer significant after adjustment for mediation (c_1'(SE)=.85 (.71), *ß*=.06, *p*=.23), indicating full mediation by pain catastrophizing. See results in Table 11 and Figure 16.

Table 11

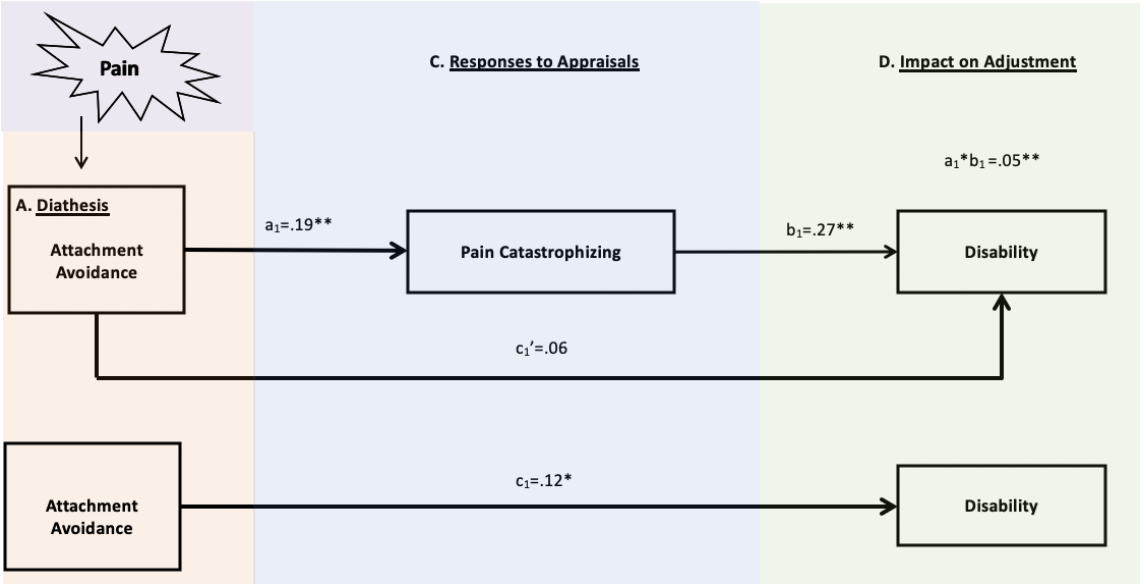
Test of Pain Catastrophizing as a Mediator of the Relationship Between Attachment Avoidance and Disability

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
PCS	2.31 (.61)	3.82	<.01	1.12	3.50	.19		
b_1								
PCS	.31 (.06)	4.96	<.01	.19	.43	.27		
c_1 (*Total Effect)*	1.58 (.72)	2.21	<.05	.18	2.99	.12		
c_1' (*Direct Effect)*	.85 (.71)	1.20	.23	-.54	2.24	.06		
a_1*b_1 (*Indirect Effects)*								
PCS	.73 (.26)			.30	1.30	.05 (.02)	.02	.09

Note. *N*=355. Results control for the effects of attachment anxiety and pain intensity. PCS=Pain Catastrophizing Scale. LLCI = Lower-level Confidence Interval; ULCI = Upper-level Confidence Interval.

Figure 16

Pain Catastrophizing as a Full Mediator of the Relationship Between Attachment Avoidance and Disability (includes standardized values)



Note. Results control for the effect of pain intensity and attachment anxiety **$p<.01$. *$p<.05$.

Attachment anxiety and adjustment (moderation). Contrary to Hypothesis 4a, and as shown in Table 12, attachment anxiety was not found to be a significant moderator of relationships between pain catastrophizing and depression or pain catastrophizing and disability.

Table 12

Test of Attachment Anxiety as a Moderator of the Effects of Pain Catastrophizing on Depression and Disability

	Estimate (SE)	*t*	*F*	*df*	*p*	adj. R^2
PCS	.14 (.08)	1.58			.11	
ECR-Anxiety	1.76 (.66)	2.65			<.01	
ECR-Avoidance	1.02 (.38)	2.70			<.01	
Pain Intensity	.04 (.02)	1.97			<.05	
PCS*ECR-Anxiety	.01 (.02)	.48			.63	
Overall model (Depression)				5, 349	<.01	.38

PCS	.29 (.16)	1.79		.08	
ECR-Anxiety	-.49 (1.23)	-.40		.69	
ECR-Avoidance	.85 (.71)	1.20		.23	
Pain Intensity	.32 (.04)	8.01		.00	
PCS*ECR-Anxiety	.01 (.04)	.15		.88	
Overall model (Disability)			5, 349	<.01	.33

Note. *N*=355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PCS=Pain Catastrophizing Scale.

Attachment avoidance and adjustment (moderation). Contrary to Hypothesis 4b, and as shown in Table 13, attachment avoidance was not found to be a significant moderator of relationships between pain catastrophizing and depression or pain catastrophizing and disability.

Table 13

Test of Attachment Avoidance as a Moderator of the Effects of Pain Catastrophizing on Depression and Disability

	Estimate (SE)	*t*	*F*	*df*	*p*	adj. R^2
PCS	.13 (.11)	1.13			.26	
ECR-Anxiety	2.06 (.30)	6.85			<.01	
ECR-Avoidance	.69 (.82)	.84			.40	
Pain Intensity	.04 (.02)	2.00			<.05	
PCS*ECR-Avoidance	.01 (.03)	.45			.66	
Overall model (Depression)				5, 349	<.01	.38
PCS	.49 (.21)	2.32			.12	
ECR-Anxiety	-.37 (.56)	-.67			.50	
ECR-Avoidance	2.09 (1.54)	1.36			.18	
Pain Intensity	.32 (.04)	8.01			<.01	
PCS*ECR-Avoidance	-.05 (.05)	-.91			.36	

Overall model (Disability)	5, 349	<.01	.33

Note. *N*=355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); PAI-Threat = Pain Appraisal Inventory (Threat Subscale); PSEQ = Pain Self-Efficacy Questionnaire.

Summary of results for Aim #2. Results pertinent to the first aim (hypotheses 3 and 4) are summarized in Table 14.

Table 14

Summary of Results for Aim #2

Hypothesis 3. Pain catastrophizing would explain positive relationships between attachment and outcomes.	Attachment anxiety was positively correlated with depression. It was not correlated with disability. Pain catastrophizing partially mediated the relationship between attachment anxiety and depression.
	Attachment avoidance was positively correlated with depression and disability. Pain catastrophizing partially mediated the relationship between attachment avoidance and depression. Pain catastrophizing fully mediated the relationship between attachment avoidance and disability.
Hypothesis 4. Attachment would exacerbate relationships between pain catastrophizing and outcomes.	Not supported.

Aim #3. Attachment and the Communal Coping Model. The third aim of the present study was to evaluate the Communal Coping Model of Pain Catastrophizing in women with generalized chronic pain, clarify unique variance in perceived responses to pain associated with each dimension of pain catastrophizing, and examine the impact of attachment anxiety and avoidance on relationships between pain catastrophizing and perceptions of responses to pain from others. Following previous work by Gauthier and colleagues (2012) examining the role of attachment on the CCM among patients with cancer pain, Hypotheses 5 and 6 were tested in a series of three steps. First, Pearson

correlations between predictors (attachment anxiety, attachment avoidance, pain catastrophizing, duration of chronic pain) and dependent variables (perceptions of solicitous and negative responses to pain from others) were calculated and significant relationships were determined by performing *t*-tests at the .05 level. Second, multivariate regression models were performed on each category of perceived responses to pain from others (i.e., solicitous and negative), with attachment anxiety, attachment avoidance, pain catastrophizing, and duration of chronic pain as predictors. Because of significant relationships with each outcome, relationship status (i.e., partnered or unpartnered) and was also included in the model.

Finally, to assess interactions between these variables, variables were standardized and product terms were created. Variables were entered in blocks, with the standardized independent variables entered first, followed by the product terms. Lower order 2-way interactions were included in models where 3-way interactions were tested. Significant interactions were investigated by plotting simple slopes for a given variable at high (1 standard deviation above the mean) and low (1 SD below the mean) values of the other variable (see Gauthier et al., 2012).

Attachment, pain catastrophizing, and perceived solicitous responses to pain. Results from multivariate analyses, including significant interactions, are displayed in Table 15.

Table 15

Multivariate Linear Regression Models: Relationships of Attachment, Pain Catastrophizing, Duration of Chronic Pain, and Relationship Status to Perceived Solicitous Responses to Pain

	Estimate (SE)	*t*	ΔF	*df*	*p*	ΔR^2
Step 1						
ECR-Anxiety	-.18 (.07)	-2.69			<.01	
ECR-Avoidance	-.11 (.06)	-1.69			.09	
PCS	.16 (.06)	2.69			<.01	
Pain Duration	-.10 (.05)	-1.76			.08	
Relationship Status	.50 (.13)	3.89			<.01	
Overall model			8.24	5, 350	<.01	.13
Step 2						
Overall Model			1.04	10, 340	.41	.03
Step 3						
YRS*ANX*REL	-.41 (.12)	-3.32			<.01	
YRS*ANX*AVO	-.12 (.05)	-2.44			<.05	
Overall model			6.28	12, 338	<.01	.04

Note. N=355. Variables were standardized prior to regression analyses. Only significant interaction terms are displayed for clarity. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale. Pain Duration = Number of years since pain began. Relationship Status (0=no; 1=yes); YRS*ANX*REL = 3-way interaction between ECR-Anxiety x Pain Duration x Relationship Status; YRS*ANX*AVO = 3-way interaction between ECR-Anxiety x ECR-Avoidance x Pain Duration.

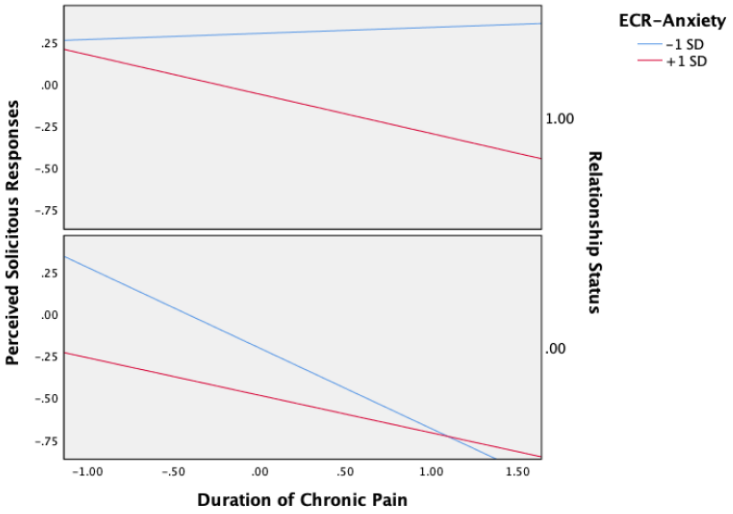
Hypothesis 5a was partially supported. Attachment anxiety was negatively associated with perceived solicitous responses in bivariate (r=-.18, p<.01) and multivariate (ß=-.18 (.07), p<.01) analyses. Attachment avoidance was also negatively associated with perceived solicitous responses in bivariate analyses (r=-.18, p<.01), but was reduced to a trend in multivariate analyses (ß=-.11 (.06), p<.10). Pain catastrophizing was not significantly associated with perceived solicitous responses in bivariate analyses, but was positively associated with perceived solicitous responses in multivariate analyses (ß=.16 (.06), p<.01). Duration of chronic pain was not significantly

associated with perceived solicitous responses in bivariate analyses, but a negative effect was trending towards significance in multivariate analyses (ß=-.10 (.05), $p<.10$). All effect sizes were small.

Hypothesis 5b was also supported. No significant 2-way interactions emerged. However, there were two significant 3-way interactions, between: (1) duration of chronic pain, attachment anxiety and relationship status (ß=-.41 (.12), $p<.01$); and (2) duration of chronic pain, attachment anxiety and attachment avoidance (ß=-.12 (.05), $p<.05$). Post hoc probing of simple slopes for the first interaction revealed that the relationship between duration of chronic pain and perceived solicitous responses was conditional on attachment anxiety among those who identified as partnered. More specifically, among those in a relationship, duration of chronic pain was significantly associated with fewer perceived solicitous responses among those with high, but not low, attachment anxiety. Duration of chronic pain was also associated with significantly fewer perceived solicitous responses among those not in a relationship regardless of attachment anxiety; however, this relationship was stronger among those with low levels of attachment anxiety. These results are displayed in Figure 17.

Figure 17

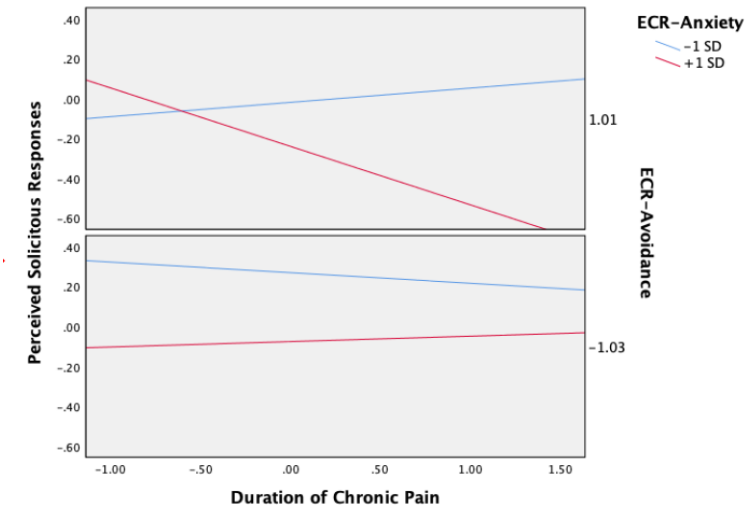
Perceived Solicitous Responses: Three-way Interaction Between Duration of Chronic Pain, Attachment Anxiety, and Relationship Status



Post hoc probing of simple slopes for the second interaction revealed that the relationship between duration of chronic pain and perceived solicitous responses was conditional on attachment anxiety among those with high attachment avoidance. More specifically, among those with high attachment avoidance and high, but not low, attachment anxiety, duration of chronic pain was significantly associated with fewer perceived solicitous responses. Among those with low attachment avoidance, duration of chronic pain was not associated with perceived solicitous responses at any level of attachment anxiety. These results are displayed in Figure 18.

Figure 18

Perceived Solicitous Responses: Three-way Interaction Between Duration of Chronic Pain, Attachment Anxiety, and Attachment Avoidance



Attachment, pain catastrophizing, and perceived negative responses to pain.

Results from multivariate analyses, including significant interactions, are displayed in Table 16.

Table 16

Multivariate Linear Regression Models: Relationships of Attachment, Pain Catastrophizing, Duration of Chronic Pain, and Relationship Status to Perceived Solicitous Responses to Pain

	Estimate (SE)	*t*	*ΔF*	*df*	*p*	*ΔR²*
Step 1						
ECR-Anxiety	.33 (.06)	5.63			<.01	
ECR-Avoidance	.12 (.06)	2.18			<.05	
PCS	.06 (.06)	.99			.32	
Pain Duration	.17 (.05)	3.43			<.01	
Relationship Status	-.17 (.11)	-1.50			.13	
Overall model			16.33	5, 350	<.01	.21
Step 2						
YRS*PCS	-.20 (.05)	-3.69			<.01	
YRS*ANX	.19 (.06)	3.32			<.01	
Overall Model			2.13	10, 340	<.05	.05

Step 3				
Overall Model	.36	10, 330	.96	.01

Note. *N*=355. Variables were standardized prior to regression analyses. Only significant interaction terms are displayed for clarity. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale. Pain Duration = Number of years since pain began. Relationship Status (0=no; 1=yes); YRS*PCS = interaction between Pain Duration x Pain Catastrophizing; YRS*ANX = interaction between Pain Duration x ECR-Anxiety.

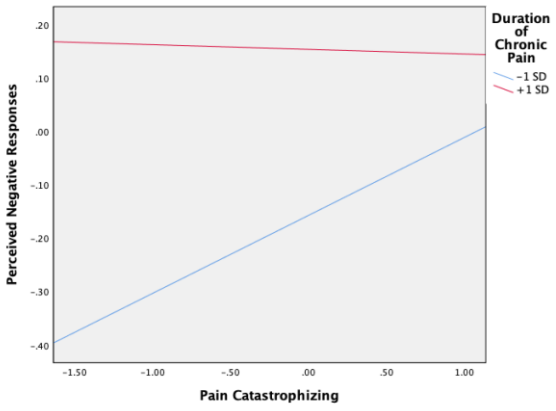
Hypothesis 6a was partially supported. Attachment anxiety was positively associated with perceived negative responses in bivariate (r=.40, p<.01) and multivariate (ß=.33 (.06), p<.01) analyses. Attachment avoidance was also negatively associated with perceived negative responses in bivariate analyses (r=.30, p<.01) and multivariate analyses (ß=.12 (.06), p<.05). Pain catastrophizing was significantly associated with more perceived negative responses in bivariate analyses (r=.23, p<.01), but was not associated with perceived negative responses in multivariate analyses. Duration of chronic pain was not significantly associated with perceived negative responses in bivariate analyses, but was significantly associated with more perceived negative responses in multivariate analyses (ß=.17 (.05), p<.01). All effect sizes were small to moderate.

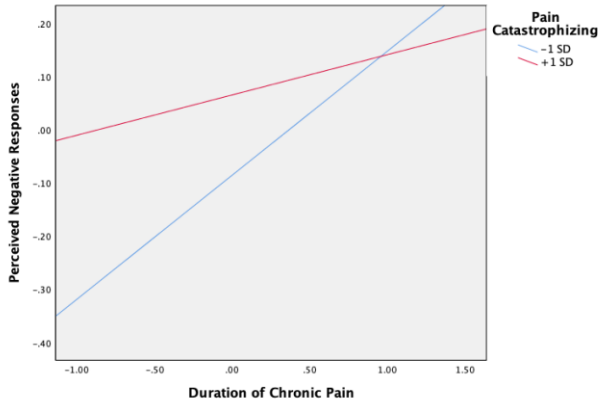
Hypothesis 6b was also supported. No significant 3-way interactions emerged. However, there were two significant 2-way interactions, between: (1) duration of chronic pain and pain catastrophizing (ß=-.20 (.05), p<.01); (2) duration of chronic pain and attachment anxiety (ß=-.19 (.06), p<.01). Post hoc probing of the first interaction revealed that the relationship between duration of chronic pain and perceived negative responses was conditional on level of pain catastrophizing, such that duration of chronic pain was associated with more perceived negative responses in the context of low, but not high, pain catastrophizing. Looked at another way, the relationship between pain

catastrophizing and perceived negative responses to pain was conditional on duration of chronic pain, such that pain catastrophizing was significantly associated with more perceived negative responses when in pain for a relatively shorter time period, and pain catastrophizing was trending towards a significant relationship with fewer perceived negative responses when in pain for a relatively longer time period. These results are displayed in Figure 19.

Figure 19

Perceived Negative Responses: Two-way Interaction Between Duration of Chronic Pain and Pain Catastrophizing



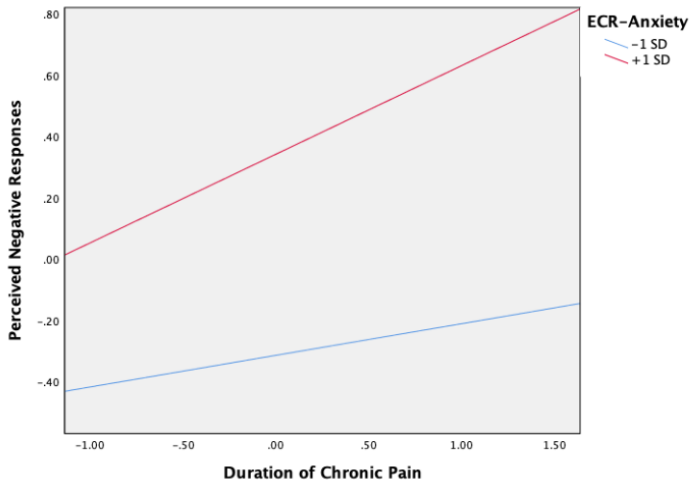


Post hoc probing of the second interaction revealed that the relationship between duration of chronic pain and perceived negative responses was conditional on attachment anxiety, such that duration of chronic pain was associated with more perceived negative

responses in the context of high, but not low, attachment anxiety. Results are displayed in Figure 20.

Figure 20

Perceived Negative Responses: Two-way Interaction Between Duration of Chronic Pain and Attachment Anxiety



Summary of results for Aim #3. Results pertinent to the first aim (hypotheses 5 and 6) are summarized in Table 17.

Table 17

Summary of Results for Aim #3

Hypothesis 5. Perceptions of solicitous responses to pain from others would be negatively associated with attachment anxiety and avoidance, positively associated with pain catastrophizing, and negatively associated with duration of chronic pain. Significant interactions between these predictors would emerge.	Perceived solicitous responses were negatively associated with attachment anxiety and avoidance in bivariate and multivariate analyses. Perceived solicitous responses were positively associated with pain catastrophizing in multivariate analyses (controlling for other variables), but not bivariate analyses. Perceived solicitous responses were not significantly associated with duration of chronic pain in bivariate or multivariate analyses.

	Significant interactions: (1) duration of pain * attachment anxiety * relationship status – among those with spouse/partner, in the context of higher attachment anxiety, duration of chronic pain was associated with fewer perceived solicitous responses. (2) duration of pain * attachment anxiety * attachment avoidance – among those with higher attachment anxiety and higher attachment avoidance, duration of chronic pain was associated with fewer perceived solicitous responses.
Hypothesis 6. Perceptions of negative responses to pain from others would be positively associated with attachment anxiety and avoidance, negatively associated with pain catastrophizing, and positively associated with duration of chronic pain. Significant interactions between these predictors would emerge.	Perceived negative responses were positively associated with attachment anxiety and avoidance in bivariate and multivariate analyses. Perceived negative responses were positively associated with pain catastrophizing in bivariate analyses (not controlling for other variables), but not multivariate analyses. Perceived negative responses were positively associated with duration of chronic pain in multivariate analyses (controlling for other variables), but not bivariate analyses. Significant interactions: (1) duration of pain * pain catastrophizing – in the context of lower pain catastrophizing, duration of chronic pain was associated with more perceived negative responses. In the context of pain of shorter duration, pain catastrophizing was associated with more perceived negative responses; in the context of pain of longer duration, pain catastrophizing was associated with fewer perceived negative responses. (2) duration of pain * attachment anxiety – in the context of higher attachment anxiety, duration of chronic pain was associated with more perceived negative responses.

Aim #4. Self-compassion. The fourth and final aim of the present study was to explore relationships between self-compassion, attachment anxiety, and pain catastrophizing. To test Hypothesis 7, self-compassion was evaluated as a mediator of relationships between attachment anxiety and pain catastrophizing. Following the steps outlined for mediation analyses above, correlations between attachment anxiety, self-compassion, and pain catastrophizing were calculated and mediation analyses using the

non-parametric bootstrapping procedure (50000 re-samples, Hayes' PROCESS model v3.6) were performed when Baron & Kenny's (1986) criteria were met. Attachment avoidance and pain intensity were included as covariates. Finally, mediation analyses were performed with and without covariates based on preliminary analyses (i.e., household income, education level, relationship status, and age); results did not differ with and without these covariates, so results without these covariates are displayed for simplicity.

To test Hypothesis 8, attachment anxiety was evaluated as a moderator of relationships between self-compassion and pain catastrophizing. Following steps outlined above, moderation analyses were performed with attachment avoidance and pain intensity included as covariates. Results did not differ with pertinent demographic variables as covariates, so results without these covariates are displayed for simplicity.

Attachment anxiety, self-compassion, and pain catastrophizing (mediation). Hypothesis 7 was supported. Attachment anxiety was negatively associated with self-compassion (a_1(SE)=-.26 (.03), *ß*=-.41, p<.01) and self-compassion was negatively associated with pain catastrophizing after adjustment for attachment anxiety (b_1(SE)= -5.10 (.80), *ß*=-.34, p<.01). The indirect effect of self-compassion was also significant (a_1*b_1=1.33 (.25); *ß*=.14, 95% CI=.09-.20), indicating a significant mediation effect. The total effect of attachment anxiety on pain catastrophizing was significant (c_1(SE)=2.65 (.47), *ß*=.28, p<.01) and the direct effect of attachment anxiety on pain catastrophizing remained significant after adjustment for mediation (c_1'(SE)=1.32 (.49), *ß*=.14, p<.01), indicating partial mediation by self-compassion. Results of the mediation model are presented in Table 18 and Figure 21.

Table 18

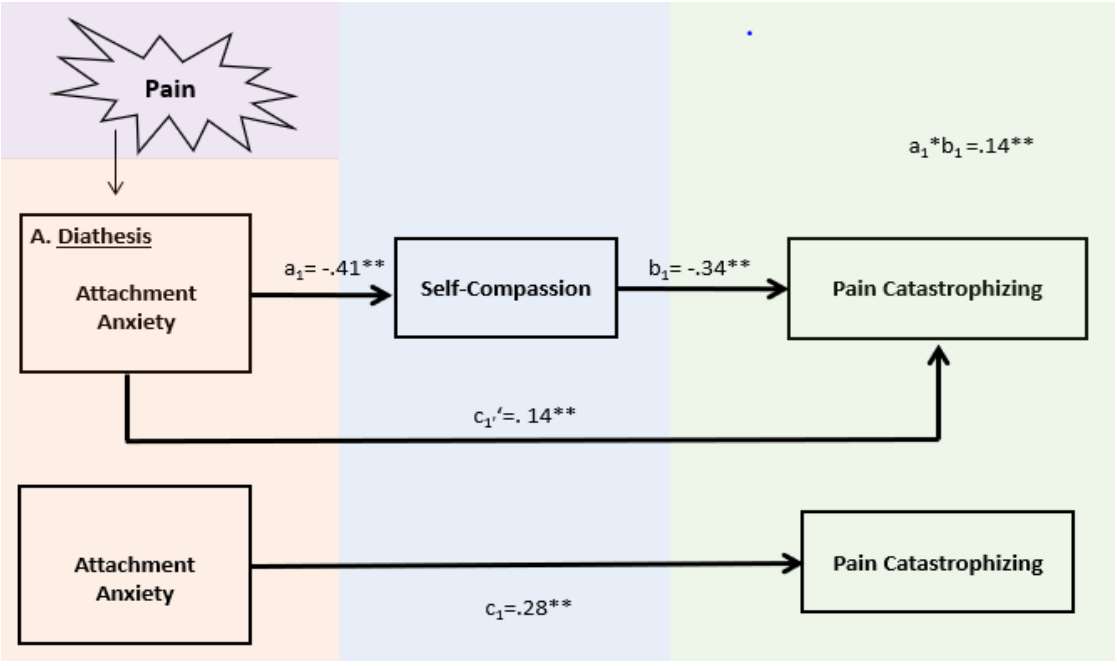
Test of Self-Compassion as a Mediator of the Relationship Between Attachment Anxiety and Pain Catastrophizing

	Estimate (SE)	*t*	*p*	*LLCI*	*ULCI*	*ß (SE)*	*LLCI*	*ULCI*
a_1								
SCS	-.26 (.03)	-8.69	<.01	-.32	-.20	-.41		
b_1								
SCS	-5.10 (.80)	-6.34	<.01	-6.68	-3.51	-.34		
c_1 (*Total Effect)*	2.65 (.47)	5.68	<.01	1.73	3.57	.28		
c_1' (*Direct Effect)*	1.32 (.49)	2.70	<.01	.36	2.28	.14		
a_1*b_1 (*Indirect Effects)*								
SCS	1.33 (.25)			.86	1.86	.14 (.03)	.09	.20

Note. *N*=355. Results control for the effects of attachment avoidance and pain intensity. SCS=Self-Compassion Scale, Short Form; PCS=Pain Catastrophizing Scale. LLCI = Lower-level Confidence Interval; ULCI = Upper-level Confidence Interval.

Figure 21

Self-Compassion as a Partial Mediator of the Relationship Between Attachment Anxiety and Pain Catastrophizing (includes standardized values)



Note. Results control for the effect of pain intensity and attachment avoidance **p<.01

Attachment anxiety, self-compassion, and pain catastrophizing (moderation).

Hypothesis 8 was also supported. A significant interaction emerged between attachment anxiety and self-compassion (ß=.08 (.04), $p<.05$). Post hoc probing of simple slopes revealed that reductions in pain catastrophizing associated with more self-compassion were weaker in the presence of more attachment anxiety. Results are displayed in Table 19 and Figure 22.

Table 19

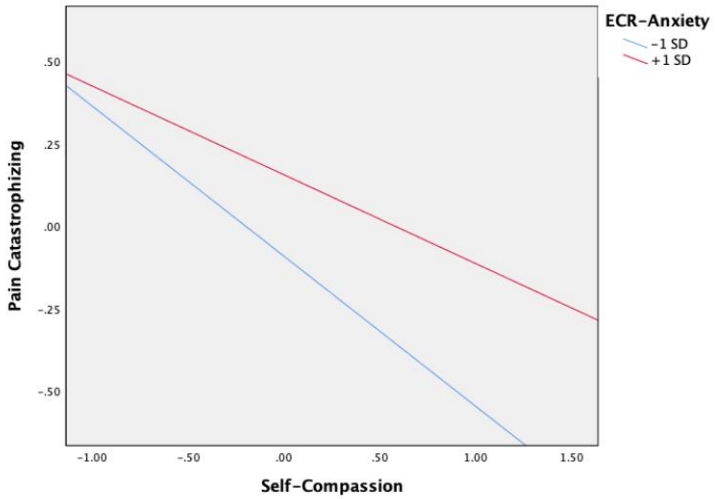
Multivariate Linear Regression models: Relationships of Attachment, Self-compassion, and Pain Intensity to Pain Catastrophizing

	Estimate (SE)	*t*	ΔF	*df*	*p*	ΔR^2
Step 1						
ECR-Anxiety	.14 (.05)	2.70			<.01	
ECR-Avoidance	.08 (.05)	1.64			.10	
Pain Intensity	.40 (.04)	9.35			<.01	
SCS-SF	-.34 (.05)	-6.34			<.01	
Overall model			57.62	4,3 51	<.01	.41
Step 2						
ANX*SCS	.08 (.04)	1.94			<.05	
Overall Model			3.79	5, 350	<.05	.01

Note. *N*=355. ECR-Anxiety = Experiences in Close Relationships (Anxiety Subscale); ECR-Avoidance = Experiences in Close Relationships (Avoidance Subscale); SCS-SF=Self-Compassion Scale – Short Form; SCS*ANX = interaction between self-compassion and attachment anxiety.

Figure 22

Pain Catastrophizing: Two-way interaction Between Attachment Anxiety and Self-Compassion



Summary of results for Aim #4. Results pertinent to the fourth aim (hypotheses 7 and 8) are summarized in Table 20.

Table 20

Summary of Results for Aim #4

Hypothesis 7. Lower levels of self-compassion would explain positive relationships between attachment anxiety and pain catastrophizing.	Lower levels of self-compassion partially mediated the relationship between attachment anxiety and pain catastrophizing.
Hypothesis 8. Attachment anxiety would moderate relationships between self-compassion and pain catastrophizing, such that reductions in pain catastrophizing associated with more self-compassion would be attenuated, or buffered, by attachment anxiety.	Significant interaction: attachment anxiety * self-compassion – reductions in pain catastrophizing associated with more self-compassion were weaker in the context of higher attachment anxiety.

Post-hoc analyses. Post-hoc analyses explored relationships between attachment, the three dimensions of pain catastrophizing (i.e., rumination, magnification, helplessness), outcomes (i.e., depression and disability), and perceptions of responses to

pain from others (i.e., negative, solicitous). First, in cases where pain catastrophizing was a significant mediator of relationships between attachment and outcome variables, a multiple mediation model was used to determine which aspect(s) of pain catastrophizing is/are responsible for this relationship. Second, to examine which aspect(s) of pain catastrophizing explained relationships between pain catastrophizing and perceptions of responses to pain from others, bivariate and multivariate analyses were repeated using each subscale of pain catastrophizing.

Attachment, depression, and disability: the three dimensions of pain catastrophizing. A multiple mediation model was used to explore mechanisms of relationships between attachment anxiety and depression. Further examination of the three dimensions of pain catastrophizing revealed significant, positive associations between attachment anxiety and rumination (r=.25, p<.01), magnification (r=.43, p<.01) and helplessness (r=.35, p<.01). Effect sizes were moderate. Significant, positive associations were also found between depression and rumination (r=.37, p<.01), magnification (r=.45, p<.01) and helplessness (r=.50, p<.01). Effect sizes were moderate. Therefore, all three dimensions of pain catastrophizing (rumination, magnification, helplessness) were included in the mediation model for the relationship between attachment anxiety and depression. Results of the multiple mediation model demonstrate a significant mediation effect (a_1*b_1=.44 (.16); ß=.07, 95% CI=.05-.14) for the helplessness dimension, but not the rumination or magnification dimensions, of pain catastrophizing. The direct effect of attachment anxiety on depression remained significant after controlling for mediation (c_1'= 1.95 (.31), ß=.27, p<.01), indicating partial mediation by helplessness.

Next, a multiple mediation model was used to explore mechanisms of relationships between attachment avoidance and depression. Further examination of the three dimensions of pain catastrophizing revealed significant, positive associations between attachment avoidance and rumination (r=.26, p<.01), magnification (r=.31, p<.01) and helplessness (r=.31, p<.01). Effect sizes were small to moderate. Therefore, all three dimensions of pain catastrophizing (rumination, magnification, helplessness) were included in mediation models for relationships between attachment avoidance and depression. Results demonstrated a significant mediation effect (a_1*b_1=.40 (.17); ß=.05, 95% CI=.02-.10) for the helplessness dimension, but not the rumination or magnification dimensions, of pain catastrophizing. The direct effect of attachment avoidance on depression remained significant after controlling for mediation (c_1'= .99 (.38), ß=.14, p<.01), indicating partial mediation by helplessness.

Finally, a multiple mediation model was used to explore mechanisms of relationships between attachment avoidance and disability. Further examination of the three dimensions of pain catastrophizing revealed significant, positive associations between disability and rumination (r=.36, p<.01), magnification (r=.33, p<.01), and helplessness (r=.49, p<.01). Effect sizes were moderate. Therefore, all three dimensions of pain catastrophizing (rumination, magnification, helplessness) were included in mediation models for relationships between attachment avoidance and disability. Results demonstrated a significant mediation effect (a_1*b_1=1.06 (.35); ß=.07, 95% CI=.03-.13) for the helplessness dimension, but not the rumination or magnification dimensions, of pain catastrophizing. The direct effect of attachment avoidance on disability was no

longer significant after controlling for mediation (c_1'= .77 (.70); *ß*=.06, *p*=.27), indicating full mediation by helplessness.

In summary, the helplessness dimension partially mediated positive relationships between attachment anxiety and depression, as well as positive relationships between attachment avoidance and depression. The helplessness dimension also fully mediated positive relationships between attachment avoidance and disability.

Others' responses to pain: the three dimensions of pain catastrophizing. Following hypotheses 5 and 6 and previous work by Gauthier and colleagues (2012) examining the role of attachment on the CCM among patients with cancer pain, relationships between the three dimensions of pain catastrophizing and responses to pain from others were tested in a series of three steps. First, Pearson correlations between predictors (attachment anxiety, attachment avoidance, individual subscales of pain catastrophizing, duration of chronic pain) and dependent variables (perceptions of solicitous and negative responses to pain from others) were calculated and significant relationships were determined by performing *t*-tests at the .05 level. Second, multivariate regression models were performed on each category of perceived responses to pain from others (i.e., solicitous and negative), with attachment anxiety, attachment avoidance, pain catastrophizing (subscale scores), and duration of chronic pain as predictors. Because of significant relationships with each outcome, relationship status (i.e., partnered or unpartnered) and was also included in the model.

Although none of the subscales were significantly associated with perceived solicitous responses in bivariate analyses, in multivariate analyses, rumination was positively associated with perceived solicitous responses (*ß*=.24 (.09), *p*<.05) and

helplessness was negatively associated with perceived solicitous responses (ß=-.18 (.08), $p<.05$). Magnification was not significant (ß=.13 (.09), $p<.17$). Effect sizes were small.

Rumination ($r=.13$, $p<.01$), magnification ($r=.17$, $p<.01$), and helplessness ($r=.28$, $p<.01$) were significantly associated with perceived negative responses in bivariate analyses. In multivariate analyses, magnification was negatively associated with perceived negative responses (ß=-.16 (.08), $p<.05$) and helplessness was positively associated with perceived negative responses (ß=.32 (.08), $p<.01$). Rumination was not significant (ß=-.11, $p=.18$). Effect sizes were small to moderate.

Table 21

Summary of Hypotheses and Results

Aims & Hypotheses	Significant Results
Aim #1	
Hypothesis 1. Appraisals would explain positive relationships between attachment and pain catastrophizing.	Anxiety: (+) threat; (+) catastrophizing Partial mediation: Anxiety → threat → catastrophizing Avoidance (+) threat; (-) self-efficacy; (+) catastrophizing Full mediation: Avoidance → threat; self-efficacy → catastrophizing
Hypothesis 2. Attachment would exacerbate relationships between appraisals and pain catastrophizing.	
Aim #2	
Hypothesis 3. Pain catastrophizing would explain positive relationships between attachment and outcomes.	Anxiety: (+) depression Partial mediation: Anxiety → catastrophizing → depression Avoidance: (+) depression; (+) disability Partial mediation: Avoidance → catastrophizing (helplessness) → depression Full mediation: Avoidance → catastrophizing (helplessness) → disability
Hypothesis 4. Attachment would exacerbate relationships between pain catastrophizing and outcomes.	

Aim #3	
Hypothesis 5. Solicitous responses to pain from others would be negatively associated with attachment anxiety and avoidance, positively associated with pain catastrophizing, and negatively associated with duration of chronic pain. Significant interactions between these predictors would emerge.	Solicitous responses to pain from others: - Anxiety (-) (bivariate, multivariate) - Avoidance (-) (bivariate, multivariate-trend) - Catastrophizing (+) (multivariate only): helplessness (-); rumination (+) - 3-way interactions: o Duration of pain * attachment anxiety * relationship status o Duration of pain * attachment anxiety * attachment avoidance
Hypothesis 6. Negative responses to pain from others would be positively associated with attachment anxiety and avoidance, negatively associated with pain catastrophizing, and positively associated with duration of chronic pain. Significant interactions between these predictors would emerge.	Negative responses to pain from others: - Anxiety (+) (bivariate, multivariate) - Avoidance (+) (bivariate, multivariate) - Catastrophizing (+) (bivariate only): helplessness (+); magnification (-) - 2-way interactions: o Duration of pain * catastrophizing o Duration of pain * attachment anxiety
Aim #4.	
Hypothesis 7. Attachment anxiety would be negatively associated with self-compassion and this relationship would partially mediate the positive relationship between attachment anxiety and pain catastrophizing.	Anxiety: (-) self-compassion Partial mediation: Anxiety → self-compassion → catastrophizing
Hypothesis 8. Attachment anxiety would moderate relationships between self-compassion and pain catastrophizing, such that reductions in pain catastrophizing associated with more self-compassion would be attenuated, or buffered, by attachment anxiety.	Pain Catastrophizing: - 2-way interaction: Attachment anxiety * self-compassion

Chapter 6: Discussion

The following discussion will summarize and interpret the findings of the present study within the context of relevant literature. It will examine the contributions and limitations of results pertaining to each study aim, including a focus on relationships between insecure attachment and the following: (1) pain appraisals and pain catastrophizing; (2) pain catastrophizing and adjustment; (3) pain catastrophizing and perceptions of social support; and (4) self-compassion and pain catastrophizing. It will also explore limitations of the present study and considerations for future research.

Aim #1: Attachment, Pain Appraisals, and Pain Catastrophizing

The first aim was to examine mechanisms of relationships between attachment and pain catastrophizing, including: (1) the extent to which they are explained by attachment-based schemata, including appraisals of stimuli (i.e., pain) as threatening and beliefs about one's ability to cope with threat (i.e., pain self-efficacy); and (2) the extent to which relationships between these kinds of schemata, or cognitive appraisals, and pain catastrophizing might be influenced by the relative presence, or absence of attachment anxiety and/or avoidance.

Hypotheses were partially supported. Consistent with expectations, attachment anxiety was positively associated with pain threat, and this effect partially mediated the positive relationship between attachment anxiety and pain catastrophizing. Contrary to expectations, attachment anxiety was not significantly associated with pain self-efficacy. Also contrary to expectations, neither attachment anxiety nor avoidance moderated relationships between appraisals and pain catastrophizing. In exploratory analyses, attachment avoidance was positively associated with pain threat and negatively

associated with pain self-efficacy, and these effects fully mediated the positive relationship between attachment avoidance and pain catastrophizing. Taken together, findings related to the first aim of the present study support the Attachment-Diathesis Model of Chronic Pain (ADMoCP) and the idea that attachment is critical in shaping the ways that women appraise and respond to chronic pain. They also provide partial support for the Communal Coping Model (CCM) and suggest that for women with higher attachment anxiety and generalized chronic pain, catastrophizing may represent a form of social communication. These findings will be discussed in greater detail, below.

Pain threat. Consistent with the CCM and the idea that pain catastrophizing serves a social communicative function, attachment anxiety was positively associated with pain threat, and this effect partially mediated the positive relationship between attachment anxiety and pain catastrophizing. These results are aligned with attachment theory and prior literature (e.g., Ciechanowski et al., 2003; Meredith, 2013), which conceptualize pain catastrophizing as a passive, hyper-activating response to stress that is designed to elicit caretaking behavior in others and as such, is likely to be more common in individuals who have more negative views of the self and fears of abandonment. Results demonstrating pain threat as a partial mediator support the idea that women with more attachment anxiety are more likely to perceive stimuli as a threat to their wellbeing, and in turn, to respond to this threat with use of strategies that are designed to solicit support from others (e.g., Meredith et al., 2005). However, the finding of partial mediation also suggests that much of the variance in pain catastrophizing associated with attachment anxiety (up to 50%) is due to factors other than pain threat. Implications of

other appraisals and responses to pain, including views of the self and others, will be discussed below and under the third and fourth aim.

Interestingly, attachment avoidance was also positively associated with pain threat, and this effect partially mediated the positive relationship between attachment avoidance and pain catastrophizing. According to attachment theory, attachment avoidance should be associated with schemata that consider others to be unreliable or untrustworthy, causing discomfort with closeness; therefore, emotional distress and/or perceived threat should trigger use of deactivating strategies that maintain emotional distance and push others away. The results of the present study, which demonstrate that women with more attachment avoidance are more likely to perceive chronic pain as a threat to their wellbeing, and in turn, to respond to this threat by catastrophizing more, suggest that in the context of chronic and disabling pain, deactivating strategies that are typically associated with avoidant attachment (i.e., downplaying one's feelings to maintain emotional distance) may no longer represent a viable approach to affective self-regulation. These results add important context to mixed findings in the current literature on the CCM and highlight the complex nature of catastrophizing in women with chronic pain (e.g., Gauthier et al., 2012; Hurter et al., 2014).

When contemplating factors that precipitate catastrophizing in women with chronic pain, it may also be helpful to consider the impact of the female gender role. Because female gender socialization emphasizes affiliation and communion, women are more likely than their male counterparts to be socialized towards a communally oriented and expressive approach in their efforts to cope with stress and pain (Vingerhoets & Bylsma, 2015). At the same time, because of traditional gender role expectations (e.g.,

taking care of children), women may also be more likely to sacrifice themselves and their own needs for the sake of others (e.g., Maji & Dixit, 2019). This gendered lens may help to shed light on positive relationships between attachment avoidance and pain threat in the present sample of women, who may feel less equipped to cope with strategies that emphasize their own personal agency, and therefore, more threatened by pain in the context of discomfort with closeness or expectations that others will be unresponsive.

From this perspective, it might be that attachment avoidance is related to more pain catastrophizing – that is, more rumination about pain, magnification of pain, and feelings of helplessness due to pain – because chronic and disabling pain represents a significant threat to the idea that one can or should be self-reliant. In this case, in addition to communicating interpersonal needs, catastrophizing may represent a pattern of escalating distress and helplessness that evolves when deactivating strategies are no longer effective and strategies that bolster agency and self-efficacy, such as those typically associated with the male gender role (e.g., assertiveness, problem-solving), are underdeveloped. The implications of this adjustment pattern will be discussed in more detail under the second and third aims.

Pain self-efficacy. The idea that gender might play a significant role in relationships between attachment and pain catastrophizing is also supported by the finding that lower self-efficacy partially explains the relationship between greater attachment avoidance, but not greater attachment anxiety, and more pain catastrophizing. Although these results are divergent from expectations and prior research, they align with the idea that women who feel uncomfortable relying on others due to their attachment dynamics may feel less capable of coping with chronic pain, particularly when societal

norms may disempower their sense of agency and encourage them to utilize social support as a primary coping mechanism. On the contrary, women who are more likely to continually seek support and reassurance from others, such as those with more attachment anxiety, may benefit from greater congruence between their attachment style, approach to affective self-regulation, and traditional gender role expectations.

Research on the benefits of communal coping, defined as a shared appraisal of illness between a patient and their support person(s) (Lyons et al., 1998), might also help to explicate why attachment avoidance, but not anxiety, may be associated with lower pain self-efficacy in women with chronic pain. Communal coping is unique in that the responsiveness and supportiveness of others is known to enhance, rather than undermine, self-efficacy by making it easier for patients to manage their illness (Helgeson et al., 2019). However, researchers believe that patient preference for independence, including schemata associated with attachment avoidance, may reduce its effectiveness. For example, in a recent study of patients with diabetes by Van Vleet and Helgeson (2019), communal coping was most effective when attachment avoidance was low, and when attachment avoidance was high, it was associated with poorer relationship quality and more distress. These results are aligned with findings that attachment avoidance represents a barrier to improving self-efficacy in multidisciplinary treatment for chronic pain, as well as researchers' hypotheses that avoidance may detrimentally impact patients' ability to form a working alliance with their providers (Kowal, McWilliams, Peloquin, et al., 2015). When considered in the context of the female gender role (i.e., an emphasis on use of communal coping above other strategies), barriers to effective communal coping may help to explain why discomfort with closeness (i.e., attachment

avoidance) is associated with greater pain threat, lower pain self-efficacy, and more pain catastrophizing in women with chronic pain.

Null findings. The absence of significant interactions between attachment and pain appraisals in predicting pain catastrophizing is inconsistent with the ADMoCP and prior research, particularly studies that focus on appraisals of acute pain. In the context of chronic pain, these null findings may reflect the dynamic and ever-changing nature of relationships between attachment, pain appraisals, coping responses, and the social environment (e.g., Sirois & Gick, 2016). The impact of the duration of chronic pain will be discussed further under the third aim.

Summary. Taken together, results from the first aim support the ADMoCP and the idea that insecure attachment represents a diathesis, or vulnerability to, problematic adjustment in women with generalized chronic pain. Although relationships between pain appraisals and pain catastrophizing did not differ in the relative presence or absence of attachment anxiety or avoidance, results from mediation analyses illuminate that insecure attachment predisposes women to more negative pain appraisals and that these appraisals result in more pain catastrophizing.

Regarding the CCM, results from the first aim are inconclusive. Findings that demonstrate positive relationships between attachment anxiety and pain catastrophizing (mediated by pain threat) support the idea that catastrophizing may represent a hyperactivating response that aims to solicit proximity, safety, and support from others. On the other hand, results demonstrating positive relationships between attachment avoidance and pain catastrophizing (mediated by pain threat and self-efficacy) highlight that the mechanisms underlying pain catastrophizing may be more complex than meets

the eye. Although we might not expect that attachment avoidance would be associated with a hyperactivating strategy like pain catastrophizing, it may be driven by a pattern of escalating distress and helplessness in women with chronic, disabling pain who have found that deactivating strategies are no longer effective at meeting their attachment-based goals (i.e., safety and security).

Aim #2: Attachment, Pain Catastrophizing, and Adjustment

The second aim was to explore relationships between attachment, pain catastrophizing, and adjustment, namely depression and disability. Analyses examined whether: (3) relationships between attachment and pain catastrophizing explain variance in depression and disability; and (4) relationships between pain catastrophizing and adjustment differ in the relative presence, or absence of attachment anxiety and/or avoidance.

Hypotheses were partially supported. Consistent with expectations, attachment anxiety was associated with more depression, and this relationship was partially explained by the positive relationship between attachment anxiety and pain catastrophizing. However, contrary to expectations, attachment anxiety was not significantly associated with disability. Also contrary to expectations, neither attachment anxiety nor avoidance moderated relationships between pain catastrophizing and adjustment. In exploratory analyses, attachment avoidance was associated with more depression and more disability. The relationship between attachment avoidance and depression was partially mediated by pain catastrophizing; the relationship between attachment avoidance and disability was fully mediated by pain catastrophizing. In general, findings related to the second aim of the study support the AMoCP and the idea

that insecure attachment represents a diathesis, or vulnerability to problematic adjustment in women with chronic pain; this will be discussed in more detail, below.

Depression. Results demonstrating positive relationships between insecure attachment and depression are aligned with the ADMoCP and prior research, including studies demonstrating associations between both dimensions of insecure attachment and depression in community samples (Marganska et al., 2013), as well as samples of individuals with chronic pain (Meredith et al., 2007). They are also consistent with research using the Experiences in Close Relationships Scale that has demonstrated stronger relationships between attachment anxiety and depression as compared to attachment avoidance and depression (e.g., Kowal et al., 2015).

Results highlighting pain catastrophizing as a partial mediator of relationships between insecure attachment and depression are also in accordance with the ADMoCP and prior research (e.g., Tremblay & Sullivan, 2010). Importantly, these results highlight that pain catastrophizing explains only a part of the variance in depression related to insecure attachment, suggesting that there may be other, more significant mechanisms by which attachment-related schemata influence this adjustment-related outcome in women with chronic pain. One possible explanation that may be particularly relevant to the female experience (and that may help to explain particularly high depression scores in this group) is that generalized chronic pain conditions, which are significantly more common in women as compared to men, often lack objective diagnostic tests, clear-cut treatments, and established etiologies. As such, individuals with these disorders are often viewed suspiciously and claims of malingering are more common than in the context of other types of chronic pain (e.g., failed back syndrome). Indeed, a recent review of

gender bias in health care and gendered norms towards patients with chronic pain showed that women are more likely than men to be perceived as hysterical, emotional, complaining, not wanting to get better, and fabricating the pain, as if it is "all in their head" (Gremyr et al., 2018). This review also showed that women are more likely to be assigned psychological causes for their pain as compared to somatic ones, and that their pain is more likely to be defined in terms of the absence of something (e.g., diagnostic evidence, organic pathology, and so on), rather than the presence of something. Not surprisingly, women with "ambiguous" illnesses report higher depression scores as compared to women with more clear medical diagnoses (McInnis et al., 2014).

For women with insecure attachment, whose interpersonal schemata may be particularly sensitive to rejection (i.e., attachment anxiety) and/or discomfort with closeness (i.e., attachment avoidance), it is easy to imagine how these gendered phenomena may be particularly detrimental to psychological well-being. These schemata may make women particularly vulnerable, or sensitive to the negative impact of perceived illegitimacy from family, friends, colleagues, and providers, including poor self-esteem and loss of dignity (Werner & Malterud, 2003), more difficulty with acceptance of pain, less willingness to engage in activities despite pain (LaChapelle et al., 2008), and more difficulty establishing alliances with providers and engaging in constructive, shared decision making (Frantsve & Kerns, 2007). Each of these effects would provide an alternative explanation as to how insecure attachment may be associated with greater depression in samples of women with generalized chronic pain. The impact of insecure attachment on perceptions of others' responses will be explored under the third aim.

Disability. Results regarding pain catastrophizing and disability may provide even more support for consideration of the traditional female gender role as critical to understanding relationships between insecure attachment and pain-related outcomes in women. Consistent with results related to self-efficacy under the first aim, it was surprising to learn that attachment avoidance, but not attachment anxiety, was associated with more self-reported disability in the present sample. According to theory and prior research, one would expect that attachment anxiety would be associated with lower pain self-efficacy, greater pain-related fear and hypervigilance to pain-related stimuli, and that these relationships would contribute to patterns of more passive coping behaviors and withdrawal from activities, resulting in more disability (i.e., the Fear-Avoidance Model of Chronic Pain; Andrews et al., 2014b; Asmundson et al., 2004). The results in the present study, however, suggest that in women with chronic pain, it may be more likely for those with greater attachment avoidance to withdraw from activities and report more disability.

In making sense of these results, which are consistent with findings of significant, negative relationships between attachment avoidance and pain self-efficacy, traditional gender role expectations and the social context could be particularly important. Participation in activities such as work, home responsibilities, and socializing with friends and family may require asking for assistance and/or advocating for one's needs, which is likely to be especially challenging for women whose attachment style *and* gender role make this uncomfortable. This is supported by existing daily diary research in women with generalized chronic pain disorders showing smaller increases in use of social coping strategies on days of high catastrophizing in women with high attachment

avoidance (Kratz et al., 2012). It also highlights the functional toll of increases in pain catastrophizing associated with attachment avoidance in women with generalized chronic pain disorders.

Dimensions of pain catastrophizing. Post-hoc analyses examining the three dimensions of pain catastrophizing may help to explain this functional toll. These analyses highlight the relative importance of the helplessness dimension, but not the rumination or magnification dimensions, in explaining relationships between insecure attachment, depression, and disability. This is consistent with prior research demonstrating helplessness as a critical factor in explaining variance in pain severity, pain-related interference, depressed mood, and quality of life following a chronic pain rehabilitation program (Craner et al., 2016). It is also consistent with findings of gender differences in pain catastrophizing, including studies that have shown that women tend to report more helplessness due to pain as compared to their male counterparts (e.g., Sullivan et al., 2000) and that gender explains the most variance (up to 10%) in the helplessness dimension of pain catastrophizing.

The present study adds to existing literature by highlighting attachment anxiety *and* avoidance as vulnerabilities to helplessness in women with generalized chronic pain disorders. It seems that regardless of whether attachment-related schemata implicate the self and/or others, women who are less secure in their relationships are more likely to feel helpless and have more difficulty with adjustment as a result. This is consistent with what is known about female gender socialization, which emphasizes affiliation and communion as critical to psychological adjustment. It can also be explained through the lens of attachment theory, which suggests that individuals with more attachment anxiety

may be more likely to feel helpless due to persistent worries about caregiver availability, while individuals with more attachment avoidance may be more likely to feel helpless due to discomfort with asking for help. Results from this study suggest that both of these mechanisms may be critically important for women with chronic pain and that the context of the female gender role may help to explain why.

Null findings. The absence of significant interactions between attachment and pain catastrophizing in predicting depression and disability was inconsistent with the ADMoCP. These findings suggest that pain catastrophizing has a consistently negative impact on adjustment, including more depression and disability, regardless of whether attachment anxiety or avoidance is present. Similar to the first aim, these results highlight the complexity of relationships between variables and suggest that additional factors, such as duration of chronic pain and perceptions of the social environment, may need to be considered in order to identify pertinent interaction effects. These factors will be discussed further under the third aim.

Summary. In sum, results from the second aim partially support the ADMoCP. Although relationships between pain catastrophizing and adjustment did not differ in the relative presence or absence of attachment anxiety or avoidance, results from mediation analyses highlight that insecure attachment predisposes women to catastrophize about pain more, and that this leads to more depression and disability.

Results from the second aim provide additional context for evaluation of the CCM. A closer examination of the three dimensions of pain catastrophizing revealed that attachment anxiety and avoidance represent a predisposition to feelings of helplessness, and that helplessness due to attachment avoidance, but not anxiety, is associated with

more disability. Consistent with the first aim, this provides support for the idea that pain catastrophizing may be driven by multiple mechanisms; though it may be reinforced by solicitous responses in women who desire emotional intimacy, it may also be perpetuated by a pattern of helplessness in women who would prefer to be self-reliant.

Aim #3: Attachment and the Communal Coping Model

The third aim was to further evaluate whether pain catastrophizing serves a social communicative function (i.e., to solicit social support) and to consider the roles of attachment and duration of chronic pain in determining how women perceive their social environment. In pursuit of this aim, analyses tested whether attachment, pain catastrophizing, and duration of chronic pain would influence and/or interact with one another to shape: (5) perceptions of solicitous responses to pain; (6) perceptions of negative responses to pain.

Consistent with expectations, perceived solicitous responses were negatively associated with attachment anxiety and avoidance in bivariate and multivariate analyses and positively associated with pain catastrophizing in multivariate (but not bivariate) analyses. Solicitous responses were not significantly associated with duration of chronic pain in either analysis. Significant interactions emerged between: (a) attachment anxiety, relationship status and duration of chronic pain; and (b) attachment anxiety, attachment avoidance and duration of chronic pain. Also consistent with expectations, perceived negative responses were positively associated with attachment anxiety and avoidance in bivariate and multivariate analyses and positively associated with pain catastrophizing in bivariate (but not multivariate) analyses. Perceived negative responses were also positively associated with duration of chronic pain in multivariate (but not bivariate)

analyses. Significant interactions emerged between: (a) pain catastrophizing and duration of chronic pain; (b) pain catastrophizing and attachment anxiety. Findings will be discussed below.

Pain catastrophizing. When controlling for attachment anxiety, attachment avoidance, and duration of chronic pain, pain catastrophizing was associated with perceptions of more solicitous, but not negative, responses to pain from others. Interestingly, when not controlling for these factors, the inverse was true; pain catastrophizing was associated with perceptions of more negative, but not solicitous, responses to pain from others. These findings are consistent with research supporting the CCM, which highlight pain catastrophizing as a mechanism of soliciting social support. They also add clarity to mixed findings in the literature, which may not consider the role of attachment or duration of chronic pain in predicting pain catastrophizing or relationships between pain catastrophizing and responses to pain from others (e.g., Boothby et al., 2004; Romano et al., 2016).

Results also revealed a significant two-way interaction between pain catastrophizing and pain duration in predicting perceptions of negative, but not solicitous, responses to pain from others. Upon closer examination, the interaction revealed that in the context of chronic pain of shorter duration, high pain catastrophizers perceived more negative responses from others. By contrast, in the context of pain of longer duration, high pain catastrophizers perceived fewer negative responses from others. These findings are contrary to prior research demonstrating that pain catastrophizing is associated with more negative responses to pain over time (e.g., Buenaver et al., 2007). Rather, they suggest that for women with generalized chronic pain disorders, pain catastrophizing may

be more strongly associated with more perceived negative responses in the early stages of chronic pain.

One possible explanation for these results, which was previously explored under the second aim, is that women with generalized chronic pain disorders are more likely to be perceived as hysterical, complaining, or malingering when pain seems "ambiguous" or unclear in etiology. This experience may be particularly relevant for women who are in the process of seeking diagnosis and treatment, which may take several years. For instance, research in women with fibromyalgia shows that on average, it takes at least three years and four different medical providers to receive a definitive diagnosis after pain onset (Choy et al., 2010). When communicating with others and seeking an explanation for symptoms, catastrophizing may represent an attempt to get others to listen if it seems like pain is not being taken seriously. It might also represent a feeling of helplessness if others are not responding to one's distress.

Dimensions of pain catastrophizing. Post-hoc analyses of the three dimensions of pain catastrophizing also support the idea that although catastrophizing may effectively solicit social support, it may also represent a sense of learned helplessness. In multivariate analyses controlling for attachment anxiety, attachment avoidance, and duration of chronic pain, findings related to rumination and magnification were consistent with the CCM, while findings related to helplessness were not. More specifically, rumination was associated with perceptions of more solicitous responses and magnification was associated with perceptions of fewer negative responses; however, helplessness demonstrated the opposite pattern; it was associated with perceptions of fewer solicitous responses and more negative responses.

These findings highlight the uniqueness and utility of each dimension of pain catastrophizing. All other things equal, ruminating on pain (e.g., "I can't seem to keep it out of my mind," "I keep thinking about how much it hurts") may be most effective in soliciting helpful responses from others, while magnification of pain (e.g., "I become afraid that the pain will get worse," "I wonder whether something serious may happen") may be most effective at reducing negative responses from others. On the other hand, feeling helpless due to pain ("I feel I can't go on," "It's terrible and I think it's never going to get any better", "It's awful and I feel that it overwhelms me") may make things worse. This helps to explain why helplessness, but not rumination or magnification, was responsible for relationships between insecure attachment, depression, and disability.

Attachment. In bivariate and multivariate analyses, attachment anxiety and avoidance were associated with perceptions of more negative, and less solicitous, responses to pain from others. Consistent with prior research (e.g., Forsythe et al., 2012; Gauthier et al., 2012), this suggests that cognitive schemata related to attachment may shape the ways by which women with chronic pain perceive supportive others in their environment. It is also aligned with prior research suggesting that insecurely attached patients may be more likely to react to pain by using interpersonal strategies, and that this leads to greater relational conflict (Pietromonaco et al., 2013). Significant interaction effects in multivariate analyses suggest that these effects may be particularly important to understanding how perceptions of the social environment evolve over time when living with a generalized chronic pain condition. Indeed, the present study found three significant interactions involving insecure attachment in predicting perceived responses of others based on duration of chronic pain.

The first interaction revealed that in women with high attachment anxiety, those who had been in chronic pain for longer reported more perceived negative responses from others as compared to those who had more recent onset of chronic pain. This means that for women whose attachment schemata emphasize negative models of the self, longer time in pain may mean a subjective experience associated with more negative or punishing responses from others. This is consistent with the idea that attachment anxiety is associated with fears of negative evaluation by others and heightened sensitivity to rejection, which may increase perceptions of conflict in relationships (Campbell et al., 2005; Manning et al., 2017). It is also consistent with recent research in couples coping with female gentio-pelvic pain, which demonstrate positive relationships between women's attachment anxiety and their perception of more negative responses from their partners, leading to more dyadic distress and lower relationship satisfaction (Charbonneau-Lefebvre et al., 2020).

The second interaction revealed that in women with high attachment anxiety that also identified as having a spouse or partner, those who had been in chronic pain for longer reported fewer perceived solicitous responses from their spouse or partner as compared to those who had more recent onset of chronic pain. This means that for women whose attachment schemata emphasize negative models of the self, longer time in pain may mean a subjective experience associated with fewer emotionally responsive or otherwise helpful responses from a spouse or partner. This is consistent with the idea that attachment anxiety is associated with preoccupation with the availability of social support, including research demonstrating that individuals with more attachment anxiety are prone to chronic relational worries associated with perceptions of their partners as

less caring and responsive to their needs (e.g., Birnbaum, 2007). It may also reflect some degree of caregiver fatigue or burnout, which may be more likely and/or more salient in the context of high attachment anxiety. Relevant to the sample in this study, in a another recent study of couples coping with female genito-pelvic pain, women were more likely to feel less accepted, understood, and cared for by their partner in the context of more attachment anxiety and depression symptoms, even when objective observers did not rate their partners that way (Bosisio et al., 2020).

The final interaction revealed that in women with high attachment anxiety and avoidance, a similar pattern emerged; duration of chronic pain was associated with perceptions of fewer solicitous responses from others. This means that for women whose attachment schemata emphasize negative models of the self and others, longer time in pain may mean a subjective experience associated with fewer emotionally responsive or otherwise helpful responses from the people that they feel closest to, whether that be a spouse/partner, other family member, or friend. This is consistent with studies of laboratory-induced stress, attachment, and perceptions of social support (e.g., Collins & Feeney, 2004), as well as the idea that co-occurring attachment anxiety and avoidance represent a fearful attachment style, which is characterized by hypervigilance to perceived rejection *and* discomfort with closeness (i.e., fear of abandonment and fear of intimacy). When both of these schemata are present, individuals are likely to be conflicted or ambivalent about receiving social support and may unknowingly send mixed messages to others (e.g., "please help me" and "go away") that push them away and/or undermine their attempts to help (Paetzold et al., 2015).

Summary. Overall, results from the third aim support the CCM and demonstrate that when controlling for insecure attachment and duration of chronic pain, pain catastrophizing in women is associated with perceptions of more solicitous, and less negative, responses to pain from others. However, a closer look at the three dimensions of pain catastrophizing provides a more nuanced perspective and elucidates the multifaceted nature of pain catastrophizing. While ruminating on and magnifying pain may effectively solicit social support, helplessness associated with pain catastrophizing may elicit more negative responses from the social environment. Taken together with findings under the second aim, it is clear that helplessness associated with attachment anxiety and avoidance may be critical for women with generalized chronic pain.

Results from the third aim provide support for the ADMoCP and highlight the importance of insecure attachment in predicting women's subjective experiences of social support. In general, findings suggest that attachment anxiety is associated with a less positive and more negative perception of social support the longer that one is in pain, including fewer solicitous responses in the context of a marriage/partnership and more negative responses from supportive others more broadly. The combination of attachment anxiety and avoidance also appears to have a detrimental effect over time, including perceptions of fewer solicitous responses from supportive others the longer that one is in pain. These findings provide useful context for findings under the first two aims, and may help to explain additional mechanisms by which attachment anxiety predisposes women to more pain catastrophizing.

Aim #4: Self-Compassion

The fourth and final aim of the present study was to explore relationships between attachment anxiety, self-compassion, and pain catastrophizing. It sought to examine whether: (7) positive relationships between attachment anxiety and pain catastrophizing are explained by less self-compassion; and (8) relationships between self-compassion and pain catastrophizing differ in the relative presence, or absence of attachment anxiety.

Both hypotheses were supported. Consistent with expectations, the positive relationship between attachment anxiety and pain catastrophizing was partially explained by less self-compassion. A significant interaction also emerged between self-compassion and attachment anxiety, such that reductions in pain catastrophizing associated with greater self-compassion were weaker in the presence of higher, as compared to lower, attachment anxiety. In general, findings under the fourth aim of the study support self-compassion as a critical factor in understanding relationships between attachment anxiety and hyperactivating coping strategies like pain catastrophizing; these findings will be discussed in more detail, below.

Attachment anxiety and self-compassion. Consistent with the ADMoCP and the idea that self-compassion may reflect internalization of one's early caregiver(s), attachment anxiety was negatively associated with self-compassion, and this effect partially mediated the positive relationship between attachment anxiety and pain catastrophizing. These results are aligned with prior literature highlighting that attachment anxiety is associated with deficits in the ability to respond to oneself with kindness, care, and concern in the context of negative events (Neff & McGehee, 2010), and illuminate that these deficits are associated with more pain catastrophizing in women

with chronic pain. This is consistent with attachment theory and the CCM, including that pain catastrophizing may represent an interpersonally-oriented, hyperactivating strategy designed to elicit positive responses like kindness, care, and concern from others.

These results also help to explain the effectiveness of interventions for women with chronic pain that focus on increasing self-compassion (e.g., Montero-Marin et al., 2020). Researchers have pointed out that these interventions lead to improvements in emotional communication and relationships that may allow others to provide more emotionally attuned support (Chapin et al., 2014). Studies have also shown that women with chronic pain who report more self-compassion are able to experience more feelings of safeness, social contentedness, and connectedness (Carvalho et al., 2019). Taken together with the findings in the present study and what is known about female gender role socialization, it follows that improvements in relationships associated with increases in self-compassion might decrease the need for hyperactivating strategies like pain catastrophizing, and that this might be especially true for women, who may tend to place more value on interpersonal connectedness. Furthermore, increases in kindness, care, and concern for the self may also reduce the need for as much support.

Interactions between attachment anxiety and self-compassion. Also consistent with the ADMoCP, a significant interaction emerged between attachment anxiety and self-compassion, such that reductions in pain catastrophizing associated with more self-compassion were weaker in the context of higher, as compared to lower, attachment anxiety. This suggests that self-compassion may be less likely to reduce pain catastrophizing for those with more anxious attachment, who may be preoccupied with the availability of caregivers to be responsive to their needs and more likely to use

hyperactivating strategies to convey their distress. This also highlights that women with more attachment anxiety, who may benefit the most from interventions that aim to increase self-compassion, may also see less relative improvement as compared to those with less negative models of the self. This supports the importance of other mediators of the relationship between attachment anxiety and pain catastrophizing, such as increased pain threat, that may also need to be addressed. More research is needed to understand the implications of these findings, including whether and how interventions might be tailored to individuals depending upon their attachment style.

Summary of Results

The purpose of the present study was to examine how relationship patterns influence coping responses in women with generalized chronic pain conditions. Using the Communal Coping Model of Pain Catastrophizing (CCM) and the Attachment-Diathesis Model of Chronic Pain (ADMoCP) as a guide, the present study demonstrates that an interpersonal, attachment based framework may be particularly useful for furthering our understanding of pain catastrophizing in women with generalized chronic pain.

Attachment Diathesis Model of Chronic Pain (ADMoCP). Results from the present study support the ADMoCP and the idea that insecure attachment represents a diathesis, or vulnerability to problematic adjustment to chronic pain in women. Consistent with the model, results show that attachment anxiety makes women more vulnerable to catastrophizing in response to chronic pain, and in turn, to report more depression. The study shows that negative working models of the self and preoccupation with proximity to others may predispose women to perceive a greater degree of threat due to pain and to exercise less self-compassion. Findings also suggest that attachment

anxiety may make self-compassion less effective by mitigating reductions in pain catastrophizing associated with this response. Inconsistent with the model, attachment anxiety did not interact with appraisals of pain or self-efficacy in predicting pain catastrophizing, nor did it interact with pain catastrophizing in predicting depression or disability; however, results from multivariate regression models highlight that attachment anxiety may interact with other factors, such as duration of chronic pain, to predispose women to perceive less solicitous, and more negative, responses to pain from others.

Also consistent with the model, results suggest that attachment avoidance renders women more vulnerable to catastrophizing in response to chronic pain, and in turn, to report more depression and disability. The study shows that negative working models of others and discomfort with closeness may predispose women to perceive a greater degree of threat due to pain and to perceive themselves as less capable of coping with it. Inconsistent with the model, attachment avoidance did not interact with appraisals of pain or self-efficacy in predicting pain catastrophizing, nor did it interact with pain catastrophizing in predicting depression or disability; however, results from multivariate regression models highlight that attachment avoidance may interact with other factors, such as attachment anxiety and duration of chronic pain, to predispose women to perceive more negative responses to pain from others.

Communal Coping Model (CCM). Results from the present study provide mixed evidence in support of the CCM and the idea that the purpose of pain catastrophizing is to solicit social support. When controlling for insecure attachment and duration of chronic pain, pain catastrophizing was associated with more solicitous, and less negative, responses to pain from others. This supports the CCM and suggests that

pain catastrophizing may be a successful strategy for soliciting support from others, and that increased solicitous responses and decreased negative responses may reinforce this exaggerated, negative mental set in women with chronic pain.

However, some results from the present study are more inconclusive. Post-hoc analyses, which highlight that the rumination and magnification dimensions of pain catastrophizing explain these effects, also demonstrate that helplessness may have the opposite effect. This is consistent with findings that the helplessness dimension was responsible for the mediating effects of pain catastrophizing in the relationship between insecure attachment and adjustment. It is also consistent with results pertaining to insecure attachment and pain appraisals. Although findings that demonstrate positive relationships between attachment anxiety and pain catastrophizing (mediated by pain threat) support the idea that catastrophizing may represent a hyperactivating response that solicits support, results demonstrating positive relationships between attachment avoidance and pain catastrophizing (mediated by pain threat and self-efficacy) highlight that pain catastrophizing may not always represent an effort to draw others closer. When considered in the context of attachment avoidance and the female gender role, results suggest that pain catastrophizing may also reflect a pattern of escalating distress and helplessness in response to chronic, disabling pain.

Taken together, results from the present study highlight the complexity of women's experiences with chronic pain from an interpersonal perspective. They demonstrate the relative importance of attachment-based schemata in shaping critical aspects of women's pain experience, including how they evaluate their pain, evaluate themselves, and evaluate their social environment. They highlight how internal working

models and patterns of self-regulation influence coping responses like pain catastrophizing and self-compassion, and demonstrate that these responses can be understood from the perspective of interpersonal patterns and attachment needs. They also illuminate several important areas for future research, which will be discussed in the following section.

Limitations and Future Directions

In addition to its contributions to the current literature, the present study and its limitations reveal many possible directions for future research. Limitations and future directions are discussed below.

Design. The cross-sectional design of the present study may be its greatest limitation. In the absence of longitudinal research, cross-sectional survey studies of chronic pain are unable to determine causality in relationships between variables and may also fail to capture dynamic relationships between constructs over time. For example, contrary to prior research, there were no significant interactions between attachment and appraisals of chronic pain in predicting pain catastrophizing or between attachment and pain catastrophizing in predicting depression or disability. This does not mean that interactions between these variables do not exist in women with chronic pain; rather, they may simply be dynamic in nature, evolving over time and across circumstances, and therefore, obscured by a cross-sectional design that is limited in its ability to control for heterogeneity in these factors.

Consistent with the idea that relationships between variables may evolve over time and across circumstances, multivariate analyses demonstrated significant interactions between insecure attachment and duration of chronic pain in predicting

perceptions of the social environment. These findings are important because they highlight differences between women depending upon their attachment style and the amount of time that they have been in chronic pain. However, these findings are limited in their ability to provide information about the evolution of women's individual experiences across time.

This study is also limited in its ability to help us understand women's experiences at pivotal time points in their illness, such as before or after diagnosis. Additionally, it may obscure important changes that occur in the aging process and/or in the context of significant life milestones, such as marriage, parenthood, or the death of a family member. Furthermore, this study is unable to differentiate relationships between variables across specific life domains, such as the workplace, family relationships, or healthcare. Importantly, recent research has shown that changes in individual attachment can occur following significant life events and transitions, and that it can also look different across time, contexts, and relationships (for review, see Fraley, 2019). Therefore, additional research guided by the ADMoCP and the CCM is needed that considers women's experiences across timepoints and domains.

Measurement. One way to narrow the scope of study to particular timepoints and/or life domains is to shift the method of assessment towards more specific measurement tools. Many of the self-report questionnaires used in the present study assessed for the *general* presence or absence of constructs of interest, such as pain threat, pain self-efficacy, pain catastrophizing, and self-compassion. Future research is needed that examines these variables and their relationships to attachment-based schemata as they pertain to specific contexts and life domains, as well as their relative presence or

absence at specific time points or in response to specific stressors and/or events. For example, a future study might examine relationships between insecure attachment, pain catastrophizing, and perceptions of providers' responses to pain in the process of seeking diagnosis. Alternatively, studies might look at relationships between these variables and domain-specific self-efficacy, such as in vocational contexts, family situations (e.g., parenting), dating, etc. The present study provides a strong foundation upon which to address these kinds of research questions; however, in order to identify critical ways that attachment shapes adjustment to chronic pain, studies anchored in specific domains of life and points in time are necessary.

Another limitation of the present study from a measurement-based perspective is its reliance exclusively on self-report from women with chronic pain. Although this is useful for defining relationships between insecure attachment and *perceptions* of the social environment from the patient perspective, it does not consider the role of others' attachment style nor their perceptions of the pain sufferer. It also precludes us from evaluating the social environment from a more objective standpoint. Per suggestions by Romeo and colleagues (2017), an interpersonal study including the perspective of significant others as well as subjective and/or observational measures of the support that they offer would yield critical new insights, including areas of incongruence between perceptions of the pain sufferer and reality. This could help to elucidate directionality/causality in relationships between variables in the present study. For example, it would help to clarify whether pain catastrophizing leads to more negative responses from others, whether *perceptions* of negative responses from others lead to more pain catastrophizing, or both. Integrating relationship context and clarifying these

dynamics might help to inform interventions for women with chronic pain and their partners.

Sampling. It is also important to highlight that the findings of the present study are limited by sampling and recruitment methods, which heavily prioritized online support groups and list servs. Though the sample was diverse in age, duration of chronic pain, relationship status, employment status, and family household income, it was homogenous in race/ethnicity (91% white). This is important because the findings in the present study may not be generalizable to women of color, whose experiences are uniquely shaped by intersecting identities and cultural differences.

Importantly, existing research suggests that racial and ethnic differences, including experiences of discrimination, may be critical factors in understanding chronic pain from a biopsychosocial perspective. Indeed, studies have shown that experiences of discrimination based on individual characteristics may contribute to the development and maintenance of chronic pain by increasing psychological distress (Brown et al., 2018). Consistent with this, one study found that episodes of major lifetime discriminatory events were the strongest predictors of back pain report in African Americans, and in African-American women specifically, perceived day-to-day discrimination was the strongest predictor (Edwards, 2008). Relative to white women, Black women report more PTSD symptoms, depression symptoms, affective distress, and disability associated with chronic pain (Ndao-Brumblay & Green, 2005); in fibromyalgia, patients of color are more likely than their white counterparts to report poorer physical and psychological outcomes (Marr et al., 2020). It is clear that future research with more diverse sampling is needed that explores the impact of insecure attachment and the role of communal coping

in non-white women with chronic pain, whose unique experiences may lead to different findings.

Contextual factors. Also pertinent to diversity, this study highlights one of the weaknesses of the ADMoCP and the CCM, which is its relative ignorance of the social, cultural, and contextual factors that shape adjustment to chronic pain from a social-cognitive perspective. Consideration of these factors, including female gender role socialization and gender bias in the social environment, may help to explain ways that insecure attachment uniquely influences adjustment in women as compared to men. For example, the present study highlights that women with more attachment avoidance report more pain threat and lower self-efficacy, and that this results in more pain catastrophizing. These findings are inconsistent with attachment theory and the CCM, but may be explained by women's greater socialization towards interpersonal affiliation and communion.

In another example, this study highlighted the unique role of helplessness in explaining relationships between insecure attachment and adjustment, as well as in contributing to more negative perceptions of social support. Without understanding the impact of gendered experiences, which may differ across cultural contexts and may also be influenced by bias in healthcare and society, it is difficult to fully make sense of why women are more likely than men to feel this way. Future research should consider the role of variables pertinent to sociocultural factors, particularly gender, as potential moderators of relationships between insecure attachment, pain appraisals, and pain catastrophizing.

Clinical implications. Though clinical interventions were not a focus of the present study, future research might also consider the implications of these results for women with chronic pain in a clinical context. Not surprisingly, pain catastrophizing is known to be a critically important variable for predicting outcomes in rheumatologic disorders characterized by generalized chronic pain, including fibromyalgia and rheumatoid arthritis (Edwards et al., 2006). Although these disorders are known to be associated with complex problems such as fatigue, sleep disturbance, and cognitive difficulties (Häuser et al., 2015), the implications of pain catastrophizing for these symptoms is less well understood. As such, a better understanding of variables associated with catastrophizing in these disorders may help to tease apart unique clinical phenomena observed in these populations as compared to other forms of chronic pain.

In particular, findings specific to the three domains of pain catastrophizing may be worthy of further exploration. Given the present study's results suggesting functional differences in rumination, magnification, and helplessness from a communal coping perspective (i.e., associations between rumination and more perceived solicitous responses; magnification and fewer perceived negative responses; helplessness and fewer perceived solicitous responses and more perceived negative responses), illuminating the implications of these findings in a clinical context might help to facilitate more effective conceptualization of pain catastrophizing on a case-by-case basis. More specifically, understanding an individual's attachment style and unique pain catastrophizing profile might help to illuminate precipitating and perpetuating factors related to this response, thereby informing ways that interventions can be more tailored to individual needs.

Additionally, several of the variables assessed, such as self-efficacy, self-compassion, and pain catastrophizing, are known to be modifiable through evidence-based interventions (e.g., Cognitive Behavioral Therapy for Chronic Pain, Ehde et al., 2014; Acceptance and Commitment Therapy for Chronic Pain, McCracken & Vowles, 2014). If future research were to determine that the relationships observed in this cross-sectional study are also valid in a clinical context, providers might be able to more accurately conceptualize adjustment-related concerns and make more attuned recommendations for treatment. For example, the findings suggest that a woman with high attachment avoidance who presents with high pain catastrophizing might benefit from an intervention focused on bolstering self-efficacy, while a woman with high attachment anxiety who presents with high pain catastrophizing might benefit from an interpersonal or group intervention that encourages self-compassion. Future research that assesses attachment and other study variables in the context of clinical assessment and treatment could help to facilitate improvements in patient-centered care.

Conclusions

In summary, the implications of the present study are multifold. First, they provide support for the ADMoCP and highlight that insecure attachment plays a significant role in women's adjustment to chronic pain, particularly in regard to predicting levels of pain catastrophizing, self-compassion, and perceptions of the social environment. Second, they provide support for the CCM and highlight that pain catastrophizing likely serves a social communicative function in women with chronic pain, and that this may be reinforced by responses from the social environment. Third, they highlight that pain catastrophizing may reflect a pattern of learned helplessness in

women with chronic pain, and that this may be related to gender role socialization and gendered experiences.

Despite its limitations and suggestions for future research, the present study makes several unique contributions to the current literature. It is the only study to use the ADMoCP and the CCM synergistically to evaluate pain catastrophizing and self-compassion from an interpersonal, attachment-based perspective, adding a critical contribution to mixed findings in the current literature. Additionally, it is one of a few studies to differentiate between the three dimensions of pain catastrophizing and to highlight the mechanisms by which helplessness may be particularly damaging for women with chronic pain. Related to this, it is unique in its exploration of the multiple functions of pain catastrophizing, including how attachment-based schemata might help to explain this response as a form of social communication as well as a representation of learned helplessness. Finally, it provides support for clinical interventions that focus on self-compassion in women with chronic pain and highlights the importance of intrapersonal, as well as interpersonal, coping responses associated with attachment.

Appendix A

Recruitment Documents and Informed Consent

Recruitment Documents

Online Advertisement

Are you a woman with chronic pain? Are you at least 18 years of age? Do you suffer from chronic pain due to Fibromyalgia, and have you been in continuous pain for at least three months? If you answered "yes" to all of these questions, you may be eligible to participate in a study conducted by researchers at the University of Maryland. The study explores the experiences of women like you through a brief online survey. We want to learn directly from women with chronic pain about their experience of living with chronic pain and its impact on their relationships. This your chance to contribute to research aimed at improving the experience of women with chronic pain.

The survey can be done online from anywhere that is convenient for you. It will take approximately 30 minutes of your time. This research is being conducted by Elizabeth Reeves, M.A. and Mary Ann Hoffman, Ph.D. at the University of Maryland, College Park. If you would like to participate in this research, please contact Elizabeth Reeves at ejreeves@umd.edu.

Email

Dear Participant,

Thank you for your interest in this study, which is being conducted by researchers at the University of Maryland, College Park. Your participation will contribute important knowledge regarding the experiences of women with chronic pain. This questionnaire will take most people approximately 30 minutes to complete. It is important that you answer all questions in one sitting, so if you are completing this questionnaire on your own, please seek out a quiet place that is free from distractions while taking the survey.

In order to better understand the experiences of women with chronic pain, it will be necessary to ask questions related to your background and current situation. Some of these questions may be personal in nature, including items inquiring about your income, relationship status, medical history, thoughts and feelings. Due to the personal nature of some of this material, it is important for you to know that the information you give will be kept confidential. You will not be asked for your name, and all information will be stored in a secure, locked location to which only the investigators have direct access. When analyzed, all survey responses will be evaluated as a group; no individual responses will be examined.

Risks associated with this study may include feeling discomfort in response to some content or inadvertently disclosing your responses if the survey is not taken in private. However, you do not have to answer any questions that make you feel uncomfortable. Benefits include the opportunity to reflect on your experience as a woman with chronic pain. Your participation in this study is voluntary and you may choose not to participate and may stop at any time. If you experience any difficulty in submitting your responses please contact the first researcher at the email address below.

If you have any questions or comments about the study, please feel free to contact either of the researchers (contact information below). If you have questions about your

rights as a research subject, please contact the Institutional Review Board (also below). This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects. Thank you again for your participation. By giving your consent to participate, you indicate that (1) you are a woman of at least 18 years of age; (2) you have been diagnosed with Fibromyalgia; (3) you have experienced chronic pain on most days of the month for at least three months; (4) the research has been explained to you; (5) your questions have been fully answered; and (6) you freely and voluntarily choose to participate in this research project. If you agree with these statements and consent to participate, please click on the 'Continue' button below.

Elizabeth Reeves, M.A.
Counseling Psychology Program
CHSE Department
University of Maryland
College Park, MD 20742

Mary Ann Hoffman, Ph.D
Professor, Counseling Psychology
CHSE Department
University of Maryland
College Park, MD 20742

Informed Consent

Purpose of the Study	*This research is being conducted by Elizabeth Reeves and Mary Ann Hoffman at the University of Maryland, College Park. We are inviting you to participate in this research project because you are female, at least 18 years of age, and have experienced chronic pain due to Fibromyalgia on most days of the month for at least three months. The purpose of this research project is to better understand the experience of women with chronic pain. In particular, we are interested in understanding how women's relationships impact the way that they experience and cope with chronic pain.*
Procedures	*This is an online study that involves completing a survey about you, your experiences with chronic pain, and how it affects your interpersonal experiences and your life. In total, this study is anticipated to require approximately 30 minutes of your time.*
Potential Risks and Discomforts	*There may be some risks from participating in this research study. You may have both positive and negative feelings about your health and how chronic pain affects your life, and this may induce feelings of discomfort or sadness. If for any reason you feel you need to contact the researchers, you can do so at ejreeves@umd.edu. There is also the risk of inadvertent disclosure if you do not complete the intervention in a private location and someone sees your responses.*
Potential Benefits	*There are no direct benefits to participation. However, possible benefits include feeling a better sense of understanding or improve well-being after reflecting on your experiences. We hope that, in the future, other people might benefit from this study through improved understanding of what can be helpful for women with chronic pain.*
Confidentiality	*The research team will minimize any potential loss of confidentiality by storing data in a locked office and password protected computer. Moreover, your identifying information will*

	not be linked to your survey or written responses. Only members of the research team will have access to your responses. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.
Medical Treatment	*The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this research study, nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.*
Compensation	*At the end of the study, you will have the opportunity to be entered into a raffle to win one of multiple $20 Amazon gift cards. This will require you to provide your email address. If you win, your gift card will be sent to that address. You will be responsible for any taxes assessed on the compensation.*
Right to Withdraw and Questions	*Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time.* *If you decide to stop taking part in the study, if you have questions, concerns, or complaints, please contact the primary investigator, Elizabeth Reeves, M.A., at 3214 Benjamin Building, University of Maryland, College Park, MD 20742,*
Participant Rights	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* University of Maryland College Park Institutional Review Board Office 1204 Marie Mount College Park, Maryland, 20742 E-mail: irb@umd.edu Telephone: 301-405-0678 *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*
Statement of Consent	*By clicking on the "next" button, this indicates that you are a woman of at least 18 years of age; you are able to read and write in English; you have experienced chronic pain due to Fibromyalgia on most days of the month for at least three months; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You may print a copy of this consent form.* *If you agree to participate, please click "next".*

Appendix B

Eligibility Criteria and Demographic Questionnaire

Eligibility Criteria

(*=does not meet eligibility)

1. Are you a woman of at least 18 years old? Yes __ No __*
2. Have you been diagnosed with Fibromyalgia? Yes __ No __*
3. Have you experienced chronic pain on most days of the month for at least three months? Yes __ No __*

If participants are ineligible

Unfortunately, you do not meet the eligibility criteria for this study. We appreciate your interest.

Demographics Questionnaire

Age: __

Racial/ethnic background (mark all that apply):
___African American/Black
___Asian-American/Pacific Islander
___Asian-Indian/Pakistani
___Biracial/Multiracial
___Hispanic/Latina
___Middle Eastern/Arab
___Native American/Native Alaskan
___White/European American
___Foreign National (please specify): _____
___Other (please specify): _____

Family's household income (before taxes):
___Less than 30,000
___30,000-59,999
___60,000-99,999
___100,000-149,999
___150,000 or higher
___Would rather not say

What is the highest level of education you have successfully completed?
___Less than high school
___High school
___2-year college
___Technical school
___4-year college
___Masters degree
___Doctorate

What is your employment status?
___Receiving Disability
___Not employed or on Disability
___Employed part-time
___Employed full-time
___Student
___Other (please specify): _____

Relationship status:
___Single
___Unmarried, in a committed relationship
___Unmarried, living with partner
___Married, living with partner
___Separated
___Divorced
___Widowed

Approximately how old were you when your pain started?
___ years old

Approximately how long has it been since your pain started?
___ years ___ months

Did your pain begin with a precipitating event?
___ No
___ Yes (please specify): _____

What diagnoses have you received that are associated with your chronic pain?
_____

Which of the following practitioners have you seen for help with chronic pain? (Check all that apply):
___ Primary Care Provider (M.D., N.P., P.A.)
___ Rheumatologist (M.D.)
___ Neurologist (M.D.)
___ Pain Specialist (e.g., Anesthesiologist, M.D.)
___ Pain Psychologist (Ph.D. or Psy.D.)
___ Other (please specify): _____

Which of the following treatments have you tried for your chronic pain? (Check all that apply):
___ Medications
___ Injections
___ Ablations
___ Surgery
___ Physical Therapy

___ Occupational Therapy
___ Acupuncture
___ Massage
___ Psychotherapy
___ Mediation/Mindfulness Practice
___ Other (please specify): _____

What medications are you currently taking? Please list all that apply, including dosage and medication schedule: _____

How satisfied are you with your medical treatment?
___Not at all satisfied
___Somewhat satisfied
___Satisfied
___Very Satisfied

Are you currently diagnosed with any other chronic health problems? Please list all that apply: _____

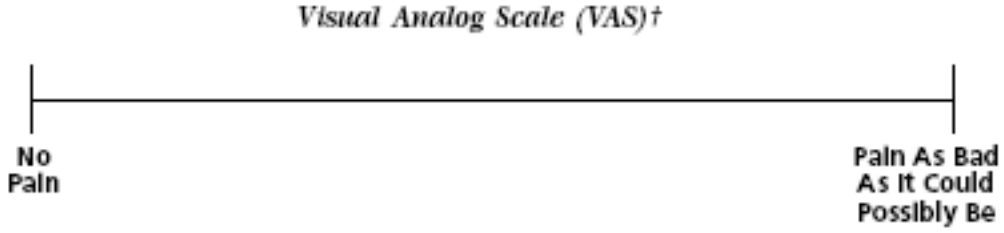
Have you ever been diagnosed with a mental health condition, such as depression or anxiety? Please list all that apply: _____

Appendix C

Pain Intensity: Visual Analogue Scale (VAS)
Turk & Melzack, 2001

Please make a mark on each respective line at the point corresponding to:

(1) Your pain right now.
(2) Your highest level of pain in the past week.
(3) Your lowest level of pain in the past week.
(4) Your average level of pain in the past week.



Appendix D

Pain Disability Index (PDI)
Pollard, 1984

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

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

Family/Home Responsibilities: This category refers to activities of the home or family. It includes chores or duties performed around the house (e.g. yard work) and errands or favors for other family members (e.g. driving the children to school).
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Recreation: This disability includes hobbies, sports, and other similar leisure time activities.
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Social Activity: This category refers to activities, which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social functions.
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Occupation: This category refers to activities that are part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer.
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Sexual Behavior: This category refers to the frequency and quality of one's sex life.
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Self-Care: This category includes activities, which involve personal maintenance and independent daily living (e.g. taking a shower, driving, getting dressed, etc.)
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Life-Support Activities: This category refers to basic life supporting behaviors such as eating, sleeping and breathing.
No Disability 0__. 1__. 2__. 3__. 4__. 5__. 6__. 7 __. 8__. 9__. 10__. Worst Disability

Appendix E

Interpersonal Relationships Questionnaire

Please list the people in your life who you feel closest to, without providing specific names. This could include friends, family members, or romantic partners (e.g., “my husband,” “my boyfriend,” “my daughter,” “my sister,” etc.):

Please describe the ways that chronic pain has impacted these relationships (if applicable):

Appendix F

The Experiences in Close Relationships Scale
Brennan, Clark & Shaver, 1998

The following statements concern how you generally feel in close relationships (e.g., with romantic partners, close friends, or family members). Respond to each statement by indicating how much you agree or disagree with it.

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

1. I prefer not to show other people how I feel deep down.
2. I worry about being rejected or abandoned.
3. I am very comfortable being close to other people. *
4. I worry a lot about my relationships.
5. Just when someone starts to get close to me I find myself pulling away.
6. I worry that others won't care about me as much as I care about them.
7. I get uncomfortable when someone wants to be very close to me.
8. I worry a fair amount about losing my close relationship partners.
9. I don't feel comfortable opening up to others.
10. I often wish that close relationship partners' feelings for me were as strong as my feelings for them.
11. I want to get close to others, but I keep pulling back.
12. I want to get very close to others, and this sometimes scares them away.
13. I am nervous when another person gets too close to me.
14. I worry about being alone.
15. I feel comfortable sharing my private thoughts and feelings with others. *
16. My desire to be very close sometimes scares people away.
17. I try to avoid getting too close to others.
18. I need a lot of reassurance that close relationship partners really care about me.
19. I find it relatively easy to get close to others. *
20. Sometimes I feel that I force others to show more feeling, more commitment in our relationship than they otherwise would.
21. I find it difficult to allow myself to depend on close relationship partners.
22. I do not often worry about being abandoned. *
23. I prefer not to be too close to others.
24. If I can't get a relationship partner to show interest in me, I get upset or angry.
25. I tell my close relationship partners just about everything. *
26. I find that my partners don't want to get as close as I would like.
27. I usually discuss my problems and concerns with others. *
28. When I don't have close others around, I feel somewhat anxious and insecure.

29. I feel comfortable depending on others. *
30. I get frustrated when my close relationship partners are not around as much as I would like.
31. I don't mind asking close others for comfort, advice, or help. *
32. I get frustrated if relationship partners are not available when I need them.
33. It helps to turn to close others in times of need. *
34. When other people disapprove of me, I feel really bad about myself.
35. I turn to close relationship partners for many things, including comfort and reassurance. *
36. I resent it when my relationship partners spend time away from me.

**Items must be reverse scored.*
Avoidance: Odd items
Anxiety: Even items

Appendix G

The Spouse Response Inventory (SRI) - Modified
Schwartz, Jensen & Romano, 2005

We are interested in how important people in your life respond to you when they think you are in pain. Using the scale below, circle a number for each of the questions to indicate how often the people you feel closest to (indicated in the survey, above) responded to you in that particular way, during the past 2 weeks, when they thought that you were in pain. During the past 2 weeks when someone close to me thought that I was in pain, s/he/they…

0 = Never
1 = Rarely
2 = Sometimes
3 = Often
4 = Always

Negative Responses to Pain Behavior Scale

1. Seemed to criticize me more
2. Did not pay any attention to me
3. Seemed to get irritated with me
4. Ignored me
5. Seemed to get frustrated with me
6. Did not talk to me (gave me the silent treatment)
7. Avoided being physically affectionate with me (did not hug me or kiss me)

Solicitous Responses to Pain Behavior Scale

1. Got me my pain medication
2. Tried to comfort me by talking to me
3. Did some of my household chores
4. Let me know that s/he was sorry that I was in pain
5. Tried to reassure me
6. Was affectionate with me (kissed or hugged me)
7. Took over some of my job/household responsibilities
8. Tried to keep the tension, stress, or noise level down in the house
9. Paid attention to me by listening to me
10. Talked to someone for me (especially in a difficult situation)
11. Gave me a massage
12. Got me something to drink
13. Cooked my favorite meal or took me out to dinner
14. Made sure that others did not bother me
15. Asked what s/he could do to help
16. Got me something to eat
17. Avoided asking me to do something for him or her (such as pick up the kids, put away dishes)
18. Got me a pillow, blanket or heating pad
19. Called my doctor

Appendix H

The Pain Appraisal Inventory (PAI)
Unruh & Ritchie, 1998

Use the following scale to record your answers.

1 = Disagree Strongly
2
3
4
5
6 = Agree Strongly

1. I am concerned that the pain might mean something is wrong with me.
2. I am concerned that the pain might become more than I can manage.
3. I am worried about getting things done.
4. I am concerned about how much more pain I can take.
5. The pain seems threatening.
6. I am worried about being depressed or discouraged because of the pain.
7. I feel controlled by the pain.
8. I think of this pain as a threat.

Appendix I

The Pain Self-Efficacy Questionnaire (PSEQ)
Nicholas, 2007

Please rate how confident you are that you can do the following things at present despite the pain. To indicate your answer, select one of the numbers on the scale, where 0 = not at all confident and 6 = completely confident.

0	1	2	3	4	5	6
Not at all Confident						Completely Confident

1. I can enjoy things, despite the pain.
2. I can do most of the household chores (e.g., tidying-up, washing dishes, etc.), despite the pain.
3. I can socialize with my friends or family members as often as I used to do, despite the pain.
4. I can cope with my pain in most situations.
5. I can do some form of work, despite the pain. ("work" includes housework, paid and unpaid work).
6. I can still do many of the things that I enjoy doing, such as hobbies or leisure activity, despite pain.
7. I can cope with my pain without medication.
8. I can still accomplish most of my goals in life, despite the pain.
9. I can live a normal lifestyle, despite the pain.

Appendix J

The Pain Catastrophizing Scale (PCS)
Sullivan, Bishop & Pivik, 1995

Everyone experiences painful situations at some point in their lives. We are interested in the types of thoughts and feeling 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 scale below, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

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

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

Rumination: Items 8-11
Magnification: Items 6, 7, 13
Helplessness: Items 1-5, 12

Appendix K

The Center for Epidemiologic Studies –
Depression Scale (CES-D)
Radloff, 1977

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

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

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

*Items are reverse scored.

Appendix L

Self-Compassion Scale – Short Form (SCS-SF)
Raes et al., 2011

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. Indicate how often you behave in the stated manner, using the following scale:

Almost Never				Almost Always
1	2	3	4	5

1. When I fail at something important to me I become consumed by feelings of inadequacy.*
2. I try to be understanding and patient towards those aspects of my personality I don't like.
3. When something painful happens I try to take a balanced view of the situation.
4. When I'm feeling down, I tend to feel like most other people are probably happier than I am.*
5. I try to see my failings are part of the human condition.
6. When I'm going through a very hard time, I give myself the caring and tenderness I need.
7. When something upsets me I try to keep my emotions in balance.
8. When I fail at something that's important to me, I tend to feel alone in my failure.*
9. When I'm feeling down I tend to obsess and fixate on everything that's wrong.*
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
11. I'm disapproving and judgmental about my own flaws and inadequacies.*
12. I'm intolerant and impatient towards those aspects of my personality I don't like.*

*Items are reverse scored

Self-Kindness: 2, 6
Self-Judgment: 11, 12
Common Humanity: 5, 10
Isolation: 4, 8
Mindfulness: 3, 7
Over-identified: 1, 9

References

Albertson, E. R., Neff, K. D., & Dill-Shackleford, K. E. (2015). Self-Compassion and Body Dissatisfaction in Women: A Randomized Controlled Trial of a Brief Meditation Intervention. *Mindfulness*, *6*(3), 444–454. https://doi.org/10.1007/s12671-014-0277-3

Alexander, R. W., Aaron, L. A., Alberts, K. R., Martin, M. Y., Stewart, K. E., Bradley, L. A., Alarcón, G. S., & Triana-Alexander, M. (1998). Sexual and physical abuse in women with fibromyalgia: Association with outpatient health care utilization and pain medication usage. *Arthritis & Rheumatism*, *11*(2), 102–115. https://doi.org/10.1002/art.1790110206

Allen, A. B., & Leary, M. R. (2010). Self-Compassion, Stress, and Coping. *Social and Personality Psychology Compass*, *4*(2), 107–118. https://doi.org/10.1111/j.1751-9004.2009.00246.x

Andersen, T. E. (2012). Does attachment insecurity affect the outcomes of a multidisciplinary pain management program? The association between attachment insecurity, pain, disability, distress, and the use of opioids. *Social Science & Medicine*, *74*(9), 1461–1468. https://doi.org/10.1016/j.socscimed.2012.01.009

Andersen, T. E., Elklit, A., & Vase, L. (2011). The relationship between chronic whiplash-associated disorder and post-traumatic stress: Attachment-anxiety may be a vulnerability factor. *European Journal of Psychotraumatology*, *2*(1), 5633. https://doi.org/10.3402/ejpt.v2i0.5633

Andrews, N. E., Meredith, P. J., Strong, J., & Donohue, G. F. (2014b). Adult Attachment and Approaches to Activity Engagement in Chronic Pain. *Pain Research and Management*, *19*(6), 317–327. https://doi.org/10.1155/2014/838954

Arambasic, J., Sherman, K. A., & Elder, E. (2019). Attachment styles, self-compassion, and psychological adjustment in long-term breast cancer survivors. *Psycho-Oncology*, *28*(5), 1134–1141. https://doi.org/10.1002/pon.5068

Arout, C., Sofuoglu, M., Bastian, L., & Rosenheck, R. (2018). Gender Differences in the Prevalence of Fibromyalgia and in Concomitant Medical and Psychiatric Disorders: A National Veterans Health Administration Study. *Journal of Women's Health*, *27*(8), 1035–1044.

Asmundson, G. J. G., Vlaeyen, J. W. S., & Crombez, G. (2004). *Understanding and Treating Fear of Pain*. Oxford University Press.

Austenfeld, J. L., & Stanton, A. L. (2004). Coping Through Emotional Approach: A New Look at Emotion, Coping, and Health-Related Outcomes. *Journal of Personality*, *72*(6), 1335–1364. https://doi.org/10.1111/j.1467-6494.2004.00299.x

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Bartholomew, K., Cobb, R. J., & Poole, J. A. (1997). Adult Attachment Patterns and Social Support Processes. In G. R. Pierce, B. Lakey, I. G. Sarason, & B. R. Sarason (Eds.), *Sourcebook of Social Support and Personality* (pp. 359–378). Springer US. https://doi.org/10.1007/978-1-4899-1843-7_16

Bartley, E. J., & Fillingim, R. B. (2013). Sex differences in pain: A brief review of clinical and experimental findings. *BJA: British Journal of Anaesthesia*, *111*(1), 52–58. https://doi.org/10.1093/bja/aet127

Bigatti, S. M., Hernandez, A. M., Cronan, T. A., & Rand, K. L. (2008). Sleep disturbances in fibromyalgia syndrome: Relationship to pain and depression. *Arthritis Care & Research*, *59*(7), 961–967. https://doi.org/10.1002/art.23828

Birnbaum, G. E. (2007). Attachment orientations, sexual functioning, and relationship satisfaction in a community sample of women. *Journal of Social and Personal Relationships*, *24*(1), 21–35. https://doi.org/10.1177/0265407507072576

Blanco, S., Peñacoba, C., Sanromán, L., & Pérez-Calvo, S. (2018). Analysis of quantitative and qualitative measures of attachment in patients with fibromyalgia: The influence on nursing care. *International Journal of Mental Health*, *47*(1), 50–63. https://doi.org/10.1080/00207411.2017.1377804

Blom, D., Thomaes, S., Kool, M. B., van Middendorp, H., Lumley, M. A., Bijlsma, J. W. J., & Geenen, R. (2012). A combination of illness invalidation from the work environment and helplessness is associated with embitterment in patients with FM. *Rheumatology*, *51*(2), 347–353. https://doi.org/10.1093/rheumatology/ker342

Blyth, F. M., Macfarlane, G. J., & Nicholas, M. K. (2007). The contribution of psychosocial factors to the development of chronic pain: The key to better outcomes for patients? *Pain*, *129*(1), 8–11. https://doi.org/10.1016/j.pain.2007.03.009

Boothby, J. L., Thorn, B. E., Overduin, L. Y., & Charles Ward, L. (2004). Catastrophizing and perceived partner responses to pain. *Pain*, *109*(3), 500–506. https://doi.org/10.1016/j.pain.2004.02.030

Bosisio, M., Pâquet, M., Bois, K., Rosen, N. O., & Bergeron, S. (2020). Are Depressive Symptoms and Attachment Styles Associated with Observed and Perceived Partner Responsiveness in Couples Coping With Genito-Pelvic Pain ? *The Journal of Sex Research*, *57*(4), 534–544. https://doi.org/10.1080/00224499.2019.1610691

Bowlby, J. (2008a). *A Secure Base: Parent-Child Attachment and Healthy Human Development*. Basic Books.

Bowlby, J. (2008b). *Attachment*. Basic Books.

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). Guilford Press.

Brown, T. T., Partanen, J., Chuong, L., Villaverde, V., Chantal Griffin, A., & Mendelson, A. (2018). Discrimination hurts: The effect of discrimination on the development of chronic

pain. *Social Science & Medicine*, *204*, 1–8. https://doi.org/10.1016/j.socscimed.2018.03.015

Buenaver, L. F., Edwards, R. R., & Haythornthwaite, J. A. (2007). Pain-related catastrophizing and perceived social responses: Inter-relationships in the context of chronic pain. *PAIN*, *127*(3), 234–242. https://doi.org/10.1016/j.pain.2006.08.018

Burns, L. C., Ritvo, S. E., Ferguson, M. K., Clarke, H., Seltzer, Z., & Katz, J. (2015). Pain catastrophizing as a risk factor for chronic pain after total knee arthroplasty: A systematic review. *Journal of Pain Research*, *8*, 21–32. https://doi.org/10.2147/JPR.S64730

Campbell, L., Simpson, J. A., Boldry, J., & Kashy, D. A. (2005). Perceptions of Conflict and Support in Romantic Relationships: The Role of Attachment Anxiety. *Journal of Personality and Social Psychology*, *88*(3), 510–531.

Cano, A. (2004). Pain catastrophizing and social support in married individuals with chronic pain: The moderating role of pain duration. *Pain*, *110*(3), 656–664. https://doi.org/10.1016/j.pain.2004.05.004

Cano, A., Barterian, J. A., & Heller, J. B. (2008). Empathic and Nonempathic Interaction in Chronic Pain Couples. *The Clinical Journal of Pain*, *24*(8), 678–684. https://doi.org/10.1097/AJP.0b013e31816753d8

Cano, A., Leong, L. E. M., Williams, A. M., May, D. K. K., & Lutz, J. R. (2012). Correlates and consequences of the disclosure of pain-related distress to one's spouse. *Pain*, *153*(12), 2441–2447. https://doi.org/10.1016/j.pain.2012.08.015

Cano, A., Weisberg, J. N., & Gallagher, R. M. (2000). Marital Satisfaction and Pain Severity Mediate the Association between Negative Spouse Responses to Pain and Depressive Symptoms in a Chronic Pain Patient Sample. *Pain Medicine*, *1*(1), 35–43. https://doi.org/10.1046/j.1526-4637.2000.99100.x

Carvalho, S. A., Pinto-Gouveia, J., Gillanders, D., & Castilho, P. (2019). Pain and Depressive Symptoms: Exploring Cognitive Fusion and Self-Compassion in a Moderated Mediation

Model. *The Journal of Psychology*, *153*(2), 173–186. https://doi.org/10.1080/00223980.2018.1507990

Chapin, H. L., Darnall, B. D., Seppala, E. M., Doty, J. R., Hah, J. M., & Mackey, S. C. (2014b). Pilot study of a compassion meditation intervention in chronic pain. *Journal of Compassionate Health Care*, *1*(1), 4. https://doi.org/10.1186/s40639-014-0004-x

Charbonneau-Lefebvre, V., Rosen, N. O., Bosisio, M., Vaillancourt-Morel, M.-P., & Bergeron, S. (2020). An Attachment Perspective on Partner Responses to Genito-pelvic Pain and Their Associations with Relationship and Sexual Outcomes. *The Journal of Sex Research*, *0*(0), 1–13. https://doi.org/10.1080/00224499.2020.1761936

Chen, S., & Jackson, T. (2018). Pain beliefs mediate relations between general resilience and dysfunction from chronic back pain. *Rehabilitation Psychology*, *63*(4), 604–611. https://doi.org/10.1037/rep0000244

Choy, E., Perrot, S., Leon, T., Kaplan, J., Petersel, D., Ginovker, A., & Kramer, E. (2010). A patient survey of the impact of fibromyalgia and the journey to diagnosis. *BMC Health Services Research*, *10*(1), 102. https://doi.org/10.1186/1472-6963-10-102

Ciechanowski, P., Sullivan, M., Jensen, M., Romano, J., & Summers, H. (2003a). The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain*, *104*(3), 627–637. https://doi.org/10.1016/S0304-3959(03)00120-9

Collins, N. L., & Feeney, B. C. (2004). Working models of attachment shape perceptions of social support: Evidence from experimental and observational studies. *Journal of Personality and Social Psychology*, *87*(3), 363.

Coronado, R. A., George, S. Z., Devin, C. J., Wegener, S. T., & Archer, K. R. (2015). Pain Sensitivity and Pain Catastrophizing Are Associated With Persistent Pain and Disability After Lumbar Spine Surgery. *Archives of Physical Medicine and Rehabilitation*, *96*(10), 1763–1770. https://doi.org/10.1016/j.apmr.2015.06.003

Costa, J., & Pinto-Gouveia, J. (2011). Acceptance of pain, self-compassion and psychopathology: Using the Chronic Pain Acceptance Questionnaire to identify patients' subgroups. *Clinical Psychology & Psychotherapy*, *18*(4), 292–302. https://doi.org/10.1002/cpp.718

Costa, J., & Pinto-Gouveia, J. (2013). Experiential avoidance and self-compassion in chronic pain. *Journal of Applied Social Psychology*, *43*(8), 1578–1591. https://doi.org/10.1111/jasp.12107

Craig, K. D., Versloot, J., Goubert, L., Vervoort, T., & Crombez, G. (2010). Perceiving Pain in Others: Automatic and Controlled Mechanisms. *The Journal of Pain*, *11*(2), 101–108. https://doi.org/10.1016/j.jpain.2009.08.008

Craner, J. R., Gilliam, W. P., & Sperry, J. A. (2016). Rumination, Magnification, and Helplessness: How do Different Aspects of Pain Catastrophizing Relate to Pain Severity and Functioning? *The Clinical Journal of Pain*, *32*(12), 1028–1035. https://doi.org/10.1097/AJP.0000000000000355

Cunningham, J. (2011). *The role of pain catastrophizing and threat/harm appraisals in pain responsivity* [Thesis, University of Alabama Libraries]. http://ir.ua.edu/handle/123456789/1166

Dahlhamer, J. (2018). Prevalence of Chronic Pain and High-Impact Chronic Pain Among Adults—United States, 2016. *MMWR. Morbidity and Mortality Weekly Report*, *67*. https://doi.org/10.15585/mmwr.mm6736a2

D'Amico, F., Feliu-Soler, A., Montero-Marín, J., Peñarrubía-María, M. T., Navarro-Gil, M., Van Gordon, W., García-Campayo, J., & Luciano, J. V. (2020). Cost-Utility of Attachment-Based Compassion Therapy (ABCT) for Fibromyalgia Compared to Relaxation: A Pilot Randomized Controlled Trial. *Journal of Clinical Medicine*, *9*(3), 726. https://doi.org/10.3390/jcm9030726

Davies, K. A., Macfarlane, G. J., McBeth, J., Morriss, R., & Dickens, C. (2009). Insecure attachment style is associated with chronic widespread pain. *PAIN®*, *143*(3), 200–205. https://doi.org/10.1016/j.pain.2009.02.013

D'Eon, J. L., Harris, C. A., & Ellis, J. A. (2004). Testing Factorial Validity and Gender Invariance of the Pain Catastrophizing Scale. *Journal of Behavioral Medicine*, *27*(4), 361–372. https://doi.org/10.1023/B:JOBM.0000042410.34535.64

Edwards, R. R. (2008). The association of perceived discrimination with low back pain. *Journal of Behavioral Medicine*, *31*(5), 379. https://doi.org/10.1007/s10865-008-9160-9

Edwards, R. R., Bingham, C. O., Bathon, J., & Haythornthwaite, J. A. (2006). Catastrophizing and pain in arthritis, fibromyalgia, and other rheumatic diseases. *Arthritis Care & Research*, *55*(2), 325–332. https://doi.org/10.1002/art.21865

Edwards, R. R., Cahalan, C., Mensing, G., Smith, M., & Haythornthwaite, J. A. (2011). Pain, catastrophizing, and depression in the rheumatic diseases. *Nature Reviews Rheumatology*, *7*(4), 216–224. https://doi.org/10.1038/nrrheum.2011.2

Edwards, R. R., Haythornthwaite, J. A., Sullivan, M. J., & Fillingim, R. B. (2004). Catastrophizing as a mediator of sex differences in pain: Differential effects for daily pain versus laboratory-induced pain. *Pain*, *111*(3), 335–341. https://doi.org/10.1016/j.pain.2004.07.012

Ehde, D. M., Dillworth, T. M., & Turner, J. A. (2014). Cognitive-behavioral therapy for individuals with chronic pain: Efficacy, innovations, and directions for research. *American Psychologist*, *69*(2), 153–166.

Eisenberger, N. (2011). The neural basis of social pain: Findings and implications. In *Social pain: Neuropsychological and health implications of loss and exclusion* (pp. 53–78).

Eisenberger, N. I., & Lieberman, M. D. (2004). Why rejection hurts: A common neural alarm system for physical and social pain. *Trends in Cognitive Sciences*, *8*(7), 294–300. https://doi.org/10.1016/j.tics.2004.05.010

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science*, *196*(4286), 129–136. https://doi.org/10.1126/science.847460

Fillingim, R. B., Edwards, R. R., & Powell, T. (1999). The relationship of sex and clinical pain to experimental pain responses. *PAIN®*, *83*(3), 419–425. https://doi.org/10.1016/S0304-3959(99)00128-1

Fillingim, R. B., King, C. D., Ribeiro-Dasilva, M. C., Rahim-Williams, B., & Riley, J. L. (2009). Sex, Gender, and Pain: A Review of Recent Clinical and Experimental Findings. *The Journal of Pain*, *10*(5), 447–485. https://doi.org/10.1016/j.jpain.2008.12.001

Fordyce, W. E. (1976). *Behavioral methods for chronic pain and illness*. Mosby.

Forsythe, L. P., Romano, J. M., Jensen, M. P., & Thorn, B. E. (2012). Attachment style is associated with perceived spouse responses and pain-related outcomes. *Rehabilitation Psychology*, *57*(4), 290–300. https://doi.org/10.1037/a0030083

Fraley, R. C. (2019). Attachment in Adulthood: Recent Developments, Emerging Debates, and Future Directions. *Annual Review of Psychology*, *70*(1), 401–422. https://doi.org/10.1146/annurev-psych-010418-102813

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, *78*(2), 350–365. https://doi.org/10.1037/0022-3514.78.2.350

Frantsve, L. M. E., & Kerns, R. D. (2007). Patient–Provider Interactions in the Management of Chronic Pain: Current Findings within the Context of Shared Medical Decision Making. *Pain Medicine*, *8*(1), 25–35. https://doi.org/10.1111/j.1526-4637.2007.00250.x

García-Campayo, J., Navarro-Gil, M., & Demarzo, M. (2016). Attachment-based compassion therapy. *Mindfulness & Compassion*, *1*(2), 68–74. https://doi.org/10.1016/j.mincom.2016.10.004

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

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. *The Journal of Pain*, *13*(12), 1258–1268. https://doi.org/10.1016/j.jpain.2012.10.001

Geisser, M. E., Roth, R. S., & Robinson, M. E. (1997). Assessing Depression among Persons with Chronic Pain Using the Center for Epidemiological Studies-Depression Scale and the Beck Depression Inventory: A Comparative Analysis. *The Clinical Journal of Pain*, *13*(2), 163–170.

George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference*. Routledge.

Gillath, O., Karantzas, G. C., & Fraley, R. C. (2016). *Adult Attachment: A Concise Introduction to Theory and Research*. Academic Press.

Granot, M., Zisman-Ilani, Y., Ram, E., Goldstick, O., & Yovell, Y. (2010). Characteristics of Attachment Style in Women With Dyspareunia. *Journal of Sex & Marital Therapy*, *37*(1), 1–16. https://doi.org/10.1080/0092623X.2011.533563

Gremyr, I., Eriksson, E., & Hensing, G. (2018). "Brave Men" and "Emotional Women": A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain. *Pain Research and Management*. https://www.hindawi.com/journals/prm/2018/6358624/

Gureje, O., Von Korff, M., Simon, G. E., & Gater, R. (1998). Persistent pain and well-being: A World Health Organization Study in Primary Care. *JAMA*, *280*(2), 147–151.

Hassouneh-Phillips, D., McNeff, E., Powers, L., & Curry, M. A. (2005). Invalidation: A Central Process Underlying Maltreatment of Women with Disabilities. *Women & Health, 41*(1), 33–50. https://doi.org/10.1300/J013v41n01_03

Häuser, W., Ablin, J., Fitzcharles, M.-A., Littlejohn, G., Luciano, J. V., Usui, C., & Walitt, B. (2015). Fibromyalgia. *Nature Reviews Disease Primers, 1*(1), 1–16. https://doi.org/10.1038/nrdp.2015.22

Helgeson, V. (2010). Gender, Stress and Coping. In S. Folkman (Ed.), *The Oxford Handbook of Stress, Health and Coping* (pp. 63–85). Oxford University Press.

Helgeson, V. S., Berg, C. A., Kelly, C. S., Van Vleet, M., Zajdel, M., Tracy, E. L., & Litchman, M. L. (2019). Patient and partner illness appraisals and health among adults with type 1 diabetes. *Journal of Behavioral Medicine, 42*(3), 480–492. https://doi.org/10.1007/s10865-018-0001-1

Hunter, T. M., Boytsov, N. N., Zhang, X., Schroeder, K., Michaud, K., & Araujo, A. B. (2017). Prevalence of rheumatoid arthritis in the United States adult population in healthcare claims databases, 2004–2014. *Rheumatology International, 37*(9), 1551–1557. https://doi.org/10.1007/s00296-017-3726-1

Hurter, S., Paloyelis, Y., de C. Williams, A. C., & Fotopoulou, A. (2014). Partners' Empathy Increases Pain Ratings: Effects of Perceived Empathy and Attachment Style on Pain Report and Display. *The Journal of Pain, 15*(9), 934–944. https://doi.org/10.1016/j.jpain.2014.06.004

Institute of Medicine. (2011). *Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research*. http://www.nationalacademies.org/hmd/Reports/2011/Relieving-Pain-in-America-A-Blueprint-for-Transforming-Prevention-Care-Education-Research.aspx

Jackson, T., Iezzi, T., Chen, H., Ebnet, S., & Eglitis, K. (2005). Gender, interpersonal transactions, and the perception of pain: An experimental analysis. *The Journal of Pain*, *6*(4), 228–236. https://doi.org/10.1016/j.jpain.2004.12.004

Jackson, T., Iezzi, T., Gunderson, J., Nagasaka, T., & Fritch, A. (2002). Gender Differences in Pain Perception: The Mediating Role of Self-Efficacy Beliefs. *Sex Roles*, *47*(11), 561–568. https://doi.org/10.1023/A:1022077922593

Jackson, T., Pope, L., Nagasaka, T., Fritch, A., Iezzi, T., & Chen, H. (2005). The impact of threatening information about pain on coping and pain tolerance. *British Journal of Health Psychology*, *10*(3), 441–451. https://doi.org/10.1348/135910705X27587

Jackson, T., Wang, Y., & Fan, H. (2014). Associations Between Pain Appraisals and Pain Outcomes: Meta-Analyses of Laboratory Pain and Chronic Pain Literatures. *The Journal of Pain*, *15*(6), 586–601. https://doi.org/10.1016/j.jpain.2014.01.499

Jackson, T., Wang, Y., Wang, Y., & Fan, H. (2014). Self-Efficacy and Chronic Pain Outcomes: A Meta-Analytic Review. *The Journal of Pain*, *15*(8), 800–814. https://doi.org/10.1016/j.jpain.2014.05.002

Jensen, I., Nygren, A., Gamberale, F., Goldie, I., & Westerholm, P. (1994). Coping with long-term musculoskeletal pain and its consequences: Is gender a factor? *Pain*, *57*(2), 167–172. https://doi.org/10.1016/0304-3959(94)90220-8

Jia, X., & Jackson, T. (2016). Pain beliefs and problems in functioning among people with arthritis: A meta-analytic review. *Journal of Behavioral Medicine*, *39*(5), 735–756. https://doi.org/10.1007/s10865-016-9777-z

Jordan, J. V. (2001). A relational-cultural model: Healing through mutual empathy. *Bulletin of the Menninger Clinic*, *65*(1), 92.

Keefe, F. J., Lefebvre, J. C., Egert, J. R., Affleck, G., Sullivan, M. J., & Caldwell, D. S. (2000). The relationship of gender to pain, pain behavior, and disability in osteoarthritis patients:

The role of catastrophizing. *Pain*, *87*(3), 325–334. https://doi.org/10.1016/S0304-3959(00)00296-7

Keogh, E., & Chaloner, N. (2002). Anxiety sensitivity and pain. *Psychopharmacology*, *164*(4).

Keogh, E., Hamid, R., Hamid, S., & Ellery, D. (2004). Investigating the effect of anxiety sensitivity, gender and negative interpretative bias on the perception of chest pain. *Pain*, *111*(1), 209–217. https://doi.org/10.1016/j.pain.2004.06.017

Keogh, E., McCracken, L. M., & Eccleston, C. (2005). Do men and women differ in their response to interdisciplinary chronic pain management? *Pain*, *114*(1), 37–46. https://doi.org/10.1016/j.pain.2004.12.009

Klotz, S. G. R., Ketels, G., Löwe, B., & Brünahl, C. A. (2020). Myofascial Findings and Psychopathological Factors in Patients with Chronic Pelvic Pain Syndrome. *Pain Medicine*, *21*(2), e34–e44. https://doi.org/10.1093/pm/pny097

Kolb, L. C. (1982). Attachment behavior and pain complaints. *Psychosomatics: Journal of Consultation and Liaison Psychiatry*, *23*(4), 413–425. https://doi.org/10.1016/S0033-3182(82)73404-8

Kool, M. B., Middendorp, H. van, Lumley, M. A., Schenk, Y., Jacobs, J. W. G., Bijlsma, J. W. J., & Geenen, R. (2010). Lack of understanding in fibromyalgia and rheumatoid arthritis: The Illness Invalidation Inventory (3*I). *Annals of the Rheumatic Diseases*, *69*(11), 1990–1995. https://doi.org/10.1136/ard.2009.123224

Kool, Marianne B., & Geenen, R. (2012). Loneliness in Patients with Rheumatic Diseases: The Significance of Invalidation and Lack of Social Support. *The Journal of Psychology*, *146*(1–2), 229–241. https://doi.org/10.1080/00223980.2011.606434

Kool, Marianne B., van Middendorp, H., Lumley, M. A., Bijlsma, J. W. J., & Geenen, R. (2013). Social support and invalidation by others contribute uniquely to the understanding of physical and mental health of patients with rheumatic diseases. *Journal of Health Psychology*, *18*(1), 86–95.

Kowal, J., McWilliams, L. A., Péloquin, K., Wilson, K. G., Henderson, P. R., & Fergusson, D. A. (2015). Attachment insecurity predicts responses to an interdisciplinary chronic pain rehabilitation program. *Journal of Behavioral Medicine*, *38*(3), 518–526. https://doi.org/10.1007/s10865-015-9623-8

Kowal, J., Wilson, K. G., McWilliams, L. A., Péloquin, K., & Duong, D. (2012). Self-perceived burden in chronic pain: Relevance, prevalence, and predictors. *PAIN®*, *153*(8), 1735–1741. https://doi.org/10.1016/j.pain.2012.05.009

Kratz, A.L., Davis, M. C., & Zautra, A. J. (2012). Attachment predicts daily catastrophizing and social coping in women with pain. *Health Psychology*, *31*(3), 278–285.

Kratz, Anna L., Davis, M. C., & Zautra, A. J. (2012). Attachment predicts daily catastrophizing and social coping in women with pain. *Health Psychology*, *31*(3), 278–285. https://doi.org/10.1037/a0025230

LaChapelle, D. L., Lavoie, S., & Boudreau, A. (2008). The Meaning and Process of Pain Acceptance. Perceptions of Women Living with Arthritis and Fibromyalgia. *Pain Research and Management*, *13*(3), 201–210. https://doi.org/10.1155/2008/258542

Laird, K. T., Preacher, K. J., & Walker, L. S. (2015). Attachment and Adjustment in Adolescents and Young Adults with a History of Pediatric Functional Abdominal Pain. *The Clinical Journal of Pain*, *31*(2), 152–158. https://doi.org/10.1097/AJP.0000000000000090

Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer Publishing Company.

Loeser, J. (1982). A multifaceted model of the components of pain. *Chronic Low Back Pain*, 146.

Loeser, J. D. (2000). Perils in the pursuit of mechanisms. *Pain*, *86*(1), 1–2. https://doi.org/10.1016/S0304-3959(00)00283-9

López-Martínez, A. E., Esteve-Zarazaga, R., & Ramírez-Maestre, C. (2008). Perceived Social Support and Coping Responses Are Independent Variables Explaining Pain Adjustment

Among Chronic Pain Patients. *The Journal of Pain*, *9*(4), 373–379. https://doi.org/10.1016/j.jpain.2007.12.002

Lyons, R., Mickelson, K., Sullivan, M., & Coyne, J. (1998). Coping as a communal process. *Journal of Social and Personal Relationships*, *15*(5), 579–605.

MacDonald, G., & Leary, M. R. (2005). Why Does Social Exclusion Hurt? The Relationship Between Social and Physical Pain. - PsycNET. *Psychological Bulletin*, *131*(2), 202–223.

MacDonald, Geoff, & Kingsbury, R. (2006). Does physical pain augment anxious attachment? *Journal of Social and Personal Relationships*, *23*(2), 291–304.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A Comparison of Methods to Test Mediation and Other Intervening Variable Effects. *Psychological Methods*, *7*(1), 83.

Maji, S., & Dixit, S. (2019). Self-silencing and women's health: A review. *International Journal of Social Psychiatry*, *65*(1), 3–13. https://doi.org/10.1177/0020764018814271

Mallinckrodt, B., Abraham, W., Wei, T., & Russell, D. (2006). Advances in testing the statistical significance of mediation effects. *Journal of Counseling Psychology*, *53*(3), 372–378.

Manning, R. P. C., Dickson, J. M., Palmier-Claus, J., Cunliffe, A., & Taylor, P. J. (2017). A systematic review of adult attachment and social anxiety. *Journal of Affective Disorders*, *211*, 44–59. https://doi.org/10.1016/j.jad.2016.12.020

Marganska, A., Gallagher, M., & Miranda, R. (2013). Adult attachment, emotion dysregulation, and symptoms of depression and generalized anxiety disorder. *American Journal of Orthopsychiatry*, *83*(1), 131–141. https://doi.org/10.1111/ajop.12001

Marr, N. C., Van Liew, C., Carovich, T. F., Cecchini, G. A., McKinley, L. E., & Cronan, T. A. (2020). The Effects of Racial/Ethnic Minority Status on Sleep, Mood Disturbance, and Depression in People with Fibromyalgia. *Psychology Research and Behavior Management*, *13*, 343–353. https://doi.org/10.2147/PRBM.S242699

Martínez, M. P., Miró, E., Sánchez, A. I., Mundo, A., & Martínez, E. (2012). Understanding the relationship between attachment style, pain appraisal and illness behavior in women. *Scandinavian Journal of Psychology*, *53*(1), 54–63. https://doi.org/10.1111/j.1467-9450.2011.00925.x

McCracken, L. M. (2005). Social context and acceptance of chronic pain: The role of solicitous and punishing responses. *Pain*, *113*(1), 155–159. https://doi.org/10.1016/j.pain.2004.10.004

McCracken, L. M., & Vowles, K. E. (2014). Acceptance and commitment therapy and mindfulness for chronic pain: Model, process, and progress. *American Psychologist*, *69*(2), 178–187. https://doi.org/10.1037/a0035623

McInnis, O. A., Matheson, K., & Anisman, H. (2014). Living with the unexplained: Coping, distress, and depression among women with chronic fatigue syndrome and/or fibromyalgia compared to an autoimmune disorder. *Anxiety, Stress, & Coping*, *27*(6), 601–618. https://doi.org/10.1080/10615806.2014.888060

McWilliams, L. A. (2017). Adult attachment insecurity is positively associated with medically unexplained chronic pain. *European Journal of Pain*, *21*(8), 1378–1383. https://doi.org/10.1002/ejp.1036

McWilliams, Lachlan A., & Asmundson, G. J. G. (2007). The relationship of adult attachment dimensions to pain-related fear, hypervigilance, and catastrophizing. *Pain*, *127*(1), 27–34. https://doi.org/10.1016/j.pain.2006.07.020

McWilliams, Lachlan A., & Bailey, S. J. (2010). Associations between adult attachment ratings and health conditions: Evidence from the National Comorbidity Survey Replication. *Health Psychology*, *29*(4), 446–453. https://doi.org/10.1037/a0020061

McWilliams, Lachlan 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. *The Clinical Journal of Pain*, *16*(4), 360–364.

McWilliams, Lachlan 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

Meints, S. M., Stout, M., Abplanalp, S., & Hirsh, A. T. (2017). Pain-Related Rumination, But Not Magnification or Helplessness, Mediates Race and Sex Differences in Experimental Pain. *The Journal of Pain*, *18*(3), 332–339. https://doi.org/10.1016/j.jpain.2016.11.005

Melzack, R., & Wall, P. D. (1965). Pain Mechanisms: A New Theory. *Science*, *150*(3699), 971–979. https://doi.org/10.1126/science.150.3699.971

Meredith, P., Ownsworth, T., & Strong, J. (2008a). A review of the evidence linking adult attachment theory and chronic pain: Presenting a conceptual model. *Clinical Psychology Review*, *28*(3), 407–429. https://doi.org/10.1016/j.cpr.2007.07.009

Meredith, P., Strong, J., & Feeney, J. A. (2006). Adult attachment, anxiety, and pain self-efficacy as predictors of pain intensity and disability. *Pain*, *123*(1), 146–154. https://doi.org/10.1016/j.pain.2006.02.025

Meredith, Pamela J., Strong, J., & Feeney, J. A. (2005b). Evidence of a Relationship between Adult Attachment Variables and Appraisals of Chronic Pain. *Pain Research and Management*, *10*(4), 191–200. https://doi.org/10.1155/2005/745650

Meredith, Pamela J., Strong, J., & Feeney, J. A. (2007). Adult attachment variables predict depression before and after treatment for chronic pain. *European Journal of Pain*, *11*(2), 164–170. https://doi.org/10.1016/j.ejpain.2006.01.004

Meredith, Pamela Joy. (2013). A Review of the Evidence Regarding Associations Between Attachment Theory and Experimentally Induced Pain. *Current Pain and Headache Reports*, *17*(4), 326. https://doi.org/10.1007/s11916-013-0326-y

Meredith, P.J. (2013). A review of the evidence regarding associations between attachment theory and experimentally induced pain. *Current Pain and Headache Reports*, *17*(4), 326.

Mikulincer, M., & Florian, V. (1998). The relationship between adult attachment styles and emotional and cognitive reactions to stressful events. In *Attachment theory and close relationships* (pp. 143–165). The Guilford Press.

Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment Theory and Affect Regulation: The Dynamics, Development, and Cognitive Consequences of Attachment-Related Strategies. *Motivation & Emotion*, *27*(2), 77–102. https://doi.org/10.1023/A:1024515519160

Mogil, J. S. (2012). Sex differences in pain and pain inhibition: Multiple explanations of a controversial phenomenon. *Nature Reviews Neuroscience*, *13*(12), 859–866. https://doi.org/10.1038/nrn3360

Montero-Marin, J., Andrés-Rodríguez, L., Tops, M., Luciano, J. V., Navarro-Gil, M., Feliu-Soler, A., Lopez-del-Hoyo, Y., & Garcia-Campayo, J. (2019). Effects of attachment-based compassion therapy (ABCT) on brain-derived neurotrophic factor and low-grade inflammation among fibromyalgia patients. *Scientific Reports*, *9*(1), 1–14.

Montero-Marin, J., Van Gordon, W., Shonin, E., Navarro-Gil, M., Gasión, V., López-del-Hoyo, Y., Luciano, J. V., & Garcia-Campayo, J. (2020). Attachment-Based Compassion Therapy for Ameliorating Fibromyalgia: Mediating Role of Mindfulness and Self-Compassion. *Mindfulness*, *11*(3), 816–828. https://doi.org/10.1007/s12671-019-01302-8

Munce, S. E. P., & Stewart, D. E. (2007). Gender Differences in Depression and Chronic Pain Conditions in a National Epidemiologic Survey. *Psychosomatics*, *48*(5), 394–399. https://doi.org/10.1176/appi.psy.48.5.394

Myers, C. D., Riley, J. L. I., & Robinson, M. E. (2003). Psychosocial Contributions to Sex-Correlated Differences in Pain. *The Clinical Journal of Pain*, *19*(4), 225.

Navarro-Gil, M., Lopez-del-Hoyo, Y., Modrego-Alarcón, M., Montero-Marin, J., Van Gordon, W., Shonin, E., & Garcia-Campayo, J. (2020). Effects of Attachment-Based Compassion

Therapy (ABCT) on Self-compassion and Attachment Style in Healthy People. *Mindfulness*, *11*(1), 51–62. https://doi.org/10.1007/s12671-018-0896-1

Ndao-Brumblay, S. K., & Green, C. R. (2005). Racial differences in the physical and psychosocial health among black and white women with chronic pain. *Journal of the National Medical Association*, *97*(10), 1369–1377.

Neff, K. (2003). Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself. *Self and Identity*, *2*(2), 85–101. https://doi.org/10.1080/15298860309032

Neff, K. D. (2003). The Development and Validation of a Scale to Measure Self-Compassion. *Self and Identity*, *2*(3), 223–250. https://doi.org/10.1080/15298860309027

Neff, K. D., & McGehee, P. (2010). Self-compassion and Psychological Resilience Among Adolescents and Young Adults. *Self and Identity*, *9*(3), 225–240. https://doi.org/10.1080/15298860902979307

Newton-John, T. R. O., Mason, C., & Hunter, M. (2014). The role of resilience in adjustment and coping with chronic pain. *Rehabilitation Psychology*, *59*(3), 360–365. https://doi.org/10.1037/a0037023

Nicholas, M. K. (2007). The pain self-efficacy questionnaire: Taking pain into account. *European Journal of Pain*, *11*(2), 153–163. https://doi.org/10.1016/j.ejpain.2005.12.008

Oliveira, P., & Costa, M. E. (2009). Interrelationships of Adult Attachment Orientations, Health Status and Worrying among Fibromyalgia Patients. *Journal of Health Psychology*, *14*(8), 1184–1195. https://doi.org/10.1177/1359105309342471

Osman, A., Barrios, F. X., Gutierrez, P. M., Kopper, B. A., Merrifield, T., & Grittmann, L. (2000a). 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

Osman, A., Barrios, F. X., Kopper, B. A., Hauptmann, W., Jones, J., & O'Neill, E. (1997). Factor Structure, Reliability, and Validity of the Pain Catastrophizing Scale. *Journal of Behavioral Medicine*, *20*(6), 589–605. https://doi.org/10.1023/A:1025570508954

Paetzold, R. L., Rholes, W. S., & Kohn, J. L. (2015). Disorganized Attachment in Adulthood: Theory, Measurement, and Implications for Romantic Relationships. *Review of General Psychology*, *19*(2), 146–156. https://doi.org/10.1037/gpr0000042

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*(6), 511–522. https://doi.org/10.1007/s10865-006-9073-4

Pietromonaco, P. R., Uchino, B., & Dunkel Schetter, C. (2013). Close Relationship Processes and Health: Implications of Attachment Theory for Health and Disease. *Health Psychology : Official Journal of the Division of Health Psychology, American Psychological Association*, *32*(5), 499–513. https://doi.org/10.1037/a0029349

Pollard, C. A. (1984). Preliminary validity study of the Pain Disability Index. *Perceptual and Motor Skills*, *59*(3), 974–974. https://doi.org/10.2466/pms.1984.59.3.974

Popescu, A., LeResche, L., Truelove, E. L., & Drangsholt, M. T. (2010). Gender differences in pain modulation by diffuse noxious inhibitory controls: A systematic review. *PAIN*, *150*(2), 309–318. https://doi.org/10.1016/j.pain.2010.05.013

Porter, L. S., Davis, D., & Keefe, F. J. (2007). Attachment and Pain: Recent Findings and Future Directions. *Pain*, *128*(3), 195–198. https://doi.org/10.1016/j.pain.2007.02.001

Quartana, P. J., Campbell, C. M., & Edwards, R. R. (2009). Pain catastrophizing: A critical review. *Expert Review of Neurotherapeutics*, *9*(5), 745–758. https://doi.org/10.1586/ern.09.34

Racine, M., Tousignant-Laflamme, Y., Kloda, L. A., Dion, D., Dupuis, G., & Choinière, M. (2012a). A systematic literature review of 10years of research on sex/gender and

experimental pain perception – Part 1: Are there really differences between women and men? *PAIN*, *153*(3), 602–618. https://doi.org/10.1016/j.pain.2011.11.025

Racine, M., Tousignant-Laflamme, Y., Kloda, L. A., Dion, D., Dupuis, G., & Choinière, M. (2012b). A systematic literature review of 10years of research on sex/gender and pain perception – Part 2: Do biopsychosocial factors alter pain sensitivity differently in women and men? *PAIN*, *153*(3), 619–635. https://doi.org/10.1016/j.pain.2011.11.026

Radloff, L. S. (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, *1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Raque-Bogdan, T. L., Ericson, S. K., Jackson, J., Martin, H. M., & Bryan, N. A. (2011). Attachment and mental and physical health: Self-compassion and mattering as mediators. *Journal of Counseling Psychology*, *58*(2), 272–278. https://doi.org/10.1037/a0023041

Romano, J. M., Molton, I. R., Alschuler, K. N., Jensen, M. P., Schmaling, K. B., & Buchwald, D. S. (2016). Reported Pain and Fatigue Behaviors Mediate the Relationship Between Catastrophizing and Perceptions of Solicitousness in Patients With Chronic Fatigue. *The Journal of Pain*, *17*(3), 328–335. https://doi.org/10.1016/j.jpain.2015.10.020

Romeo, A., Tesio, V., Castelnuovo, G., & Castelli, L. (2017). Attachment Style and Chronic Pain: Toward an Interpersonal Model of Pain. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.00284

Sambo, C. F., Howard, M., Kopelman, M., Williams, S., & Fotopoulou, A. (2010). Knowing you care: Effects of perceived empathy and attachment style on pain perception. *PAIN®*, *151*(3), 687–693. https://doi.org/10.1016/j.pain.2010.08.035

Sardá, J., Nicholas, M. K., Pimenta, C. A. M., & Asghari, A. (2007). Pain-related self-efficacy beliefs in a Brazilian chronic pain patient sample: A psychometric analysis. *Stress and Health*, *23*(3), 185–190. https://doi.org/10.1002/smi.1135

Schappert, S. M., & Burt, C. W. (2006). Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 2001-02. *Vital and Health Statistics. Series 13, Data from the National Health Survey*, *159*, 1–66.

Schlomer, G. L., Bauman, S., & Card, N. A. (2010). Best practices for missing data management in counseling psychology. *Journal of Counseling Psychology*, *57*(1), 1–10. https://doi.org/10.1037/a0018082

Schwartz, L., Jensen, M. P., & Romano, J. M. (2005). The development and psychometric evaluation of an instrument to assess spouse responses to pain and well behavior in patients with chronic pain: The Spouse Response Inventory. *The Journal of Pain*, *6*(4), 243–252. https://doi.org/10.1016/j.jpain.2004.12.010

Shaver, P. R., & Mikulincer, M. (2008). Adult Attachment and Cognitive and Affective Reactions to Positive and Negative Events. *Social and Personality Psychology Compass*, *2*(5), 1844–1865. https://doi.org/10.1111/j.1751-9004.2008.00146.x

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, *7*(4), 422–445.

Sibley, C. G., Fischer, R., & Liu, J. H. (2005). Reliability and Validity of the Revised Experiences in Close Relationships (ECR-R) Self-Report Measure of Adult Romantic Attachment. *Personality and Social Psychology Bulletin*, *31*(11), 1524–1536.

Sirois, F. M., & Gick, M. L. (2016a). An appraisal-based coping model of attachment and adjustment to arthritis. *Journal of Health Psychology*, *21*(5), 821–831. https://doi.org/10.1177/1359105314539531

Smarr, K. L., & Keefer, A. L. (2011). Measures of depression and depressive symptoms: Beck Depression Inventory-II (BDI-II), Center for Epidemiologic Studies Depression Scale (CES-D), Geriatric Depression Scale (GDS), Hospital Anxiety and Depression Scale (HADS), and Patient Health Questionnaire-9 (PHQ-9). *Arthritis Care & Research*, *63*(S11), S454–S466. https://doi.org/10.1002/acr.20556

Smeets, R. J. E. M., Vlaeyen, J. W. S., Kester, A. D. M., & Knottnerus, J. A. (2006). Reduction of Pain Catastrophizing Mediates the Outcome of Both Physical and Cognitive-Behavioral Treatment in Chronic Low Back Pain. *The Journal of Pain*, *7*(4), 261–271. https://doi.org/10.1016/j.jpain.2005.10.011

Spence, J. (1984). Gender identity and its implications for the concepts of masculinity and femininity. *Current Theory and Research in Motivation*, *32*, 59–95.

Stubbs, D., Krebs, E., Bair, M., Damush, T., Wu, J., Sutherland, J., & Kroenke, K. (2010). Sex Differences in Pain and Pain-Related Disability among Primary Care Patients with Chronic Musculoskeletal Pain. *Pain Medicine*, *11*(2), 232–239.

Sullivan, M., Bishop, S., & Pivik, J. (1995). The pain catastrophizing scale: Development and validation. *Psychological Assessment*, *7*(4), 524.

Sullivan, Michael 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. *The Clinical Journal of Pain*, *17*(1), 52.

Sullivan, Michael J. L., Tripp, D. A., & Santor, D. (2000a). Gender Differences in Pain and Pain Behavior: The Role of Catastrophizing. *Cognitive Therapy and Research*, *24*(1), 121–134. https://doi.org/10.1023/A:1005459110063

Sullivan, M.J.L. (2012). The communal coping model of pain catastrophising: Clinical and research implications. *Canadian Psychology*, *53*(1), 32–41.

Swank, J. M., & Mullen, P. R. (2017). Evaluating Evidence for Conceptually Related Constructs Using Bivariate Correlations. *Measurement and Evaluation in Counseling and Development*, *50*(4), 270–274. https://doi.org/10.1080/07481756.2017.1339562

Tabachnick, B. (2007). *Experimental Designs Using ANOVA*.

Tait, R. C., Pollard, C. A., Margolis, R. B., Duckro, P. N., & Krause, S. J. (1987). The Pain Disability Index: Psychometric and validity data. *Archives of Physical Medicine and Rehabilitation*, *68*(7), 438–441.

Tait, Raymond C., Chibnall, J. T., & Krause, S. (1990). The Pain Disability Index: Psychometric properties. *Pain*, *40*(2), 171–182. https://doi.org/10.1016/0304-3959(90)90068-O

Tamres, L. K., Janicki, D., & Helgeson, V. S. (2002). Sex Differences in Coping Behavior: A Meta-Analytic Review and an Examination of Relative Coping. *Personality and Social Psychology Review*, *6*(1), 2–30. https://doi.org/10.1207/S15327957PSPR0601_1

Taylor, H., & Curran, N. M. (1985). *The Nuprin pain report* (pp. 1–233). New York: Louis Harris and Associates.

Teyber, E., & Teyber, F. (2010). *Interpersonal Process in Therapy: An Integrative Model* (6 edition). Brooks Cole.

Thorn, B. E., & Dixon, K. E. (2007). Coping with Chronic Pain: A Stress-Appraisal Coping Model. In E. Martz & H. Livneh (Eds.), *Coping with Chronic Illness and Disability: Theoretical, Empirical, and Clinical Aspects* (pp. 313–335). Springer US. https://doi.org/10.1007/978-0-387-48670-3_15

Tremblay, I., & Sullivan, M. J. L. (2010). Attachment and Pain Outcomes in Adolescents: The Mediating Role of Pain Catastrophizing and Anxiety. *The Journal of Pain*, *11*(2), 160–171. https://doi.org/10.1016/j.jpain.2009.06.015

Turk, D. C., & Melzack, R. (2011). *Handbook of Pain Assessment, Third Edition*. Guilford Press.

Unruh, A. M. (1996). Gender variations in clinical pain experience. *Pain*, *65*(2), 123–167. https://doi.org/10.1016/0304-3959(95)00214-6

Unruh, A. M., & Ritchie, J. A. (1998). *Development of the Pain Appraisal Inventory: Psychometric Properties* [Research article]. Pain Research and Management. https://doi.org/10.1155/1998/709372

Unruh, A. M., Ritchie, J., & Merskey, H. (1999). Does Gender Affect Appraisal of Pain and Pain Coping Strategies? *The Clinical Journal of Pain*, *15*(1), 31.

Van Vleet, M., Helgeson, V., Seltman, H., Korytkowski, M., & Hausmann, L. (2019). An examination of the communal coping process in recently diagnosed diabetes. *Journal of Social and Personal Relationships*, *36*(4), 1297–1316.

Vervoort, T., Eccleston, C., Goubert, L., Buysse, A., & Crombez, G. (2010). Children's catastrophic thinking about their pain predicts pain and disability 6 months later. *European Journal of Pain*, *14*(1), 90–96. https://doi.org/10.1016/j.ejpain.2009.03.001

Vierhaus, M., Lohaus, A., & Schmitz, A.-K. (2011). Sex, gender, coping, and self-efficacy: Mediation of sex differences in pain perception in children and adolescents. *European Journal of Pain*, *15*(6), 621.e1-621.e8. https://doi.org/10.1016/j.ejpain.2010.11.003

Vingerhoets, A. J. J. M., & Bylsma, L. M. (2015). The Riddle of Human Emotional Crying: A Challenge for Emotion Researchers: *Emotion Review*. https://doi.org/10.1177/1754073915586226

Vowles, K. E., Wetherell, J. L., & Sorrell, J. T. (2009). Targeting Acceptance, Mindfulness, and Values-Based Action in Chronic Pain: Findings of Two Preliminary Trials of an Outpatient Group-Based Intervention. *Cognitive and Behavioral Practice*, *16*(1), 49–58. https://doi.org/10.1016/j.cbpra.2008.08.001

Vrtička, P., Andersson, F., Grandjean, D., Sander, D., & Vuilleumier, P. (2008). Individual Attachment Style Modulates Human Amygdala and Striatum Activation during Social Appraisal. *PLOS ONE*, *3*(8), e2868. https://doi.org/10.1371/journal.pone.0002868

Walsh, C. A., Jamieson, E., MacMillan, H., & Boyle, M. (2007). Child Abuse and Chronic Pain in a Community Survey of Women. *Journal of Interpersonal Violence*, *22*(12), 1536–1554. https://doi.org/10.1177/0886260507306484

Wei, M., Liao, K. Y.-H., Ku, T.-Y., & Shaffer, P. A. (2011). Attachment, Self-Compassion, Empathy, and Subjective Well-Being Among College Students and Community Adults. *Journal of Personality*, *79*(1), 191–221. https://doi.org/10.1111/j.1467-6494.2010.00677.x

Weissman-Fogel, I., Sprecher, E., & Pud, D. (2008). Effects of catastrophizing on pain perception and pain modulation. *Experimental Brain Research, 186*(1), 79–85. https://doi.org/10.1007/s00221-007-1206-7

Werner, A., & Malterud, K. (2003). It is hard work behaving as a credible patient: Encounters between women with chronic pain and their doctors. *Social Science & Medicine, 57*(8), 1409–1419. https://doi.org/10.1016/S0277-9536(02)00520-8

Wiesenfeld-Hallin, Z. (2005). Sex differences in pain perception. *Gender Medicine, 2*(3), 137–145. https://doi.org/10.1016/S1550-8579(05)80042-7

Williams, A. C. de C. (2002). Facial expression of pain: An evolutionary account. *Behavioral and Brain Sciences, 25*(4), 439–455. https://doi.org/10.1017/S0140525X02000080

Wren, A. A., Somers, T. J., Wright, M. A., Goetz, M. C., Leary, M. R., Fras, A. M., Huh, B. K., Rogers, L. L., & Keefe, F. J. (2012). Self-Compassion in Patients With Persistent Musculoskeletal Pain: Relationship of Self-Compassion to Adjustment to Persistent Pain. *Journal of Pain and Symptom Management, 43*(4), 759–770. https://doi.org/10.1016/j.jpainsymman.2011.04.014

Wuest, J., Ford-Gilboe, M., Merritt-Gray, M., Varcoe, C., Lent, B., Wilk, P., & Campbell, J. (2009). Abuse-Related Injury and Symptoms of Posttraumatic Stress Disorder as Mechanisms of Chronic Pain in Survivors of Intimate Partner Violence. *Pain Medicine, 10*(4), 739–747. https://doi.org/10.1111/j.1526-4637.2009.00624.x

Zauszniewski, J. A., Bekhet, A. K., & Suresky, M. J. (2008). Factors Associated With Perceived Burden, Resourcefulness, and Quality of Life in Female Family Members of Adults With Serious Mental Illness. *Journal of the American Psychiatric Nurses Association, 14*(2), 125–135. https://doi.org/10.1177/1078390308315612