

PERCEPTION OF PAIN IN OTHERS:
THE IMPACT OF A LABEL OF MAJOR DEPRESSIVE DISORDER

by

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Abstract

Approximately one in five Canadian adults suffer from chronic pain. Furthermore, rates of psychiatric disorders, particularly major depression, are elevated among chronic pain populations. Although the influence of psychosocial factors on judgments of pain in others is gaining increased attention in the research literature, the extent to which a label of a comorbid psychiatric condition influences how pain is perceived in individuals with chronic pain has not yet been investigated. Using a between-subject vignette methodology, the current study examined how a label of comorbid major depression influenced the assessment of pain intensity in individuals with chronic pain. The present study investigated whether a comorbid diagnosis of depression can influence the perception of pain in individuals with chronic pain, as well as how and for whom this effect might exist. This research hypothesized the association between a comorbid MDD label and pain intensity assessment may be mediated by physical pain attributions, psychological pain attributions, or pain genuineness or moderated by an individuals' level of mental illness stigma, psychological distress, or empathy. Three hundred and seventy-one participants read a vignette and watched a video of a middle-aged male or female adult with chronic pain undergoing a pain induction exercise. The participants responded to an online questionnaire assessing their perception of the patient's pain intensity, pain genuineness, physical or psychological causal attributions of pain, and psychological distress, as well as self-report trait measures of mental illness stigma, and empathy. The findings indicated that a label of comorbid depression in individuals with chronic pain influences observers' perception of the patient's psychological distress, pain genuineness, and physical pain attributions regarding causes of pain, but not pain intensity. No significant mediation or moderation effects emerged. Given the high rates of depression in chronic pain and the poor quality of life outcomes in this population, future research

is needed to examine other ways comorbid depression may impact pain perception in others. This area of research shows promise in improving the assessment and subsequent treatment of individuals suffering from acute and chronic pain.

Preface

A portion of this research has been presented at the Canadian Psychological Association 74th annual convention: McDivitt, K.E., Turcotte, K., Jassi, A., Holtzman, S (2013). Pain as a Social Phenomenon: Does Attachment Style Influence Pain Perception in Others? *Annals of Canadian Psychology Supplement*. 54(2A), 137. The ethics application for the study described in this document was approved by the Okanagan Research Ethics Board- Office of Research Services, and was assigned the tracking number H12-01271.

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Dedication

To my parents & Tim Czyrnyj: I would not be where I am today without your patient and unflagging support.

Introduction

Pain is the most pervasive and universal form of human distress. It is a complex psychological and physiological experience that has been defined by the International Association for the Study of Pain (IASP; 2005) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. This definition rejects the notion that pain is caused solely by tissue damage and allows for multiple causes, mediators and moderators in the perception and experience of pain. Chronic pain is defined as continuous long-term pain of more than twelve weeks or after the time that healing would have been thought to occur following trauma or surgery (IASP, 2012). General population surveys have revealed the prevalence of chronic pain in Canada to be between 15% and 29% (Boulanger et al., 2007; Moulin et al., 2002; Schopflocher et al., 2011). Chronic pain often contributes to dramatic reductions in quality of life for pain sufferers, and creates a significant economic burden on society (Hadjistavropoulos & Craig, 2004). According to the Canadian Pain Society (2011), based on recent U.S. figures (Relieving Pain in America, 2011), it is estimated that the annual health care cost of chronic pain in Canada is at least \$56-60 billion. These health care cost estimates do not include the significant societal and intrapersonal costs related to disability and the lost productivity associated with chronic pain (Lynch et al., 2009).

Biopsychosocial Model of Pain

Since the 19th century there have been vigorous and widespread efforts among the scientific community to advance the understanding of the etiology, assessment, and treatment of pain. The biopsychosocial model of pain has been widely recognized as necessary for pain to be accurately understood and for pain interventions to be effectively developed and delivered (Hadjistavropoulos et al., 2011; Turk & Okifuji, 2002). The biopsychosocial model of pain, as

opposed to the biomedical model, emphasizes the complex interaction between the biological, psychological, and social factors in the experience of pain (Craig, 2009; Melzack & Wall, 1965). A fundamental component of the biopsychosocial model is pain communication (Craig, 2009). Although pain is largely an internal, subjective experience, it has fundamental social characteristics. People rarely suffer from pain in silence and its immediate and long-term consequences impact not only the individual, but also families, communities, and society as a whole (Hadjistavropoulos et al., 2011). An interpersonal conceptualization of pain requires a consideration of both the ways in which pain is expressed in an interpersonal context, as well as how others respond to the expressed pain. Research indicates that observing others in pain may elicit a variety of cognitive, emotional, and behavioural responses in the observer (Craig et al., 2010; Goubert, Craig, Buysse, 2005; Goubert et al., 2009; Tait & Chibnall 1997; Tait, Chibnall, & Kalauokalani, 2009). This, in turn, may impact the pain experience and well-being of the person in pain (Coll et al., 2011; Goubert, Craig, Buysse, 2005; Hadjistavropoulos et al., 2011).

Pain Communication

Pain is experienced in a social context. Understanding how others respond to an individual's pain is an integral component to understanding the etiology and course of that pain (Hadjistavropoulos, et al, 2011). In order to advance psychosocial pain research, Craig (2009) developed the social communication model of pain, and Hadjistavropoulos et al (2011) extended Craig's model and developed the biopsychosocial communication model of pain. These communication models of pain supplement alternative models of pain by emphasizing the cognitive and social factors that can impact the pain experience. Both models are rooted in Rosenthal's (1982) formulation of communication processes whereby observers decode and react to psychological states encoded in the behaviour of others. According to Rosenthal (1982), communication is viewed as a three-step process ($A \rightarrow B \rightarrow C$). An internal experience (Step A) is encoded with varying degrees of

fidelity in expressive behaviour (Step B). If observers are to respond with sensitivity, the expressive behaviour requires decoding (Step C). When applied to the context of pain, this model suggests that pain is an internal subjective experience that cannot be observed directly, but rather it must be inferred via verbal and nonverbal behaviour.

Pain Assessment Tools

The act of perceiving the pain of others is a challenging and ambiguous task. As a result, observers' perceptions of the severity of another's pain are often discrepant from patients' own perceptions (Cremeans-Smith et al., 2003). Over the past several decades, pain researchers and clinicians have devised a number of approaches to assess pain in others, including verbal self-report tools and coding of facial expressions (Hadjistavropoulos & Craig, 2002). The current gold standard for assessing pain encompasses both self-report (Melzack & Katz, 1999) as well as the nonverbal expression of pain (Hadjistavropoulos & Craig, 2002).

In health care settings, patients are most commonly asked to quantify their pain by providing a single general self-report rating of pain intensity (Turk & Melzack, 2010). A commonly used method to assess pain intensity is the visual analogue scale (VAS). The VAS consists of a line, usually 10 cm long, whose ends are labeled as the extremes of pain, such as 'No pain' to 'Pain as bad as it could be'. Patients are asked to indicate along the 10 cm line their current experience of pain (Turk & Melzack, 2010). However, research has indicated that rating pain intensity is influenced by a number of factors, such as cultural background (Bates et al., 1993), past experience with pain (Hofle et al., 2012), the meaning of the situation (McGrath, 1994), personality variables (Peters & Vancleef, 2008), and emotions (Villemure & Bushnell, 2002).

Facial expressions are the most automatic form of nonverbal pain communication among humans. The evolutionary function of facial expressions of pain appears to be largely

communicative (Prkachin, 2009; Williams, 2002). There is a consistency with which facial actions are associated with pain across painful stimuli and cultures, indicating a possible universal pain expression (Ekman, Sorenson, & Friesen, 1969). Across different categories of nociceptive stimulation (e.g., cold, pressure, ischemia, electric shock) there is a commonly demonstrated increase in four facial actions - brow lowering, orbit tightening, upper-lip raising/nose wrinkling, and eye closure (Prkachin, 2009). Coding measures have been devised to objectively measure facial expressions, including Facial Action Coding System (FACS) (Ekman & Friesmen, 1978), and the Prkachin and Solomon Pain Intensity (PSPI) metric (Prkachin & Solomon, 2008). The facial display of pain has been shown to be a major influence on observer judgments of the experience of acute and chronic pain in others (Williams, 2002). These pain expressions typically add context and meaning to interpersonal interactions and are often thought to be more credible than verbal reports of pain and pain behaviours since they are less subject to conscious control (Poole & Craig, 1992).

Perception of Pain in Others

In sum, it is impossible to objectively measure how much pain an individual is experiencing (Turk & Melzack, 2010). At the same time, obtaining an accurate assessment of an individual's pain experience has meaningful medical and interpersonal consequences (Bailey et al., 2012; MacLeod et al., 2001). There are important repercussions to both underestimating and overestimating another's pain. For example, underestimation could lead to inadequate pain management, while overestimation could provoke overprotective behaviour or over-involvement by formal and informal care providers (Perreault & Dionne, 2006).

Informal Caregivers Judgments of Pain

There is strong evidence to suggest that the ways in which informal support networks perceive and respond to individuals when they are in pain can play a critical role in their emotional and physical well-being (McCracken, 2005). In the context of chronic pain, research indicates that when patients and informal familial caregivers disagree on pain ratings, caregivers more frequently overestimate rather than underestimate patients' pain (Redinbaugh et al., 2002). Less agreement, regardless of whether it is overestimation or underestimation of pain, between patients and caregivers has been shown to be associated with greater mood disturbance in patients, (Miaskowski et al., 1997) and greater interpersonal conflict such as perception of problematic social support from spouses (Lehman et al., 2011). On the other hand, studies suggest that caregivers' accurate understanding of a patient's pain is associated with better patient health and psychological well-being (Lehman et al., 2011; Wells et al., 2003). For example, in a study of spouses' perceptions of pain severity it was found that dyadic agreement regarding pain severity between patients and their spouses was consistently related to better psychological well being among patients, even after considering the patients' self-reports of their own pain (Creamens-Smith et al., 2003).

Psychosocial Factors Influencing the Perception of Pain in Others

Central to understanding how pain is perceived in others is the recognition and exploration of the interpersonal and psychosocial characteristics that can contribute to this complex process (Hadjistavropoulos et al., 2011). Indeed, researchers have been increasingly investigating the various patient and observer characteristics that may influence accuracy in the estimation of pain in others. To date, the role of observer gender has received the most research attention. In general, female observers compared to male observers tend to be more accurate in judging pain in others

but this effect may vary based on the sex of the patient (Kallai, Barke, & Voss, 2004; Tait et al., 2009). Women are perceived to have more pain than men, but there is a tendency by observers of both sexes to underestimate pain in others with men exhibiting greater underestimation compared to women (Robinson & Wise, 2003).

Comorbid Psychiatric Disorders and the Perception of Pain in Others

Although rates of psychiatric disorders have been consistently shown to be elevated among chronic pain populations (Dersh, Polatin, & Gatchel, 2002), there is a dearth of research regarding *how* the presence of a comorbid psychiatric condition may influence judgments of pain in others. In the context of primary care, patients with physical pain frequently report comorbid mood and anxiety disorders (Bair et al., 2003). For example, findings from a recent cross sectional multi-site epidemiological study of 7152 Spanish primary care patients indicated that a report of pain was associated with a 2.5 to almost 10-fold greater likelihood of having a comorbid anxiety or mood disorder, compared to those without pain (Means-Christensen et al., 2007). To date, research on the relationship between pain and psychiatric disorders has focused predominantly on major depressive disorder (MDD), as it is the most common pain comorbidity (Bair et al., 2003; Means-Christensen et al., 2007; Dersh, Polatin, & Gatchel, 2002).

MDD is a mood disorder characterized by the presence of at least five diagnostic symptoms such as feelings of sadness, worthlessness, and guilt for a period of at least two weeks (DSM-5, 2013). A large body of literature has focused on the complex interaction between depression and chronic pain, as the two conditions frequently co-occur, are mutually influential, and often respond to similar pharmacological and psychological treatments (Bair et al., 2003). According to a systematic literature review of studies investigating the comorbidity of depression and chronic pain, the mean prevalence of pain among those who suffer from depression is 65%, with estimates ranging from 15% to 100% (Williams et al., 2006). Importantly, comorbid

depression and chronic pain are associated with an array of poor patient outcomes (Kroenke et al., 1994; Kroenke, 2003a; Kroenke, 2003b). For example, individuals in chronic pain with comorbid depression tend to report more painful symptom complaints, more intense pain, and longer duration of pain (Bair et al., 2003; Tunks, Cook, & Weir, 2008). Chronic pain with comorbid depression has also been linked to greater impairments in social functioning, higher unemployment rates, and diminished patient quality of life compared to those suffering from pain or depression alone (Bair et al., 2003; Lepine & Briley, 2004).

Label of Major Depressive Disorder. Given the high rates of comorbid psychiatric disorders among individuals with chronic pain, how mental illness labels and their stigmatization impact pain perception is highly relevant in this area of research. Recognizing and labeling a mental health problem as it emerges is considered to be a natural part of the help-seeking process. Indeed, the identification and labeling of mental disorders is often employed by the mental health community to facilitate help-seeking and entry into treatment (Wright, Jorm, & MacKinnon, 2011). However, any label has the potential to incite automatic and potentially negative responses (Ishibashi, 2005). Labeling or diagnosing someone with a mental illness has the potential to create a range of positive and negative repercussions from increased stigmatization to increased access to social services (Link & Phelan, 2010).

Scheff (1966; 1974) and Link (1989; 2001) have been at the forefront of research examining the association between labeling and stigma related to mental disorders. Scheff's labeling theory (1966; 1974) suggests that various labels such as "the mentally ill" are given to those who behave in socially deviant ways. The theory argues that at least some of the pathologies associated with 'deviant' behaviour such as mental illness are due to the tendency of those who are labeled to be stigmatized and to subsequently play out their assigned roles. Link (1989) devised the modified labeling theory of mental illness and has reported on the negative

and stigmatizing impact of a person being labeled as mentally ill. According to the modified labeling theory (Link, 1989) an extension of the labeling theory that focused specifically on mental illness, the negative consequences of psychiatric treatment is rooted in the cultural definition of being “mentally ill”. When an individual is diagnosed with mental illness, culturally formed stereotypes about the mentally ill, such as ‘incompetent’ and ‘dangerous’ become personally relevant and are transformed into expectations that others will devalue and discriminate against that person.

The empirical evidence on the effects of labeling in the context of mental illness is equivocal (Angermeyer & Matschinger, 2003). Some research has revealed positive consequences of labeling, including the promotion of help-seeking behaviour (Wright, Jorm, & Mackinnon, 2011). However, other research suggests that a majority of individuals with a label of a mental illness report negative personal experiences, due to the associated effects of stigmatization (Pescosolido et al., 2010; Rosenfield, 1997). Indeed, there is a substantial body of research showing that the use of psychiatric terms by the public is frequently stigmatizing (Angermeyer et al., 2005). Individuals with mental illness suffer educational, vocational, and interpersonal setbacks as a result of negative societal attitudes towards their condition (Rusch, Angermeyer, & Corrigan, 2005). Mental illness stigma can lead to strained familial relationships, employment discrimination, and general social rejection (Feldman & Crandall, 2007). The more individuals with mental illness feel stigmatized, the lower their self-esteem, life satisfaction, and social adjustment. For instance, a study by Link and colleagues (1987), examined the differential outcomes of individuals who have been treated for a mental illness in a psychiatric hospital compared with a community sample that have not been treated but suffered similar psychiatric problems. The untreated participants were identified in the course of the research interview by the diagnostic interview but had no prior contact with a psychiatrist, psychologist, or social

worker. The treated (i.e., labeled) groups reported a higher unemployment rate, lower earnings, and greater feelings of demoralization compared to the untreated group. Further experimental research in undergraduate students has revealed that a label of mental illness caused psychophysiological reactivity (e.g., increased heart rate reactivity as well as palmer skin conductance) typically associated with negative affect, which predicted self-reported stigma towards the individuals with a label of mental illness (Graves, Cassisi, & Penn, 2005).

To our knowledge, no prior research has examined how a label of mental illness influences judgments of people suffering from chronic pain. The pain and disability in individuals with chronic pain and comorbid depression may be due to pain, but could also be that individuals who carry a label of “depressed” may be stigmatized against and subsequently assessed and treated differently in formal and informal health care settings (Cook & Wang, 2010; Corrigan et al., 2003; Lauber et al., 2003; Lauber et al., 2006). Limited knowledge about mental illness as well as negative attitudes toward individuals with mental illness is widespread in the general public (Link et al., 1999) as well as undergraduate students (Stone & Merlo, 2011). In particular, since depression is associated with stereotypes affiliated with psychosomatic disorders such as untrustworthiness, unpredictability, and malingering (Cook & Wang, 2010), it is possible that pain in individuals with comorbid mental illness is underestimated and undertreated.

Mediators and Moderators of the Perception of Pain in Others

Hayes (2013) states that empirical research is more beneficial to understanding an area of research if it establishes whether an effect exists, but also how and for whom the relationship holds. If a comorbid label of depression impacts pain ratings, the next step is to understand *how* and *when* this effect occurs, as this question has never been systematically explored. A link between a comorbid MDD label and pain intensity assessment may be mediated by the influence the comorbid label has on physical pain attributions, psychological pain attributions, or pain

genuineness. As well, the effect of a comorbid MDD label may be moderated by an individuals' level of mental illness stigma, psychological distress, or empathy.

Mediators

Pain Attributions. Beliefs regarding pain are an emerging area of research in the biopsychosocial model of pain. In the biopsychosocial model of pain, an individual's beliefs about the cause of pain plays an important role in the experience of pain (Sloan et al., 2008). Similarly, observers' beliefs and attributions regarding pain etiology may have important implications for the interpretation of pain in others, as well as treatment recommendations (Edwards et al., 1992; Shaw, 2002; Thomas et al., 2012). Although chronic pain can be caused by a wide array of medical factors there is frequently no identifiable organic pathology (Gagliese & Katz, 2000). Indeed, medically unexplained symptoms of pain and bodily dysfunction are the single most prevalent class of symptoms in primary care (Henningesen, Zimmermann, & Sattel, 2003). In the context of chronic pain, the dominant discourse in the medical fields historically has been the specificity theory of pain (Melzack & Wall, 1965), which is based on the theory of body-mind dualism (Descartes, 1664). Patients viewed through this dualistic lens are seen to have either a disordered body or a disturbed mind. As the medical field currently emphasizes objective evidence of body dysfunction over subjective claims of pain, and in the absence of physical proof, there is a default to an inference of a 'disturbed mind' (Cohen et al., 2011). The default idiopathic interpretation has a range of negative consequences including stigma, pain underestimation and subsequent inadequate pain management strategies.

Attributions about the cause of persistent pain have two dominant dimensions- physical pain attributions and psychological pain attributions. Physical pain attributions refer to attributions that the pain experience is primarily caused by physiological factors that indicate physical harm or threat to well-being. Psychological pain attributions refer to the internal

influences and feelings that impact the experience of pain and that can potentially threaten well-being. These two dimensions, stemming from the dualistic framework of mind-body dualism, are considered to accurately reflect the general populations perception of the pain experience (Edwards et al., 1992). Research in chronic pain patients indicates that physical attributions of pain have been significantly associated with poorer functioning in individuals with chronic pain conditions (Pons, Shipton, & Mulder, 2012). A limited body of past research has indicated that observer pain beliefs are significantly correlated with the accuracy of observer ratings of patient pain severity (Cano, Miller, & Loree, 2009; McCluskey et al., 2011). As research has established physical and psychological causal attributions of pain are correlated with accuracy in the perception of pain in others (Cano, Miller, & Loree, 2009; Edwards et al., 1992; McCluskey et al., 2011) more systematic research is needed to extend the understanding of causal pain attribution beliefs and pain assessment in other populations. This research will investigate if observers' beliefs about causal attributions of pain mediate pain intensity assessments in chronic pain patients with comorbid depression.

Pain Genuineness. The extent to which care providers believe that a pain patient is being genuine (i.e., that the pain is not malingered or exaggerated) has the potential to profoundly impact the pain assessment and treatment suggestion process (De Ruddere et al., 2012; De Ruddere et al., 2013a). Experimental research has indicated that observers can differentiate between genuine, suppressed, and exaggerated facial pain expressions in others (Craig et al., 1991; Hadjistavropoulos, et al., 1996; Hill & Craig, 2002; Poole & Craig, 1992). Furthermore, a number of vignette studies have revealed that when a clear explanation for pain is lacking, observers doubt the genuineness of the pain and attribute less pain intensity to the patient (Chibnall & Tait, 1995; Chibnall & Tait, 1999; Craig 1999; Kappesser, Williams, & Prkachin, 2006; Tait & Chibnall, 1997; Tait, Chibnall, & Kaklauokalani, 2009) as well as feel less

sympathy towards the patient (De Ruddere et al., 2012). This body of research also indicates that observers may become suspicious of pain genuineness when they are led to believe that the individual in pain is impacted by psychosocial factors. For example, previous research has found that minor psychosocial stressors (e.g., marital discord) experienced by the pain patient influenced the degree to which pain displayed by the patient (e.g., pain behaviours and facial expressions) was taken into account when assessing their pain intensity (De Ruddere et al., 2013a). More research is needed to assess how other psychosocial factors, such as a comorbid mental health condition, can influence pain perception in others. This research will investigate whether observers' attributions of pain genuineness mediate pain intensity assessments in chronic pain patients with comorbid depression.

Moderators

Stigma Against Mental Illness. Stigmatization is defined as a process by which the reaction of a community to specific personal characteristics reduces a person's identity "from a whole and usual person to a tainted, discounted one" causing that person to be discredited, devalued, rejected, and socially excluded (Goffman, 1963, p. 3). Currently, stigma carries a more psychological connotation referring to the majority's tendency to distance themselves from and limit the rights of the disparaged groups (Corrigan et al., 2003). The effects of stigma on the affected individual include psychological stress, fear, various social participation restrictions, an increased risk of disability, and an advanced disease course (Corrigan, 2004). A disparity exists between health care services provided to groups that are identified as mentally ill as opposed to those not identified as mentally ill which highlights the existence of mental illness stigma in health care (Corrigan, 2004). Indeed, a systematic review of the literature indicates that people with mental illness receive fewer preventative medical services compared to those not labeled with a mental illness (Hert et al., 2011).

During the stigmatization process when individuals are labeled, set apart, and linked to undesirable characteristics, a rationale is constructed for devaluing, rejecting, and excluding them (Link et al., 2004). Weiner (1995) developed a model of causal attribution that contributed to an understanding of the relationship between stigmatizing attitudes and discriminatory behaviour. Causal attributions regarding the origin and controllability of mental illness is a key component of public stigma of mental illness. Public stigma relates to the attitudes and behaviours others have towards individuals with mental illness that impact the course of their illness. One of the most common stereotypes that results in public stigma is that individuals with mental illness are *responsible* for causing their illness. The assessment of personal responsibility for their mental illness causes emotional reactions such as pity, and leads to behavioural responses such as helping or rejecting the individual with mental illness (Corrigan et al., 2003). In sum, causal attributions regarding personal responsibility in mental illness is a key dimension of public stigma, which leads to social rejection of the individual with mental illness. Attributing personal responsibility for a negative event (e.g., “She is causing her own distress”) leads to diminished helping behaviour and increased pity (Corrigan et al., 2002). Previous research has found that greater mental illness stigma might influence the perception of individuals experiencing emotional (Pescosolido et al., 2010) and physical distress (Looper & Kirmayer, 2004).

Empathy. Empathy is a factor that may also moderate the impact of a mental illness label on pain perception. Empathy is a complex psychological construct characterized by a sense of knowing, and even sharing, the experience of another person (Decety & Moriguchi, 2007). It is the ability to infer, share, and respond to the affective experiences of others (Goubert et al., 2005; Goubert, 2009). Empathy involves three separate processes: feeling what another person is feeling, knowing what another person is feeling, and the intention to respond in a compassionate manner to another’s distress (Decety & Moriguchi, 2007). The exact process underlying

empathetic responses remains an area of active research. To date, findings suggest that cognitive and affective (Decety & Jackson, 2004) as well as neurological processing (Bernhardt & Singer, 2012) are involved. Cognitively, empathy involves the ability to take another's perspective and infer their mental state, while recognizing the perspective as separate from 'self'. The affective component of empathy involves imagining the persons' internal affective state, which may include the direct simulation of the same internal emotional experience (Green et al., 2009). The subjective experience of 'feeling another's pain' (de Vignemone & Singer, 2006) is mediated by some of the same brain structures such as the anterior insula and dorsal-anterior/anterior-midcingulate cortex (Lamm, Decety, & Singer, 2011) involved in processing painful stimuli internally. Overall the research literature focusing on neurological studies suggest empathy is associated with the vicarious activation of the pain system (Lamm, Decety, & Singer, 2011; Loggia, Mogil, & Bushnell, 2008; Singer et al., 2004; Singer et al., 2006). Research (Green et al., 2009) has found that trait-level empathy is associated with a better internal representation of another's experience. Higher levels of empathy were associated with more accurate pain perception resulting in improved recognition and understanding of others' distress (Gleichgerrcht & Decety, 2013; Goubert et al., 2005).

Vignette Approach to Studying Pain Perception in Others

Systematic research of the factors that influence formal and informal caregivers perception of pain in others is necessary, as these judgments impact the quality of care provided to vulnerable chronic pain populations (Tait, 2013). One methodological approach to better understand the influence of psychosocial factors on the perception of pain in others has been vignette research. Vignettes are used for three main purposes in health research: to allow actions in context to be explored, to clarify people's judgments, and to provide an unthreatening manner in which to explore sensitive topics (Hughes & Huby, 2002). Vignettes are stories about individuals,

situations and structures, which can elicit participants' perceptions, beliefs, and attitudes. In vignette pain research, participants are typically asked to review information about a patient and respond with beliefs, perceptions, and treatment suggestions. Recent research has paired vignette research methodology with videos or still images of individuals in pain to assess how psychosocial factors influence the perception of pain with objective facial expression markers. Some examples of vignette research methodology in pain perception research include understanding the role of empathy in the perception of pain in others (Goubert et al., 2009), the impact of symptom certainty (Tait & Chibnall, 2009; Tait, Chibnall, & Kalauokalani 2009), patient likability (De Ruddere et al., 2011), social deception (De Ruddere et al., 2013a), and the absence or presence of medical evidence (De Ruddere et al., 2012; De Ruddere et al., 2013b) on the perception of pain in others. The vignette format, combined with video clips of chronic pain patients, is a promising experimental research methodology. It allows researchers to experimentally manipulate patient attributes (e.g., depressive comorbidity) and investigate how the manipulated factor influences the perception of pain in others objectively by comparing participant pain intensity ratings with patient self-reported pain (e.g., VAS) as well more objective measures such as facial coding measures (e.g., PSPI).

Current Study

The current study employed a between-subject experimental vignette paradigm to investigate the influence of a mental illness label on the perception of pain in others. It is well established that psychiatric disorders frequently co-occur with chronic pain conditions (Bair et al., 2003). Indeed, Gatchel (2004) states that nowhere do psychiatric and medical pathologies interface more prominently than in pain disorders. However, despite recent calls in the literature to investigate psychosocial factors that influence the perception of pain in others (De Ruddere et al., 2013b; Hadjistavropoulos, et al., 2011), no previous research, to our knowledge, has investigated

whether psychiatric comorbidity influences the perception of pain in others. Thus, the first aim of this research was to examine whether a label of MDD as opposed to no MDD would impact observer ratings of pain intensity in a male or female patient suffering from chronic pain. The second aim was to investigate *how* and *for whom* a label of MDD might influence the perception of pain intensity in a male or female patient suffering from chronic pain. Specifically, the present study investigated whether perceptions of pain genuineness, physical pain attributions, or psychological pain attributions might mediate the association between a label of MDD and the perception of pain intensity. This research also investigated whether mental illness stigma, empathy, or perceptions of patient psychological distress might moderate the association between a label of MDD and the perception of pain intensity in others. The final aim was to explore the degree to which positively and negatively valenced words are used to describe patients with and without an MDD label.

Hypotheses

Hypotheses regarding the link between the MDD (versus no MDD) condition and perception of pain intensity were divided into four related sets of research questions. An overview of the hypothesized relationship between experimental condition, moderators, mediators, and pain intensity is depicted in Figure 1.

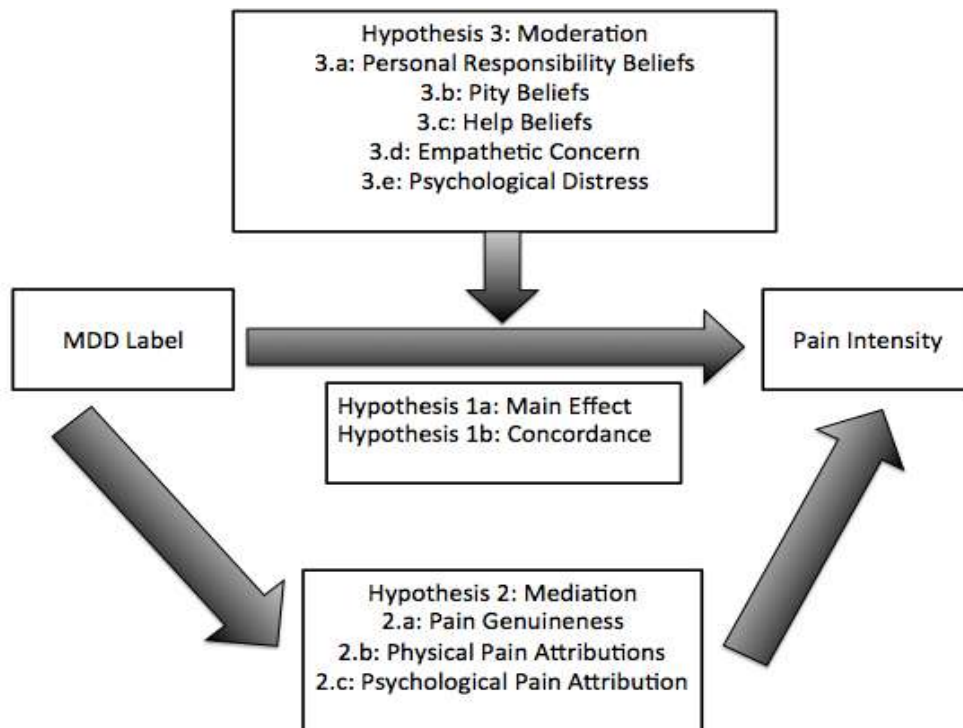


Figure 1 Hypothesized Relationship between Experimental Condition, Moderators, Mediators, and Outcome

Research Question 1. Does a label of MDD have a direct influence on the perception of pain intensity?

Hypothesis 1a: It was hypothesized that study participants in the MDD condition would rate chronic pain patients as experiencing lower levels of pain intensity, compared to participants in the no MDD condition.

Hypothesis 1b: It was also hypothesized that participants in the MDD condition would rate patients with less accuracy, compared to the no MDD condition. Specifically, it was expected that participants in the MDD condition would be more likely to underestimate patients' pain compared to participants assigned to the no MDD condition.

Research Question 2. Do causal attributions of pain (physical and psychological) or beliefs about pain genuineness mediate the relationship between MDD condition and the perception of pain intensity in others?

A mediator specifies how (or the mechanism by which) a given effect occurs (Holmberg, 1997). Previous research suggests that causal attributions concerning pain (Edwards et al., 1992) and beliefs about pain genuineness (De Ruddere et al., 2012) may influence the manner in which pain is perceived in others. Given that these questions have not been previously addressed in pain populations with a comorbid MDD condition, tentative hypotheses were generated.

Hypothesis 2a. It was hypothesized that pain genuineness beliefs would be lower in the MDD condition, and that this would help explain the effect of a comorbid MDD label on ratings of pain intensity.

Hypothesis 2b. It was hypothesized that physical pain attributions would be lower in the MDD condition, and that this would help explain the effect of a comorbid MDD label on pain intensity.

Hypothesis 2c. It was hypothesized that psychological pain attributions would be higher in the MDD condition, and that psychological attributions would mediate the effect of a comorbid MDD label on pain intensity.

Research Question 3. Do participants' levels of mental illness stigma, empathy, or psychological distress moderate the relationship between MDD condition and the perception of pain intensity in others?

A moderator is defined as a variable that affects the relationship between two variables, so that the nature of the impact of the predictor on the criterion varies according to the level or value of the moderator (Holmberg, 1997). Previous research has found that greater mental illness stigma might influence the perception of people when they are experiencing emotional

(Pescosolido et al., 2010) and physical (Looper & Kirmayer, 2004) distress. However, no research to date has investigated the manner in which mental illness stigma may influence the perception of pain among patients who have been diagnosed with a comorbid mental health condition. Given that this question has not specifically been addressed in past research, tentative hypotheses were proposed. These hypotheses addressed three key aspects of mental illness stigma: personal responsibility (i.e., that person is responsible for present condition), pity (i.e., pity felt towards person with mental illness) and help (i.e., willingness to help a person with mental illness).

As discussed earlier, previous research has found that empathy can impact the perception of others when they are in pain (Goubert et al., 2005; Green et al., 2009). However, here again, studies have not yet investigated the manner in which empathy might influence the perception of pain in patients who suffer from a comorbid psychiatric disorder. Therefore, tentative hypotheses were made regarding empathy and the perception of pain in others.

Hypothesis 3a. It was hypothesized that participants assigned to the MDD condition who report higher personal responsibility beliefs would report patients being in less pain, than would participants lower in personal responsibility beliefs.

Hypothesis 3b. It was hypothesized that participants assigned to the MDD condition who self report higher pitying attitudes would report patients being in more pain, than would participants lower in pitying attitudes.

Hypothesis 3c. It was hypothesized that participants in the MDD condition who self-report greater helping attitudes would rate patients as being in more pain, compared to those with lower helping attitudes.

Hypothesis 3d. It was hypothesized that participants in the MDD condition who reported greater empathetic concern would rate patients as being in more pain, compared to those with lower empathetic concern.

Hypothesis 3e. It was hypothesized that the negative relationship between a label of MDD and pain intensity would be stronger among participants who estimated that the patient was in greater personal distress.

Research Question 4. What are the valences of participant opinions regarding chronic pain patients with or without a comorbid diagnosis of MDD? As qualitative data is needed to more fully understand how MDD labels might influence judgments and opinions, an exploratory linguistic analysis of the open-ended comments provided about each participant was conducted.

Hypothesis 4: It was hypothesized that participants in the MDD condition would provide more negatively-valenced and less positively-valenced comments about patients, compared to participants assigned to the no MDD condition.

Method

Sample and Recruitment

The final sample consisted of 371 University of British Columbia Okanagan (UBCO) undergraduate students. Study participants were predominantly female (74%) and Caucasian (75.5%), ranging from 18 to 49 years of age (mean = 19.92, $SD = 2.95$). Of all the participants in the study, 49.3% reported personally experiencing (past or present) persistent pain, and 81.9% reported knowing an individual who had experienced persistent pain that lasted longer than 3 months. As well, 8.9% had a past or present diagnosis of a mental illness, and 46.1% of the participants personally knew an individual who had been diagnosed with a mental illness. Participants were recruited through the UBCO psychology research subject pool (SONA) between September 21, 2012 and November 29, 2012. To be eligible, participants were required to be a UBCO student, at least 18 years of age, and fluent in English. Students received 1.0 course credit for their participation.

Procedure

This online study was part of a larger study investigating psychosocial factors that influence the perception of pain in others. As such, only the variables pertinent to the present research questions will be discussed below. This research consisted of two distinct phases which were both completed using Qualtrics an Internet-based survey platform (Qualtrics, Provo, UT). Participants took an average of 35 minutes to complete the study protocol.

Phase One: Patient Vignette & Video Clip.

After providing informed consent, participants were asked to read one of four vignettes, each of which contained a fabricated medical case history of a middle-aged adult suffering from

chronic shoulder pain. The vignettes contained information typically displayed in a medical case history, such as chief health complaint, history of present illness, past medical history, and psychiatric history. All vignettes described a patient suffering from chronic shoulder pain, but varied based on two key factors: (a) patient gender and (b) the presence or absence of MDD. Using the randomization function in Qualtrics, participants were randomly assigned to one of the following four conditions: (1) Female – Diagnosis of MDD (2) Female – No psychiatric diagnosis, (3) Male – Diagnosis of MDD (4) Male – No psychiatric diagnosis. The details of each vignette are presented in Appendix B.

Next, participants watched a brief 50-second silent video clip of a chronic pain patient rotating their injured and uninjured arms. Participants assigned to conditions one and two watched a video of a female patient, and participants assigned to conditions three and four watched a video of a male patient. With permission from Pittsburg University's Affect Analysis Group, these two video clips were taken from the UNBC-McMaster shoulder pain expression archive. This archive contains data on 25 patients with chronic shoulder pain who allowed their data to be used in future research on pain assessment. The details of the UNBC-McMaster Shoulder Pain Expression archive are provided elsewhere (Lucey et al., 2011; Prkachin & Solomon, 2008), but information pertinent to the current study will be summarized here. Pain patients were recruited from three active physiotherapy clinics by advertisements posted on the campus of McMaster University. To be eligible for inclusion, participants had to self-identify as suffering from chronic shoulder pain. Seventy percent of the patients had attended a physician or physiotherapist for their shoulder pain and had received diagnoses that varied considerably and included arthritis, bursitis, tendonitis, subluxation, rotator cuff injuries. The patients were tested in a laboratory room, which had a bed for performing passive range-of-motion tests. Two Sony digital video cameras were used to record participants' facial expressions. Subjects were recorded

during movement of their affected and unaffected shoulder during active and passive conditions. In the active condition, subjects initiated shoulder rotation on their own. In the passive condition, a physiotherapist was responsible for the movement. Patients used a 10cm Visual Analog Scale (VAS), anchored at each end with the words ‘No pain’ and ‘Pain as bad as could be,’ to self-report the amount of pain they experienced during each rotation trial. The patients’ facial expressions were coded using the Prkachin and Solomon Pain Intensity (PSPI) metric with inter-rater reliability at .85 (Hammal & Cohn, 2012). Informed consent was provided for future research use of images and videos. As such, no demographic information was available for the patients in this database. The two patient videos that were selected for inclusion in the present study were chosen because both appeared to be middle-aged, Caucasian, and both self-reported a maximum pain intensity of 7.0 on the VAS during the active movement of the affected arm. However, the male patient reported a somewhat higher average level of pain across the length of the video clip (VAS of 6.5; PSPI of 1.52), compared to the female patient (VAS of 4.3; PSPI of 0.12).

Measures

Pain Assessment. After viewing the video clip, participants were asked to respond to five questions regarding the pain experienced by the patient depicted in the vignette and accompanying video (see Appendix C). Participants were asked to rate the patient’s *pain intensity* using a 10cm Visual Analog Scale (VAS) anchored with the words ‘No pain’ and ‘Pain as bad as could be’. All other items assessed participants’ evaluations regarding each individual’s level of *pain-related psychological distress*, the *genuineness of the pain*, the likelihood that the pain is *attributable to psychological factors*, and likelihood that the *pain is attributable to physical factors*. Items were assessed on a 7-point Likert scale ranging from (1) strongly disagree to (7) strongly agree.

Manipulation Check. In order to determine whether participants were attending to the specific details contained in the vignette and video clip, participants were asked several multiple choice questions (see Appendix D). These questions asked specifically about the patient's name, age, cause of injury, and whether or not the patient they viewed had a comorbid mental illness. For the purposes of this study, only the latter question (which was a multiple-choice question) was used as a manipulation check.

Open-Ended Summary. Using an open-ended response format, the participants were asked to detail their thoughts, comments, or opinions regarding the chronic pain patient.

Phase Two. In the second phase of the experiment, participants were asked to complete a series of standardized self-report questionnaires. The questionnaires assessed mental illness stigma, empathy, as well as demographic factors including health history.

Mental Illness Stigma. The Attribution Questionnaire (AQ) was developed by Corrigan (2003) to measure mental illness stigma. The attribution questionnaire is a 21-item self-report measure of mental illness stigma measuring six domains of mental illness stigma. Three of the six subscales were deemed relevant to the research questions and included in this research protocol. The questionnaire is administered following a vignette about a non-violent man diagnosed with schizophrenia named Harry. The three subscales of the questionnaire included in this study protocol are personal responsibility (3 items; e.g., "I would think that it were Harry's own fault that he is in the present condition"), pity (3 items; e.g., "I would feel pity for Harry"), and helping/avoidant behaviour (4 items; e.g., "If I were an employer, I would interview Harry for a job"). Respondents indicate how well a response describes them using a 9-point Likert ranging from (1) Not at all to (9) Very much. Item values are summed to get subscale scores. The AQ has shown moderate reliability in past research in undergraduate samples (Corrigan, 2004).

In the present research, Cronbach's alpha was .45 for personal responsibility, .81 for pity, and .80 helping/avoidant behaviour.

Empathy. The Interpersonal Reactivity Inventory (IRI) was developed by Davis (1980, 1983, 1996) to measure individual differences in empathy. The IRI contains 28 self-report items measuring four domains of empathy. One of the four subscales, empathic concern (EC), was included in this research protocol. The EC subscale includes 7 items and assesses the tendency to experience feelings of sympathy and compassion towards others (e.g., "I often have tender, concerned feelings for people less fortunate than me"). Respondents indicate how well a response describes them using a 5-point Likert scale ranging from (1) Does not describe me well to (5) Describes me very well. Item values are summed to get subscale scores. The IRI has shown strong reliability in past research in undergraduate samples (Quince et al., 2011). In this research the Cronbach's alpha was .79 for empathetic concern.

Demographics. Participants were asked to report on demographic information including age, gender, ethnicity, past or present physical illness in self and close others (McWilliams & Asmundson, 2007), and past or present mental illness in self and close others (McWilliams & Asmundson, 2007).

Statistical Analysis Plan

Gender issues in the statistical analysis. A substantive body of research has indicated that men and women experience and express pain and distress in qualitatively different manners and to different degrees (Unruh, 1996). Furthermore, based on data in the UNBC-McMaster shoulder pain archive, the male and female chronic pain patient self-reported different average pain intensity. Statistical techniques for controlling for these differences (e.g., controlling for gender) were deemed insufficient. Therefore, the decision was made to conduct the main analyses

separately for female and male patients. However, supplementary analyses were run assessing both male and female pain patient groups together and the results are also presented below.

Preliminary Analyses. First, the means and standard deviations of the study variables were calculated. Next, the bivariate relationships between the predictor, outcome, mediator, and moderator variables were analyzed using Pearson correlations.

Research Question 1 (accuracy of pain ratings). The accuracy of participant pain ratings based on their assignment to the MDD or no MDD condition was evaluated in two ways. First, independent samples t-tests were calculated to determine if there was a significant difference in pain intensity between MDD and no MDD conditions. Second, in order to compare the accuracy of pain ratings in the MDD versus no MDD groups, difference scores were first computed by subtracting participants' VAS pain ratings from patients' VAS self-ratings (patient ratings were obtained from the UNBC-McMaster shoulder pain archive). Next, patient-participant concordance was operationalized using the procedure devised by Miaskowski and colleagues (1997). Specifically, participant pain ratings that were within one centimeter point of the patient's self-report (i.e. either above or below) were defined as being concordant, whereas the remaining participants were defined as non-concordant. Participants who rated the patient's pain as more than one centimeter points *lower* than their self-reported pain comprised the underestimation group and participants who rated the pain as more than one centimeter point *higher* than the patients self reported pain comprised the overestimation group. Finally, chi-square analyses were conducted to compare the accuracy of pain ratings between participants assigned to the MDD versus no MDD groups.

Research Question 2 (mediation analyses). After verifying that the statistical assumptions for mediation using regression analysis were met, six mediation models (three for the male group and three for the female group) were tested to explore whether pain genuineness, physical pain

attributions, and psychological pain attributions mediated the relationship between MDD and no MDD conditions and pain intensity.

The mediation analysis method outlined by David Kenny (Baron & Kenny, 1986; Kenny, Kashy, & Bolger, 1998) is the most commonly used approach in the field of psychology and as such was used in this research. Using multiple linear regressions this approach involves testing three equations (Frazier, Tix, & Barron, 2004). First, the outcome variable is regressed on the predictor to establish that there is a total effect to mediate (Path c; Figure 2). Second, the mediator is regressed on the predictor variable (Path a; Figure 2). In the final equation the outcome variable is regressed on both the predictor and the mediator, which provides a test of whether the mediator is related to the outcome (Path b; Figure 2) as well as an estimate of the association between the predictor and the outcome while controlling for the mediator (Path c'; Figure 2). Statisticians have questioned the necessity of testing the overall association in Path c (Collins et al., 1998; Hayes, 2013; MacKinnon & Luecken, 2008; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002). As such, this research tested all pathways, regardless of the significance of the relationship between the experimental condition and pain intensity.

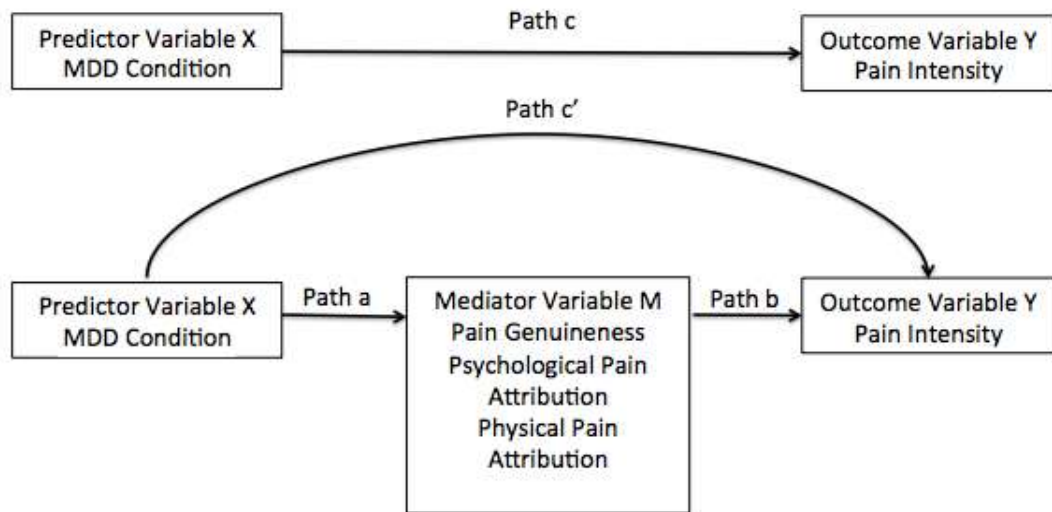


Figure 2 Direct and Mediated Effect between Experimental Condition and Pain Intensity

Research Question 3 (moderation analyses). After verifying that the statistical assumptions for hierarchical multiple regression were met, ten hierarchical multiple regression models (five for the male group and five for the female group) were created to explore how empathic concern, personal responsibility, pity, help, and perceived psychological distress moderated the relationship between the MDD or no MDD condition and pain intensity. Statisticians (e.g., Hayes, 2013) have indicated that an association between the predictor and the outcome variable is not required in order for the predictors' effect to be moderated and as such moderation tests will be conducted regardless of the association between the predictor (MDD condition) and outcome (pain intensity). Moderation analyses were performed by first centering the variables of interest by subtracting the group mean from the variable to reduce multicollinearity among predictors, moderators, and their interaction term (Aiken & West, 1991). Next, the product terms were created. To form product terms the predictor and moderator variables were multiplied together using the dummy coded categorical predictor variable and the centered moderator variables (Aiken & West, 1991; Cohen et al., 2003). Five product terms based off of the moderator variables (personal responsibility beliefs, pity, help, empathic concern,

psychological distress) were created for both male and female patient condition, for a total of ten product terms. In the final step, the MMR equation was structured by entering the dummy-coded predictor variable (“1” for MDD condition and “0” for no MDD condition) and the group centered moderating variable in the first step, and the interaction term in the second step.

Research Question 4 (analysis of open-ended questions). The open-ended comment provided regarding each participant was assessed for positive or negative valence words using Linguistic Inquiry and Word Count (LIWC; Pennebaker et al, 2007) software. LIWC is a text analysis software program that identifies and counts positive and negative valenced words in text based on a dictionary of 4500 valence-analyzed words. Independent samples t-tests were calculated to determine if there was a significant difference in the percentage of positive and negative-valenced words between MDD and no MDD conditions.

Results

Data Screening: Overview

Prior to conducting the data analysis for the aforementioned research questions, the success of the experimental manipulation was examined. Next, the key study variables (pain intensity, pain genuineness, psychological pain attributions, physical pain attributions, psychological distress, empathic concern, and the mental illness stigma subscales) were screened for missing data, univariate, and multivariate outliers, skewed distributions and multicollinearity as per procedures described by Tabachnick and Fidell (2001) and Field (2009). Categorical variables were dummy-coded.

Manipulation check

A manipulation check was conducted to determine if participants had been attentive to the information provided in the medical case history vignette, with an emphasis on the information regarding the presence or absence of MDD. Of the 421 participants who completed the online study protocol, 371 (88%) answered the multiple-choice question about the presence or absence of MDD correctly. Broken down by condition, 88 of 102 (86%) of the participants in condition one (female, MDD), 100 of 110 (90%) of the participants in condition two (female, no MDD), 97 of 106 (91%) in condition three (male, MDD), and 86 of 103 (83%) of the participants in condition four (male, no MDD) responded with the correct answer. A Chi-Square test was conducted to determine whether participants in each of the four conditions were equally likely to pass the manipulation check, and this was indeed the case ($\chi^2(3) = 2.67, p = .44$). Participants who failed the manipulation check ($n = 50$) were deemed inattentive to the experimental manipulation and were excluded from the analysis.

As another means of assessing whether participants were attentive to the MDD manipulation, we examined the question, ‘To what extent does the patient experience psychological distress’ on a seven-point likert scale. Independent samples t-tests were conducted to determine if there was a significant difference in ratings of perceived psychological distress between the MDD and no MDD groups. In the male patient groups, psychological distress scores were significantly higher for the MDD condition ($M = 4.5, SD = 1.26$), compared to the no MDD condition ($M = 3.29, SD = 1.54$); $t(181) = -5.704, p < .00$. In the female groups, participants estimates of psychological distress were also higher in those assigned to the MDD condition ($M = 4.01, SD = 1.48$), compared to the no MDD condition ($M = 3.09, SD = 1.44$) conditions; $t(186) = -4.303, p < .00$. These findings suggest that the experimental manipulation was a success.

Missing Data. Missing data is one of the most widespread problems in data analysis in the field of psychology. The importance of missing data depends on the amount of data missing, the pattern of missing data, and the reason why the data is missing (Tabachnick & Fidell, 2001). When few data points are missing, and if that data is missing in a random pattern, almost any data imputation procedure for handling missing values will yield similar results (Tabachnick & Fidell, 2001). Of all the scales included in the current study, none were missing more than 0.5% of data. Little’s Missing Completely At Random (MCAR) test was conducted to determine if there was a pattern to the missing data in this data set (Little, 1988). All results were non-significant (all p 's $> .10$), indicating that there was no pattern to the missing data. Expectation Maximization (EM) methodology (Dempster, Laird, & Rubin, 1977) offers the simplest and most parsimonious approach to imputation of missing data, provided there is evidence that the data are missing at random (Tabachnick & Fidell, 2001). EM methodology was chosen to impute missing data in the present study. In EM, a missing data correlation matrix is formed by assuming the

shape of a distribution for the partially missing data and data is imputed based on inferences about missing values on the likelihood under that distribution (Dempster, Laird, & Rubin, 1977).

Univariate Outliers. Inspection of frequency distributions indicated that all scale scores fell within expected ranges. A visual inspection of the data did not reveal a patterned response (e.g. all 1's) from participants. Transforming the data into z-scores and examining possible extreme values identified univariate outliers. The IRI empathic concern subscale was found to have two outliers and the physical pain attribution item had one outlier (i.e., z scores greater than 3.29 ($p < .00$ two-tailed test)). Given the relatively large sample size ($n = 371$) it is not unusual for some participants to score greater than 3.29 and as such these three univariate outliers from three different participants were considered to be a part of the intended population and their scores were not substituted or deleted.

Multivariate Outliers. Multivariate outliers indicate that an individual is responding differently compared to other participants across multiple dimensions. Specifically, they are cases with extreme scores on two or more variables (Tabachnick & Fidell, 2001). Calculating Mahalanobis distances assessed multivariate outliers in this data set. The values exceeding an absolute value of 2.60 ($p < .005$) were considered violations of normality (Tabachnick & Fiddell, 2007). The analysis revealed five outliers representing five different participants. The dataset was checked for the influence of multivariate outliers using Cook's D, a measure of the change in regression coefficients when a case is deleted. Cook's D is a product of leverage and discrepancy (Cook & Weisber, 1982). Using this measure, with a guideline of 1.0, no influential outliers were found. As these multivariate outliers were not influential according to Cook's guidelines the scores were not substituted or deleted.

Normality. Histograms, probability plots, and detrended normal probability plots were visual aids in assessing normality. To statistically assess for normality two distinct types of

normality tests were also conducted. The first set of tests included the Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk (S-W) tests. The values exceeding an absolute value of 3.29 $p < .001$ were considered violations of normality according to sample size guidelines (Tabachnick & Fidell, 2007). However, some statisticians (Field, 2009) indicate that these tests should not be used in larger samples because they are likely to be significant even when skewness and kurtosis are not too different from normal. Therefore, an additional normality test was conducted for each variable by dividing skewness and kurtosis values by their respective standard errors.

The results of the K-S and S-W tests indicated that, with the exception of the pain intensity subscale $D(371) = .07, p < .001$; $W(371) = .99, p < .06$, the distributions of the empathic concern subscale, psychological distress, personal responsibility, pity, and help subscales, pain genuineness, psychological distress, physical attributions, and psychological attributions were all different from a normal distribution. Normality tests were conducted for the entire sample combined, as well as for the four conditions separately, with the pattern of results being virtually identical.

The second approach for testing of normality (dividing skewness and kurtosis values by their respective standard errors) was then employed. The values exceeding an absolute value of 3.29 $p < .001$ were considered violations of normality (Tabachnick & Fidell, 2007). All of the self-report measures demonstrated skew and kurtosis values within an acceptable range (-2.82 to 2.83), with the exception of the empathetic concern subscale (skew, -5.22) and pity subscale (skew, -3.83). A visual inspection of the empathetic concern and pity subscales confirmed they were negatively skewed. A reflected square root transformation was conducted on the empathetic concern subscale and the transformed variable skew was within normal range (1.37). A reflected square root transformation was also conducted on the pity subscale and the transformed variable skew was in the normal range (2.35). The square root transformations of the two subscales were

used in all analyses. Of note, all analyses were also conducted using the original values for empathetic concern subscale and pity subscale, and the results did not differ in any meaningful way.

Multicollinearity. Multicollinearity occurs in data sets in which one or more of the predictor variables are highly correlated with the other predictor variables in the regression equation. If multicollinearity occurs, the estimate of the regression coefficient for the correlated predictor will be unreliable as little unique information would be available from which to estimate its values resulting in a large standard error in the regression coefficient (Cohen et al., 2003). The bivariate correlations between the predictor variables were well below Tabachnick & Fidell's (2007) guideline of .90 (i.e., correlations ranged from .00 to .71), suggesting that the predictor variables were not collinear. Multicollinearity was also assessed using variance inflation factor (VIF) and tolerance statistics (Cohen et al., 2003; Field, 2009). VIF should be less than 10 and the tolerance statistics should be above 0.10 (Cohen et al., 2003). All values in this sample were within the range of these guidelines.

Categorical Variable Coding. Regression analysis requires all variables entered into the model to be continuous variables (Aiken & West, 1991). As the predictor variable was categorical the first step was to represent this variable with dummy coded variables. The dummy code "1" was chosen to represent the MDD conditions and "0" to represent the no MDD conditions.

Preliminary Analyses

Means, standard deviations, and ranges of the outcome variable (pain intensity), mediator variables (physical and psychological pain attributions, pain genuineness) and moderator variables (empathy, stigma, psychological distress) were calculated separately for the female

(Table 1) and male (Table 2) patient. Results are presented in each table separately for the no MDD, MDD, as well as both conditions combined.

Independent samples t-tests were conducted to examine if there were differences in the demographic and psychosocial characteristics of the participants assigned to the no MDD and MDD groups. In the female patient conditions there was no significant difference in demographic characteristics such as age $t(186) = .38, p = .70$, gender $t(186) = -.04, p = .96$, Caucasian ethnicity $t(185) = -1.59, p = .11$, personal history of pain $t(186) = -1.74, p = .08$, close others' history of pain $t(186) = -.58, p = .56$, personal history of mental illness $t(186) = 1.03, p = .30$, and close others' history of mental illness $t(186) = 2.97, p = .30$ or study variables such as empathic concern $t(186) = .917, p = .36$, personal responsibility beliefs $t(186) = -.74, p = .45$, pity $t(186) = .41, p = .68$, or help $t(186) = .01, p = .98$.

In the male condition there was no significant differences in demographic characteristics such as age $t(181) = -.79, p = .43$, gender $t(181) = 1.36, p = .17$, Caucasian ethnicity $t(179) = -.94, p = .34$, personal history of pain $t(181) = .62, p = .53$, close others' history of pain $t(181) = -.56, p = .57$, personal history of mental illness $t(181) = .77, p = .12$, close others' history of pain $t(181) = 1.45, p = .14$ or study variables such as empathetic concern $t(181) = 1.14, p = .25$, personal responsibility beliefs $t(181) = 1.12, p = .26$, pity $t(181) = 1.37, p = .17$, or help $t(181) = -.26, p = .79$. These non-significant independent samples t-tests of study variables suggest that the random assignment of participant to conditions was successful. Furthermore, as there was no significant difference in these variables between the two experimental conditions, it was deemed unnecessary to control for covariates in the following analyses.

Table 1

Descriptive Results for Study Variables (Female Patient, n = 188)

	No MDD Condition M(<i>SD</i>)	MDD Condition M(<i>SD</i>)	Overall M(<i>SD</i>)	Range
Outcome				
Pain Intensity	4.58 (1.99)	4.59 (1.75)	4.59 (1.88)	.20-9
Mediators				
Pain Genuineness	4.99 (1.28)	4.69 (1.31)	4.85 (1.30)	1-7
Psychological Attribution	2.89 (1.49)	3.90 (1.66)	3.36 (1.65)	1-7
Physical Attribution	5.41 (1.18)	4.88 (1.39)	5.15 (1.31)	1-7
Moderators				
Psychological Distress	3.09 (1.43)	4.01 (1.48)	3.52 (1.53)	1-7
AQ PRB	9.16 (4.36)	9.65 (4.60)	9.39 (4.47)	3-21
AQ Pity	2.96 (.93)	2.91 (.72)	2.94 (.83)	1-5
AQ Help	23.70 (6.75)	23.68 (6.77)	23.69 (6.74)	5-36
IRI EC	2.86 (.80)	2.75 (.86)	2.81 (.83)	1-5.20

Note. M = Mean, *SD* = Standard Deviation, AQ = Attribution Questionnaire, PRB = Personal Responsibility Beliefs, IRI = Interpersonal Reactivity Index, EC = Empathic Concern. IRI EC and AQ-Pity have reflected square root transformations applied.

Table 2

Descriptive Results for Study Variables (Male Patient, n = 183)

	No MDD Condition M(<i>SD</i>)	MDD Condition M(<i>SD</i>)	Overall M(<i>SD</i>)	Range
Outcome				
Pain Intensity	4.77 (1.66)	4.6 (1.91)	4.69 (1.78)	0-9
Mediators				
Pain Genuineness	4.97 (1.43)	4.89 (1.40)	4.93 (1.41)	1-7
Psychological Attribution	3.26 (1.38)	4.11 (1.45)	3.66 (1.47)	1-7
Physical Attribution	4.91 (1.47)	4.68 (1.40)	4.80 (1.43)	1-7
Moderators				
Psychological Distress	3.30 (1.54)	4.5 (1.26)	3.86 (1.53)	1-7
AQ PRB	9.16 (4.36)	9.65 (4.60)	9.69 (4.43)	3-23
AQ Pity	2.96 (.93)	2.91 (.72)	2.90 (.87)	1-5
AQ Help	23.70 (6.75)	23.68 (6.77)	23.61 (6.64)	5-36
IRI EC	2.86 (.80)	2.75 (.86)	2.81 (.75)	1-4.80

Note. M = Mean, *SD* = Standard Deviation, AQ = Attribution Questionnaire, PRB = Personal Responsibility Beliefs, IRI = Interpersonal Reactivity Index, EC = Empathic Concern. IRI EC and AQ-Pity have reflected square root transformations applied.

Bivariate Analyses

In order to explore the bivariate relationship between study variables, Pearson correlations were conducted. Results for the Female (Table 3) and Male (Table 4) patient are presented below. The bivariate correlations indicate that, when aggregated across MDD and no MDD groups, *pain intensity* was significantly positively correlated with psychological distress, physical pain attributions, and pain genuineness.

In the male condition, there were also significant positive correlations between the *experimental condition* and both psychological pain attributions ($r = .28, p < .01$) and psychological distress ($r = .39, p < .01$), indicating that those assigned to the MDD condition made higher attributions of the psychological causes of pain and perceived greater psychological distress. In the female condition, there were significant positive correlations between the *experimental condition* and both psychological pain attributions ($r = .30, p < .01$) and psychological distress ($r = .30, p < .01$) in addition to a negative correlation with physical pain attributions ($r = -.20, p < .01$), indicating that those assigned to the MDD condition made higher attributions on the psychological causes of pain and lower attributions on the physical cause of pain.

The bivariate correlations also revealed that pain genuineness was positively correlated with physical pain attribution and negatively correlated with psychological pain attribution in both the male and female patient conditions. In the female condition pain genuineness was positively correlated with physical pain attributions ($r = .63, p < .01$) and negatively correlated with psychological pain attributions ($r = -.23, p < .01$). In the male condition pain genuineness was positively correlated with physical pain attributions ($r = .71, p < .01$) and negatively correlated with psychological pain attributions ($r = -.18, p < .05$).

Table 3

Bivariate Pearson Correlations among Predictor, Outcome, Mediator, and Moderator Variables (Female Condition, n = 188)

Variable	1	2	3	4	5	6	7	8	9	10	
Predictor											
Outcome	1. Experimental Condition	--									
Mediators	2. Pain Intensity	.00	--								
	3. Physical Attribution	-.20**	.38**	--							
	4. Psychological Attribution	.30**	.06	-.42**	--						
	5. Pain Genuineness	-.11	.39**	.63**	-.23**	--					
Moderators	6. Psychological Distress	.30**	.21**	-.29**	.71**	-.13	--				
	7. AQ-PRB	.05	-.02	-.04	.11	-.12	.05	--			
	8. AQ-Pity	-.03	-.01	.09	-.00	.04	-.04	.12	--		
	9. AQ-Help	-.00	.02	.04	.00	.01	-.02	-.19	-.10	--	
	10. IRI-EC	-.06	-.16*	-.09	-.07	-.04	-.12	.07	.26**	-.33**	--

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level. AQ = Attribution Questionnaire PRB = Personal Responsibility Beliefs, IRI = Interpersonal Reactivity Index, EC = Empathic Concern. AQ Pity and IRI EC subscales have a reflected square root transformations applied (and should thus be interpreted in the opposite direction as presented above). Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 4

Bivariate Pearson Correlations among Predictor, Outcome, Mediator, and Moderator Variables (Male Patient, n = 183)

Variable	1	2	3	4	5	6	7	8	9	10	
Predictor											
Outcome	1. Experimental Condition	--									
Mediators	2. Pain Intensity	-.04	--								
	3. Physical Attribution	-.08	.39**	--							
	4. Psychological Attribution	.28**	-.02	-.38**	--						
	5. Pain Genuineness	-.02	.42**	.71**	-.18*	--					
Moderators	6. Psychological Distress	.39**	.15*	-.12	.54**	-.04	--				
	7. AQ-PRB	-.08	-.04	-.06	.03	-.12	.00	--			
	8. AQ-Pity	-.10	-.19**	-.18*	-.04	-.15*	-.20**	.14	--		
	9. AQ-Help	.02	.19**	.19**	-.06	.19**	-.01	.04	-.00	--	
	10. IRI-EC	-.08	-.19**	-.17*	-.03	-.18*	-.15*	.14	.34**	-.28**	--

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level. AQ = Attribution Questionnaire PRB = Personal Responsibility Beliefs, IRI = Interpersonal Reactivity Index, EC = Empathic Concern. AQ Pity and IRI EC subscales have a reflected square root transformations applied (and should thus be interpreted in the opposite direction as presented above). Experimental condition dummy coded MDD = 1 no MDD = 0.

Main Analyses

Research Question 1a: Direct Effect.

The extent to which participant estimates of patient pain intensity differed between the MDD and no MDD conditions were examined in two different ways. First, independent samples t-tests were conducted to compare pain intensity in the MDD and no MDD conditions in both the male and female patient. In the female group, there was no significant difference in pain intensity between the MDD and no MDD conditions $t(186) = -.03, p = .96$. Similarly, in the male group, there was no significant difference in pain intensity between the MDD and no MDD conditions $t(181) = .62, p = .53$. Supplementary analyses were conducted to examine the extent to which participant estimates of patient pain intensity differed in the MDD and no MDD condition collapsed across male and female patients. Again, results indicated that there was no difference in pain intensity between MDD and no MDD conditions, $t(370) = -.07, p = .69$.

Research Question 1b: Concordance

Next, the accuracy of pain intensity reports between MDD and no MDD conditions was examined. Difference scores were calculated for the participants' estimates of the patients' pain and the patient's self-report of their experienced pain. Specifically, participants' 0-10 VAS rating was subtracted from the male patients' self-reported VAS rating of 6.5 and the female patient's self-reported VAS rating of 4.3. Following the guidelines of Miaskowski et al (1997), participants within 1 score of the VAS were coded as concordant, participants over 1 were coded as overestimating, and participants under 1 were coded as underestimating. Chi-square test analyses were then conducted to examine rates of overestimated, underestimated, and correctly estimated pain for the pain intensities experienced in the MDD versus no MDD conditions. An assumption of the Chi-square test is that the expected frequencies should be greater than 5 (Field,

2009). This assumption was not met in two cells of the male condition, and as such, Fisher's exact test p values are reported in addition to Chi-square for the male condition. For the female condition (Table 5), there was no significant difference in pain concordance between the MDD and no MDD conditions. Similarly, for the male condition (Table 6), there was no relationship was between the label and concordance with pain. In other words, participants in the MDD condition were no more likely to over-, under-, or accurately estimate patients' pain, compared to those in the no MDD condition.

Table 5

Results of Chi-Square Test Examining Pain Concordance in the MDD versus no MDD groups (Female Patient, n = 188)

Condition	No MDD Condition n = 100	MDD Condition n = 88
Underestimate	26 (26%)	20 (20.72%)
Concordant	40 (40%)	41 (46.59%)
Overestimate	34 (34%)	27 (30.68%)

Note. χ^2 (2, N = 188) = .83, p = .65. Numbers in parentheses indicate column percentages.

Table 6

Results of Chi-Square Test Examining Pain Concordance in the MDD versus no MDD groups (Male Patient, n = 183)

Condition	No MDD Condition n = 97	MDD Condition n = 86
Underestimate	60 (61.85%)	51 (59.30%)
Concordant	35 (36.08%)	31 (36.04%)
Overestimate	2 (2.06%)	4 (4.65%)

Note. χ^2 (2, N = 183) = .98, p = .67 (Fisher Exact Test). Numbers in parentheses indicate column percentages.

Supplementary Concordance Analyses

Upon visual inspection of the concordance results, participants seemed to be more likely to *overestimate* the female patient’s pain and more likely to *underestimate* the male patient’s pain (Table 7). Therefore, supplementary Chi-square analyses were conducted to compare female vs. male patients (rather than MDD vs. no MDD conditions) on pain concordance. The chi-square analyses indicate that the expected account assumption was not met and as such following the guidelines of Field (2009) Fisher Exact Test results are reported. There was a significant association between male and female patient groups and how concordant the participants were in their pain assessment, $\chi^2(2) = 73.53$, Fisher Exact Test $p < .001$. An analysis of the standardized residual of the observed compared to expected frequency counts in the Chi-square analysis revealed that a larger difference than expected by chance for underestimation of pain in the female patient (-3.8), and male patient (3.8) as well as the overestimation of pain in the female patient (4.6) and male patient (-4.7). Cramer’s statistic for this relationship is .44 ($p < .001$) out of a possible maximum value of 1, representing a medium association between patient gender and concordance in pain assessment.

Table 7

Results of Chi-Square Test Examining Pain Concordance in Male versus Female Patients (n = 371)

Concordance	Female Patients n = 188	Male Patients n = 183
Underestimate	45 (23.93%)	111 (60.65%)
Concordant	82 (43.61%)	66 (36.06%)
Overestimate	61 (32.44%)	6 (3.27%)

Note. $\chi^2(2) = 73.53$, Fisher Exact Test $p < .001$. Numbers in parentheses indicate column percentages.

Research Question 2: Mediation.

Based on the results of research question one, no direct effects of the experimental condition (MDD or no MDD) on the assessment of pain intensity (Figure 2: path c) were found. The relationship between the experimental condition and ratings of pain intensity were not significant in the female condition ($B = .01, p = .96$) or the male condition ($B = -.16, p = .53$). Despite the non-significant findings of the main effect, analyses of the other paths of the proposed mediation model (Figure 2: paths a, b, c') were conducted to better understand the role of other variables such as physical pain attributions, psychological pain attributions, and pain genuineness on ratings of pain intensity.

Pain Genuineness

The results for the female condition are presented in Table 8 while the results for the male condition are presented in Table 9. To determine whether the predictor was related to the mediator, the experimental condition was regressed on pain genuineness (step 2; path a). Results indicated that a label of MDD was not related to levels of perceived pain genuineness in the female condition ($B = -.29, p = .11$) or the male condition ($B = -.07, p = .71$). To test whether pain genuineness was related to pain intensity, pain intensity was regressed simultaneously on both pain genuineness and experimental condition (step 3; path b). In this case, higher levels of pain genuineness were significantly associated with higher levels of perceived pain intensity in the patient in the female condition ($B = .57, p < .00$) and the male condition ($B = .53, p < .00$). The direct effect of the experimental condition (step 3; path c') was not significant in the female condition ($B = .18, p = .47$) or the male condition ($B = -.12, p = .60$).

Table 8

Mediating Role of Pain Genuineness in the Relationship Between the Experimental Condition and Pain Intensity (Female Patient, n = 188)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	.01	.27	[-.53, .55]	.00
Testing Step 2 (Path a)				
Outcome: Pain Genuineness				
Predictor: Condition	-.29	.18	[-.67, .07]	-.11
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Pain Genuineness (Path b)	.57	.09	[.37, .76]	.40**
Predictor: Condition	.18	.25	[-.32, .68]	.04

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 9

Mediating Role of Pain Genuineness in the Relationship Between the Experimental Condition and Pain Intensity (Male Patient, n = 183)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	-.16	.26	[-.68, .35]	.04
Testing Step 2 (Path a)				
Outcome: Pain Genuineness				
Predictor: Condition	-.07	.21	[-.49, .33]	-.02
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Pain Genuineness (Path b)	.53	.08	[.36, .70]	.43**
Predictor: Condition	-.12	.24	[-.59, .35]	-.03

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Psychological Pain Attributions

The results for the female condition are presented in Table 10 while the results for the male condition are presented in Table 11. To evaluate whether the predictor was related to the mediator, the experimental condition was regressed onto psychological pain attributions (step 2; path a). The MDD condition was significantly associated with greater psychological pain attributions in both the female condition ($B = 1, p < .00$) and the male condition ($B = .85, p = .01$). To test whether psychological pain attributions were related to pain intensity, pain intensity was regressed simultaneously on both psychological pain attributions and experimental condition (step 3; path b). The relationship between psychological pain attributions and pain intensity was not significant in either the female condition ($B = .08, p = .33$) or the male condition ($B = -.01, p = .86$). The direct effect of the experimental condition (step 3; path c') was not significant in the female condition ($B = -.07, p = .79$) or the male condition ($B = -.15, p = .58$).

Table 10

Mediating Role of Psychological Pain Attributions in the Relationship Between the
Experimental Condition and Pain Intensity (Female Patient, n = 188)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	.01	.27	[-.53, .55]	.00
Testing Step 2 (Path a)				
Outcome: Psychological Attribution				
Predictor: Condition	1.00	.23	[.55, 1.46]	.30**
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Psychological Attribution (Path b)	.08	.08	[-.08, .25]	.07
Predictor: Condition	-.07	.28	[-.64, .49]	-.02

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 11

Mediating Role of Psychological Pain Attributions in the Relationship Between the
Experimental Condition and Pain Intensity (Male Patient, n = 183)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	-.16	.26	[-.68, .35]	.04
Testing Step 2 (Path a)				
Outcome: Psychological Attribution				
Predictor: Condition	.85	.21	[-.49, .33]	-.02**
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Psychological Attribution (Path b)	-.01	.09	[.36, .70]	.43
Predictor: Condition	-.15	.27	[-.59, .35]	-.03

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Physical Pain Attributions

The results for the female condition are presented in Table 12 and in Table 13 for the male condition. To establish that the predictor was related to the mediator, the experimental condition was regressed on physical pain attributions (step 2; path a). The unstandardized regression coefficient was significant in the female condition ($B = -.53, p = < .00$) but not the male condition ($B = -.23, p = .27$). To test whether physical pain attributions was related to pain intensity, pain intensity was regressed simultaneously on both physical pain attributions and experimental condition (step 3; path b). The association between physical pain attribution and pain intensity was significant in the female condition ($B = .58, p = < .00$) and the male condition ($B = .49, p = < .00$). The direct effect of the experimental condition (step 3; path c') on pain intensity was not significant in the female condition ($B = .32, p = .21$) or the male condition ($B = -.05, p = .83$).

Table 12

Mediating Role of Physical Pain Attribution in the Relationship Between the Experimental Condition and Pain Intensity (Female Patient, n = 188)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	.01	.27	[-.53, .55]	.00
Testing Step 2 (Path a)				
Outcome: Physical Attribution				
Predictor: Condition	-.53	.18	[-.90, -.16]	-.20**
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Physical Attribution (Path b)	.58	.09	[.38, .77]	.40**
Predictor: Condition	.32	.25	[-.19, .83]	.08

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 13

Mediating Role of Physical Pain Attribution in the Relationship Between the Experimental Condition and Pain Intensity (Male Patient, n = 183)

Testing steps in Mediation Model	<i>B</i>	<i>SE B</i>	95% CI	β
Testing Step 1 (Path c)				
Outcome: Pain Intensity				
Predictor: Condition	-.16	.26	[-.68, .35]	.04
Testing Step 2 (Path a)				
Outcome: Physical Attribution				
Predictor: Condition	-.23	.21	[-.65, .18]	-.08
Testing Step 3 (Paths b and c')				
Outcome: Pain Intensity				
Mediator: Physical Attribution (Path b)	.49	.08	[.32, .65]	.39**
Predictor: Condition	-.05	.24	[-.53, .43]	-.01

Note * Correlation Significant at 0.05 level, ** Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval (lower limit, upper limit), β = beta. Experimental condition dummy coded MDD = 1 no MDD = 0.

Supplementary Mediation Analyses

Supplementary mediation analyses were run assessing the male and female patient conditions combined to determine whether results differed. Multiple regression analyses were used to test the three mediation hypotheses for pain genuineness, physical pain attributions, and psychological pain attributions. To form the regression equation, the experimental conditions were dummy coded MDD = 1 no MDD = 0 and entered as the predictor. Patient gender was dummy coded male = 1 female = 0 and entered as a covariate.

Mediator-Pain Intensity (path b). Consistent with the findings run separately by patient gender (i.e., male vs. female patient), the statistical significance of the relationships between mediator and the outcome variable remained the same across all three mediators. Specifically, a significant association was found between pain genuineness and pain intensity ($B = .55, p = < .00$) and between physical pain attributions and pain intensity ($B = .52, p = < .00$). No direct effect was found between psychological pain attributions and pain intensity ($B = .04, p = .51$).

Experimental Condition-Mediator (path a). Consistent with the findings run separately by patient gender, no relationship was found between experimental condition and pain genuineness ($B = -.18, p = .18$) and a significant relationship was found between experimental condition and psychological pain attributions ($B = .93, p = < .00$). One inconsistent finding emerged. A significant association was found between experimental condition and physical pain attributions ($B = -.38, p = < .00$). When this analysis was run separately, an effect of experimental condition on physical pain attributions was found in the female condition but not the male condition.

Research Question 3: Moderation

Based on the results of question one, no direct effects of experimental condition (MDD or no MDD) on assessment of pain intensity were found. Despite the non-significant findings of the main effect, analyses of moderation effects were conducted to test for moderation effects as well as to better understand the role of other variables such as personal responsibility beliefs, pity, help, empathic concern, and perceived psychological distress on ratings of pain intensity.

Stigma: Personal Responsibility Beliefs

The results for the test of the moderating role of personal responsibility beliefs on the relationship between experimental condition and pain intensity in the female patient are presented in Table 14 and in Table 15 for the male patient. The interaction term between personal responsibility beliefs and the experimental condition was not significant in the female patient ($\beta = .11, p = .28$), nor was it significant in the male patient ($\beta = .08, p = .43$). The main effect of personal responsibility beliefs did not predict pain intensity in the female patient ($\beta = -.02, p = .78$) nor the male patient ($\beta = -.05, p = .49$).

Table 14

Moderating Role of Personal Responsibility Beliefs on Relationship between Experimental Condition and Pain Intensity (Female Patient, n = 188)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.00	-.01
	Condition	.01	.27	[-.53, .56]	.00		
	AQ PRB	-.00	.03	[-.07, .05]	-.02		
Step 2						.00	-.01
	Condition	.01	.27	[-.53, .56]	.00		
	AQ PRB	-.04	.04	[-.12, .04]	-.09		
	Condition X AQ PRB	.06	.06	[-.05, .18]	.11		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 15

Moderating Role of Personal Responsibility Beliefs on Relationship between Experimental Condition and Pain Intensity (Male Patient, n = 183)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.00	-.00
	Condition	-.18	.26	[-.70, .34]	-.05		
	AQ PRB	-.02	.03	[-.08, .03]	-.05		
Step 2						.00	-.00
	Condition	-.18	.26	[-.70, .34]	-.05		
	AQ PRB	-.04	.04	[-.13, .04]	-.11		
	Condition X AQ PRB	.04	.06	[-.07, .16]	.08		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error or *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0.

Stigma: Pity Beliefs

The results for the test of the moderating role of pity on the relationship between experimental condition and pain intensity in the female patient are presented in Table 16 and in Table 17 for the male patient. The interaction term between pity beliefs and the experimental condition in the female patient was not significant ($\beta = -.06, p = .50$) nor was it significant in the male patient ($\beta = -.09, p = .34$). However, a significant main effect did emerge, indicating that higher levels of pity (correcting for transformation) were associated with higher estimates of patient pain intensity in the male condition ($\beta = -.20, p < .00$), but not in the female condition ($\beta = -.01, p = .84$).

Table 16

Moderating Role of Pity Beliefs on Relationship between Experimental Condition and Pain Intensity (Female Patient, n = 188)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.00	-.01
	Condition	.00	.27	[-.53, .55]	.00		
	AQ Pity	-.03	.16	[-.35, .29]	-.01		
Step 2						.00	-.01
	Condition	.00	.27	[-.54, .55]	.00		
	AQ Pity	.04	.20	[-.35, .44]	.02		
	Condition X AQ Pity	-.23	.34	[-.91, .45]	.06		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0. AQ-Pity has a reflected square root transformations applied.

Table 17

Moderating Role of Pity Beliefs on Relationship between Experimental Condition and Pain Intensity (Male Patient, n = 183)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.04	.03
	Condition	-.23	.26	[-.75, .27]	-.06		
	AQ Pity	-.41	.15	[-.70, -.11]	-.20**		
Step 2						.04	.03
	Condition	-.24	.26	[-.76, .27]	-.06		
	AQ Pity	-.28	.20	[-.68, .11]	-.13		
	Condition X AQ Pity	-.28	.30	[-.87, .30]	-.09		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0. AQ-Pity has a reflected square root transformations applied.

Stigma: Help Beliefs

The results for the test of the moderating role of help on the relationship between experimental condition and pain intensity in the female patient are presented in Table 18 and in Table 19 for the male patient. The interaction term between help beliefs and the experimental condition was not significant in the female patient ($\beta = .00, p = .98$), nor was it significant in the male condition ($\beta = .02, p = .83$). The levels of help beliefs were not associated with estimates of patient pain intensity ($\beta = .02, p = .75$) in the female patient. However, the higher levels of help beliefs were associated with higher estimates of patient pain intensity in the male patient ($\beta = .19, p = < .00$).

Table 18

Moderating Role of Help Beliefs on Relationship between Experimental Condition and Pain

Intensity (Female Patient, n = 188)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.00	-.01
	Condition	.01	.27	[-.53, .55]	.00		
	AQ Help	.00	.02	[-.03, .04]	.02		
Step 2						.00	-.00
	Condition	.01	.27	[-.56, .55]	.00		
	AQ Help	.00	.02	[-.05, .06]	.02		
	Condition X AQ Help	.00	.04	[-.08, .08]	.00		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 19

Moderating Role of Help Beliefs on Relationship between Experimental Condition and Pain

Intensity (Male Patient, n = 183)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.04	.04
	Condition	-.17	.26	[-.69, .36]	-.05		
	AQ Help	.05	.02	[.01, .09]	.19**		
Step 2						.04	.04
	Condition	-.17	.26	[-.69, .33]	-.05		
	AQ Help	.04	.02	[-.00, .10]	.18		
	Condition X AQ Help	.00	.03	[-.07, .08]	.02		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 . Experimental condition dummy coded MDD = 1 no MDD = 0.

Empathy: Empathetic Concern

The results for the test of the moderating role of empathic concern on the relationship between experimental condition and pain intensity for the female patient are presented in Table 20 and in Table 21 for the male patient. The interaction term between empathic concern and the experimental condition was not significant in the female patient ($\beta = -.02, p = .78$) or the male patient ($\beta = -.00, p = .97$). However, higher levels of empathic concern (correcting for transformation) were associated with higher estimates of patient pain intensity ($\beta = -.16, p = .02$) in the female patient as well as the male patient ($\beta = -.20, p < .00$).

Table 20

Moderating Role of Emphatic Concern on Relationship between Experimental Condition and Pain Intensity (Female Patient, n = 188)

	Predictor	<i>B</i>	<i>SE B</i>	95% CI	β	R ²	ΔR^2
Step 1						.02	.01
	Condition	-.03	.27	[-.57, .50]	-.00		
	IRI EC	-.37	.16	[-.69, -.04]	-.16*		
Step 2						.02	.00
	Condition	-.03	.27	[-.57, .51]	-.00		
	IRI EC	-.32	.23	[-.78, .13]	-.14		
	Condition X IRI EC	-.09	.33	[-.74, .55]	-.02		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R² = multiple correlations squared, ΔR^2 = change in R². Experimental condition dummy coded MDD = 1 no MDD = 0. IRI EC has a reflected square root transformations applied.

Table 21

Moderating Role of Emphatic Concern on Relationship between Experimental Condition and Pain Intensity (Male Patient, n = 183)

	Predictor	<i>B</i>	<i>SE B</i>	95% CI	β	R ²	ΔR^2
Step 1						.04	.03
	Condition	-.22	.26	[-.74, .29]	-.06		
	IRI EC	-.47	.17	[-.81, -.13]	-.20*		
Step 2						.04	.02
	Condition	-.22	.26	[-.73, .29]	-.06		
	IRI EC	-.47	.24	[-.94, .00]	-.20*		
	Condition X IRI EC	-.01	.34	[-.69, .67]	-.00		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R² = multiple correlations squared, ΔR^2 = change in R². Experimental condition dummy coded MDD = 1 no MDD = 0. IRI EC has a reflected square root transformations applied.

Perception of Patient Psychological Distress

The results for the test of the moderating role of perceived psychological distress on the relationship between experimental condition and pain intensity for the female patient are presented in Table 22 and in Table 23 for the male patient. The interaction term between perception of patient psychological distress and the experimental condition was not significant in the female patient ($\beta = -.05, p = .58$) or the male patient ($\beta = .03, p = .75$). Higher levels of perceived patient psychological distress were associated with higher estimates of patient pain intensity ($\beta = .23, p = < .00$) in the female patient as well as the male patient ($\beta = .20, p = .01$).

Table 22

Moderating Role of Perceived Psychological Distress on Relationship between Experimental Condition and Pain Intensity (Female Patient, n = 188)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.22	.05
	Condition	-.25	.28	[-.81, .29]	-.06		
	Psychological Distress	.29	.09	[.11, .47]	.23**		
Step 2						.23	.05
	Condition	-.25	.28	[-.81, .30]	-.06		
	Psychological Distress	.34	.12	[.08, .59]	.27**		
	Condition X Psychological Distress	-.10	.18	[-.46, .26]	-.05		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 .
Experimental condition dummy coded MDD = 1 no MDD = 0.

Table 23

Moderating Role of Perceived Psychological Distress on Relationship between Experimental Condition and Pain Intensity (Male Patient, n = 183)

Predictor		<i>B</i>	<i>SE B</i>	95% CI	β	R^2	ΔR^2
Step 1						.03	.02
	Condition	-.45	.28	[-1.01, .10]	-.12		
	Psychological Distress	.23	.09	[.05, .41]	.20*		
Step 2						.03	.02
	Condition	-.46	.28	[-1.02, .10]	-.12		
	Psychological Distress	.21	.11	[-.01, .44]	.18		
	Condition X Psychological Distress	.06	.19	[-.31, .43]	.03		

Note * = Correlation Significant at 0.05 level, ** = Correlation Significant at 0.01 level, *B* = unstandardized regression coefficient, *SE B* = standard error of *B*, 95% CI = 95% confidence interval [lower limit, upper limit], β = beta, R^2 = multiple correlations squared, ΔR^2 = change in R^2 .
Experimental condition dummy coded MDD = 1 no MDD = 0.

Supplementary Moderation Analyses

Supplementary moderation analyses were run assessing the male and female patients together. The moderated multiple regression equation was structured by entering: 1) the dummy-coded predictor variable (MDD and no MDD conditions) along with a dummy-coded patient gender variable (male patient and female patient) with the centered moderator variable and 2) the interaction term in the final step. Consistent with the analyses run separately by patient gender, no significant moderation effects were found. The significant main effects on estimates of pain intensity were found for empathetic concern ($\beta = -.18, p < .00$), and ratings of patient psychological distress ($\beta = .22, p < .00$) were consistent with analyses run separately by gender where higher levels of each variable were associated with higher pain assessment in the patient. As well, consistent with the analyses run separately by patient gender a main effect was not found for personal responsibility beliefs ($\beta = -.03, p = .52$)

In contrast, when the supplementary analyses were conducted together two main effects emerged that were not present in the analyses run separately on the female patient. Specifically, a main effect was found for help beliefs ($\beta = .10, p = .04$) where greater help beliefs were associated with higher pain assessment in others. However, when run separately help beliefs were not significantly related to the female patients pain assessment. As well, when the supplementary analyses were conducted together a main effect was found for pity beliefs ($\beta = -.10, p = .04$), where greater pity beliefs were associated with higher pain assessment in others. However, when run separately, pity beliefs were not significantly associated with the assessment of pain in the female patients. Additional supplementary analyses were conducted to determine whether the effects of pity or help remained significant while controlling for empathetic concern. Results

indicated that, controlling for empathic concern, pity ($\beta = .00, p = .96$), and help ($\beta = .01, p = .87$) were no longer related to assessment of pain intensity.

Research Question 4: Linguistic Analysis

The open-ended comments that were solicited about each patient were optional and as such only a subset of the total sample provided comments. In the female no MDD condition ($n = 56$) the word count ranged from 2 to 82 words (median = 16) while the female MDD condition ($n = 55$) ranged from 2 to 69 words (median = 18). The word count for the male no MDD condition ($n = 58$) ranged from 2 to 50 words (median = 16) while the word count for the male MDD condition ($n = 36$) ranged from 2 to 65 words (median = 18). LIWC text analysis software analyzes written text on a word by words basis to calculate the percentage of words in the text that match predetermined language dimensions. In this research LIWC was used to identify the percentage of total words participants' open-ended comments were associated with positive or negative emotions based on the LIWC's dictionary of 4500 words and word stems.

The result of the linguistic analysis of positive- and negative-valenced patient commentary for the female patient is present in table 24 and in table 25 for the male patient. Independent samples t-tests were conducted to compare the percentage of positive and negative valenced words in the MDD and no MDD conditions. For the female patient, there was no significant difference between the MDD and no MDD conditions in the percentage of positively valenced words $t(109) = -.56, p = .57$ or negatively valenced words $t(109) = -1.65, p = .10$. In the male condition there was no significant difference in the positive valence $t(92) = .40, p = .64$ or in the negative valence $t(92) = .40, p = .68$.

Table 24

Linguistic Analysis of Percentage of Positive and Negative Valenced Words in Patient

Commentary MDD vs. No MDD conditions (Female Patient, n = 111)

Valence	Overall n = 111		No MDD n = 56		Range	MDD n = 55		Range	T-Test	
	M	SD	M	SD		M	SD		T	p
Positive	1.00	2.53	.86	2.44	0-13.33	1.13	2.64	0-12.50	-.56	.57
Negative	8.41	7.75	7.21	6.89	0-40	9.62	8.42	0-40	-1.65	.10

Note. M = Mean, SD = Standard Deviation, N = Sample Size.

Table 25

Linguistic Analysis of Percentage of Positive and Negative Valenced Words in Patient

Commentary MDD vs. No MDD Conditions (Male Patient, n = 94)

Valence	Overall n = 94		No MDD n = 58		Range	MDD n = 36		Range	T-Test	
	M	SD	M	SD		M	SD		T	p
Positive	2.00	6.17	2.26	7.19	0-50	1.66	4.10	0-20	.47	.64
Negative	8.17	8.33	8.41	9.67	0-50	7.77	5.65	0-25	.40	.68

Note. M = Mean, SD = Standard Deviation, N = Sample Size.

Discussion

The manner in which observers assess and respond to an individual in pain has substantial implications for their treatment and well-being. Past research has found that when an observer's assessment of pain intensity is concordant with the pain patient's self-report, the physical and psychological well-being of the patient are greatly improved (Creamens-Smith et al., 2003; Lehman et al., 2011; Wells et al., 2003). Despite the importance of patient-observer concordance in the assessment of pain, there is no objective manner in which to determine the intensity of another's physical pain. In fact, pain assessment can be considered an exercise in social judgment (Tait, 2013). A growing body of research within the biopsychosocial model of pain communication has found that a number of contextual, social, and psychological factors can influence how pain is perceived in others (Hadjistavropoulos, et al., 2011). The present study proposed that one of the biopsychosocial factors that could influence how pain is perceived in others is a diagnostic label of psychiatric comorbidity. An extensive body of epidemiological research has indicated that psychiatric disorders commonly co-occur with chronic pain, with major depression as one of the most prevalent chronic pain comorbidities (Bair et al., 2003; Tunks, Crook, & Weir, 2008). The present study was the first, to our knowledge, to investigate whether a comorbid diagnosis of depression can influence the perception of pain in individuals with chronic pain, and to explore *how* and *for whom* this effect might exist.

Overview of Findings. Overall, counter to study hypotheses, the present findings suggest that a label of comorbid depression does not directly influence the perception of pain intensity in male or female chronic pain patients. Patient gender did, however, influence the perception of pain intensity. Participants were significantly more likely to *underestimate* the pain intensity

experienced by the male patient, whereas participants were significantly more likely to *overestimate* pain intensity in the female patient.

The mediation analyses, separated by male and female patient condition, as well as aggregated across gender, did not identify any statistically significant mediators. Although no significant main effects were found between experimental condition and *pain genuineness*, higher ratings of pain genuineness were associated with higher pain intensity assessments in both the male and female condition. The analysis of the relationship between experimental condition and *psychological attributions of pain* indicated the MDD condition was associated with greater psychological pain attributions in both the female and male condition whereas no relationship emerged between psychological pain attribution and pain intensity. The analysis examining the relationship between experimental condition and *physical attributions of pain* revealed a significant negative relationship in the female condition but not in the male condition. A significant positive relationship emerged between physical pain attributions and pain intensity in both male and female conditions where greater physical pain attributions were related to higher pain intensity assessments.

The moderation analyses, separated by male or female patient condition, as well as aggregated across gender, did not reveal any statistically significant interaction effects. Main effects were found for *pity* and *help* in the male patient condition, but not the female patient condition whereas main effects for *empathic concern* and *psychological distress* were found in both the male and female patient conditions.

Lastly, the linguistic analyses revealed no statistically significant differences in proportion of positively or negatively valenced words used to describe the patients in the open-ended response section. The results for each of the four research questions are discussed in more detail below.

Research Question: Direct Effect

The primary goal of this research was to investigate if a diagnostic label of MDD would have a direct influence on the perception of pain intensity in male and female patients. Contrary to the first study hypothesis, no significant differences in pain intensity ratings were found between the MDD and no MDD conditions for the male or female patient. Chi-square analyses revealed no significant differences in the likelihood of over- under- or accurately estimating pain between MDD and no MDD conditions. The supplementary Chi-square analyses did, however, reveal a significant moderate-sized effect for the difference in the likelihood of concordance or discordance in the assessment of pain in female patients as opposed to male patients where participants were more likely to underestimate pain in the male patient and overestimate pain in the female patient.

Potential explanations for the non-significant main effects of a label of MDD include: potentially weak effects of a diagnostic label of “major depressive disorder,” as opposed to describing the *behaviours* associated with MDD or using a label of a more severe mental illness, and individual differences that may moderate the observers’ response to an individual with depressive comorbidity.

Limitations of a Diagnostic Label. A lack of a significant effect of an MDD label on ratings of pain intensity may have been due in part to the decision to use only a brief mention of an MDD diagnosis in the case history vignette. Depression was chosen for inclusion in this research as epidemiological studies (e.g., Bair et al., 2003) revealed it is the most prevalent comorbidity with chronic pain. However, cross-sectional research has found that the label of depression has a weaker effect on self-reported stigmatized responses compared to other mental illness labels such as schizophrenia (Jorm et al., 2005). Indeed, research suggests that the term “depression” may not designate solely a mental illness, as unlike “schizophrenia” it is also used

to characterize normal negative mood states (Schomerus, Matshinger, & Angermeyer, 2006). Therefore if the study protocol had used a general diagnostic label of a “mental disorder” or specific disorders such as schizophrenia or substance abuse disorders the effect of the label may have been more pronounced. As well, what may also be more impactful, particularly when it comes to stigma surrounding depression, are the behaviours that accompany depression, rather than the label itself. For example, behaviours associated with the diagnostic criteria of depression (DSM-5, 2013) such as sadness, disinterest in previously enjoyed activities, hypersomnia, and the inability to concentrate may be more likely to impact individuals attributions that chronic pain is due to or influenced by psychosocial factors. Thus, future research is needed to investigate if the other diagnostic labels, as well as the behaviours associated with these diagnostic labels, influences the assessment of pain in others.

Individual Differences Influencing Main Effects. In the mental illness stigma literature equivocal empirical evidence has been found for the effects of labeling on stigmatizing attitudes and behaviours (Link et al., 1997). Whereas some research has supported the notion that labels of mental illness negatively influence the perception of others (Graves, Cassisi, & Penn, 2005), other research has found positive effects of labels (Wright, Jorm, & Mackinnon, 2011) or no effects at all (Angermeyer & Matschinger, 2003). This highlights the potential importance of individual differences in the impact of a mental illness label on the perception of others. In the present study, the potentially moderating role of stigmatizing attitudes, empathy, and psychological distress were included in the study protocol. However, other potential moderating factors such as gender role expectations in pain perception and stigma against chronic illness were excluded. These potentially important moderator variables will be discussed in more detail in the study limitations and future directions section.

Inaccuracies in Pain Estimates

It is important to note that accuracy in pain concordance (i.e., within +/- 1cm on the VAS) was poor across both conditions. In female condition, only 43% of participants were concordant across the MDD and no MDD conditions while in the male group, only 36% were concordant across the MDD and no MDD conditions. Possible reasons for the general inaccuracies in pain perception in this study include: assessing pain in unknown chronic pain patients as opposed to similar and familiar others, gender of the patient influencing the perception of pain, and inconsistency of pain self-report with facial pain expressiveness. These potential explanations for non-significant main effects and inaccuracies in pain estimates are detailed below.

Accuracy of pain ratings for strangers versus familiar and similar others. Research has found that empathy and accuracy in pain assessment may be influenced by contextual factors such as familiarity or similarity to the observed person in pain (de Vignemont & Singer, 2006). This is consistent with evolutionary theories that predict accuracy in pain perception would be biased towards those with whom one has a positive personal relationship (de Waal, 2008). Specifically, when an individual perceives himself or herself to be similar to someone who is experiencing pain they tend to empathize more with the person (Beckes, Coan, & Hasselmo, 2012; Lamm et al., 2010). Similarly, when they are familiar (e.g., friend, spouse) as opposed to unfamiliar (e.g., physician) they tend to be more accurate in the assessment of pain (Goubert et al., 2005). In the current research, participants with a mean age of 19 were asked to assess the pain of middle-age male or female strangers. Thus, the assessment of pain in dissimilar and unfamiliar others may have reduced the overall accuracy of pain estimates in the present study. Additional research is needed to better understand how similarity and familiarity between patient and observer can impact accuracy of pain ratings. To this end, informal caregivers are

predominantly close family members (Roth et al., 2007), making research in familiar and similar others of particular importance. As well, future research should investigate pain assessment in unfamiliar and dissimilar others as in health care settings patients often come from very different ethnic and cultural backgrounds to their health care providers (Egede, 2006).

Patient Gender and the Accuracy of Pain Ratings. Previous research has indicated that stereotypical beliefs about sex differences include women having greater emotional intensity compared to men (Grossman & Wood, 1993). The heuristic that women experience everything with greater emotional intensity is potentially related to the perception that women have greater pain sensitivity (Keefe et al., 2001; Lumley et al., 2011). This heuristic may lead individuals to infer more intense pain in women than men (Robinson et al., 2001; Robinson & Wise, 2003). For example, previous research has found that gender heuristics (e.g., women feel more intense emotions, including pain), leads to overestimation of women's pain intensity in experimental vignette research by undergraduate students *independent* of the pain behaviours expressed by the person in pain (Martel et al., 2008). In the current research results found that although a label of MDD did not appear to impact accuracy of pain ratings, patient gender did impact concordance in pain assessment. Participants were more likely to overestimate the pain in the female patient as compared to the male patient. Indeed the concordance analyses revealed that while six participants (3%) in the male condition overestimated the male patients' pain, 61 participants (32%) in the female condition overestimated the female patients' pain. This finding is consistent with empirical research that found gender influences how others' pain is rated (Robinson & Wise, 2004).

To this end, another possible explanation for the difference in pain concordance across the male and female groups involves gender roles. Observers invoke heuristics when making inferences about others' pain (Martel et al., 2008). Gender roles refer to society's widely assumed

set of characteristics for each sex and may include beliefs regarding appropriate pain behaviours for each gender (Unruh, 1996). The stereotypical male role in Western society is to be stoic and able to withstand pain, whereas the stereotypical belief is women tend to exhibit increased sensitivity to pain (Kallai, Barke, & Voss 2004). Indeed, the concordance analysis revealed participants were significantly more likely to underestimate pain in the male patient as opposed to the female patient despite the fact that the male patient had higher self-reported pain intensity on the VAS scale. Thus, gender roles may also help explain why we found greater concordance in the perception of pain in the female patient as opposed to the male patient.

Facial Expressiveness of Pain. Several reviews, based on an extensive body of research, have demonstrated that facial expressions are an important source of information regarding the experience of pain (Prkachin, 2009; Williams, 2002). Experimental research has found that observers rely on facial expressions when assessing pain intensity in others (Sullivan et al., 2006). Despite the evidence for the validity of facial pain expression in pain assessment, some research has called into question the extent to which facial expressions of pain and self-reports of pain correspond. While some researchers have found significant correlations between self-reports and facial measures (Craig, Hyde, & Patrick, 1991; Prkachin & Solomon, 2008), others have gone so far as to conclude that verbal self-reports of pain and facial expressions provide different information about the pain experience (Hadjistavropoulos et al., 1996). This is consistent with research that questions the universality of facial expressions such as the conceptual act model of emotions (Barrett, 2006). In the current research, there was a substantial gap between the patients' self-reported VAS pain rating and their objective PSPI facial coding scores. Specifically, the male patient had a maximum VAS of 7, average VAS of 6.5 compared to PSPI score of 1.52 out of a possible 4. The female patient had a maximum VAS of 7, average VAS of 4.3 compared to PSPI score of 0.12 out of a possible 4. Indeed, research on the UNBC-McMaster pain database

has found that the correlation between self report and facial pain reactivity across all the participants in the database was fairly low, $r = .31$, $p = <.00$ (Prkachin & Solomon, 2008). Due to informed consent restrictions allowing access to videos only, it is not possible to extrapolate the correlation for the specific patients used in this study. More research is needed to understand the individual differences in facial pain expressivity, its relationship to self-reported pain, and how these individual differences impact how pain is perceived in others.

Research Question: Mediation Effects

To investigate possible mediation effects between MDD condition and pain intensity, analyses investigated whether pain genuineness, physical pain attribution, or psychological pain attributions mediated the relationship between MDD and no MDD conditions and the perception of pain in others. Due to the negligible relationship between the experimental condition and ratings of pain intensity, a formal test of indirect effects was not conducted. However, the association between the experimental condition and the proposed mediators, as well as the relationships between the proposed mediators and ratings of pain intensity were tested. In these analyses, main effects were found for pain genuineness, physical pain attributions, and psychological pain attributions. The findings for these variables are discussed below.

Pain Genuineness. The issue of “pain genuineness” is particularly relevant in the context of chronic pain conditions. Chronic pain conditions are often diagnostically complex and associated with some degree of suspicion among formal and informal caregivers, particularly when they are not associated with clear identifiable tissue damage or when there are psychosocial factors that may be implicated in the cause of pain (Tait, Chibnall, & Kalauokalani, 2009; De Ruddere et al., 2013b). In the current study, a label of MDD did not impact perceptions of pain genuineness, but significant positive associations were found between pain genuineness and pain intensity assessments in both the male and female conditions indicating the more genuine the

pain was perceived to be, the more pain the person was perceived to be experiencing. This finding is consistent with past vignette pain perception research conducted with undergraduate students which found that observers estimate lower levels of pain in patients when they believe that the pain the patient is expressing is less genuine (Kappasser, & Williams, 2008). Research (e.g., De Ruddere et al., 2012) has found that observers take the pain of others less seriously during pain assessment when there is no clear medical evidence for the pain, and the pain is therefore seen as less genuine. In sum, consistent with previous research, greater assessment of pain genuineness was associated with higher ratings of perceived pain intensity in both the male and female patient.

Causal Pain Attributions. Weiner (1980) has proposed an attribution theory, which states that individuals attempt to understand the world by determining *the cause* of an event or behaviour. In the pain literature, studies have found that the causal inferences an individual makes about why a person is in pain influences the manner in which that pain is assessed as well as the subsequent behavioural responses towards that person. In the current research, participants assigned to the MDD condition made greater psychological pain attributions than those assigned to the no MDD condition. However, contrary to study hypotheses, psychological pain attributions were not significantly related to pain intensity ratings. It is possible the lack of significant findings could be related to the variability between participants in how psychological pain attributions regarding the cause of pain impacts them; for some it may make them attribute greater pain intensity, for others lower pain intensity, and for others it may make no difference at all. This finding is in contrast to past research showing that patients' psychological as opposed to physical attributions of pain have been associated with increased psychological distress and worse psychosocial outcomes in chronic pain patients regardless of physical pathology (Meana et al., 1999).

The results for physical pain attributions indicated that, in the female condition, those assigned to the MDD condition made significantly lower ratings of physical pain attributions, compared to the no MDD condition. However, no significant results emerged for the male condition indicating the MDD condition did not influence physical pain attributions. The results regarding physical pain attributions and pain intensity revealed significant positive relationships in both male and female conditions. Greater physical pain attributions were significantly related to greater pain intensity ratings. The differences in the attributions made across patient genders may reflect gender role expectations that influence pain assessment in others. Research has found that women are seen as more sensitive to pain, and more willing to report pain than men (Wandner et al., 2012). The differential attributions regarding the cause of pain could be a contributing factor to the under management of pain in women (Unruh, 1996).

Taken together, these findings suggest that it is the *absence* of physical attributions of pain that seems to be more important in estimating pain in others, rather than *presence* of psychological attributions, at least in this undergraduate student sample. Related to this, our findings also indicated that the association between physical pain attributions and perceptions of patient genuineness was stronger than the association between psychological pain attributions and pain genuineness.

Research Question: Moderation Effects

To investigate possible moderation effects between MDD condition and pain intensity, moderated multiple regression analyses investigated whether stigma, empathy, or psychological distress moderated the relationship between MDD and no MDD conditions and the perception of pain intensity in others. Contrary to the study hypotheses, stigma, empathy, and psychological distress were not significant moderators of the relationship between psychiatric comorbidity condition and the perception of pain in others. A number of methodological and measurement

issues could have led to the lack of significant interaction effects. Despite the methodological and measurement issues and the lack of significant interaction effects, a number of significant main effects emerged, and these will be discussed below.

Stigma. Stigma is a phenomenon associated with many chronic health conditions (Van Brakel, 2006). According to Corrigan's (2003) model of public stigma, the emotional reaction of pity and behavioural reaction of help theoretically stem from personal responsibility beliefs. Specifically, when individuals view patients as being responsible for the cause of their illness, they are likely to react negatively (e.g., pity) whereas when individuals are not seen as responsible for their illnesses they are likely to react positively (e.g., help). The specific role of personal responsibility, pity, and helping behaviours in mental illness stigma was explored in the present research. Although the stigma subscales did not moderate the relationship between MDD condition and pain intensity, results did show that there was a positive main effect for both pity and help, where greater pity and help scores on the Attribution Questionnaire were related to higher pain intensity ratings. No effect for personal responsibility beliefs was found in the male and female conditions. Due to the theoretical importance of the role of perceived personal responsibility in the stigma response and in the chronic pain literature, future research should directly assess (similar to the likert question used in other portions of this research) the extent to which an individual is perceived to be responsible for their pain condition, as well as the degree of pity an individual has towards the patients and their willingness to help.

In this research, in the female condition, personal responsibility beliefs were positively correlated with pity but not helping behaviour. In the male condition there were no significant correlations between personal responsibility beliefs and pity or help beliefs. It is possible that pity could be related not only to higher pain ratings, but also pain overestimation. Past research has

found overestimation of pain was related to over-solicitous responses by informal caregivers and subsequently resulted in poorer patient outcomes (Lehman et al., 2011).

The associations between mental health stigma and pain ratings across the MDD and no MDD conditions may reflect underlying empathic concern dispositions. Pearson correlations revealed that in both the male and female conditions higher levels of empathic concern were significantly correlated with lower personal responsibility beliefs and higher willingness to help and pity responses. Supplementary regression analyses revealed that, controlling for empathic concern, the results for pity and help on pain intensity became non-significant.

Empathy. Empathy refers to the ability to perceive and share another's affective state (Goubert et al., 2005; Goubert et al., 2009). In this research, a main effect, but not an interaction effect, for empathic concern was found. Higher empathic concern was related to higher ratings of pain intensity in both the male and female conditions. The main effect found in this research is consistent with a large body of research linking empathy with the greater perception of pain in others (Goubert et al., 2005; Goubert et al., 2009; Loggia et al., 2008). Despite the consistency in the findings for the construct of empathy and the perception of pain in others, some research findings for the Interpersonal Reactivity Index trait empathic concern subscale and the perception of pain in others is mixed. Consistent with the findings from this research, one study (Singer et al., 2004) found that the empathic concern subscale was positively correlated with higher pain assessments. Conversely, others (Loggia et al., 2008; Saarela et al., 2007) did not find a significant correlation with empathic concern and pain assessment in others.

Psychological Distress. Chronic pain and psychological distress are mutually influential and inextricably linked (Fishbain et al., 1997). In the current study, contrary to the hypothesis, psychological distress was not found to moderate the relationship between experimental condition and pain intensity. There was, however, a statistically significant main effect for

psychological distress in both the male and female condition for participants with or without the label of comorbid depression, such that greater perceived psychological distress in the patient was related to greater ratings of pain intensity. This finding is consistent with longitudinal research investigating the relationship between psychological distress, chronic pain, and psychiatric comorbidity from perspective of the patient. This research found that in 1715 chronic pain patients, the experience of chronic pain, in interaction with comorbid psychiatric disorders, predicts psychological distress (McBeth, Macfarlane, & Silman, 2002). Although the primary focus of the current study was the impact of a label of comorbid depression on the perception of pain intensity in others, findings related to psychological distress warrant attention. The results from the current study indicate the male and female in the MDD condition were rated as significantly more psychologically distressed compared to the male and female in the no MDD condition. While the significant difference between psychological distress across the MDD and no MDD conditions indicates that the experimental manipulation was a success, it is also consistent with previous research (De Ruddere et al, 2013b) demonstrating that individuals view chronic pain patients as more psychologically distressed if they were labeled as having psychosocial stressor.

Research Question: Linguistic Analyses

A growing body of vignette research has shown that observers' responses towards others in pain are influenced by the observers' evaluations of the positive (e.g., likeability) or negative (e.g., malingering) characteristic of the patient (Chibnall & Tait, 1995; Tait & Chibnall, 1997; De Ruddere et al., 2011). It was hypothesized that patients in the MDD condition would generally be perceived in a more negative and less positive light, compared to those in the no MDD label condition by participants who completed the open-ended evaluation of the patient. Contrary to study hypotheses, linguistic analyses of the open-ended text revealed that there was no

significance difference in positive or negative valenced words for the male or female patient between the MDD and no MDD conditions. This is inconsistent with past research that has found that individuals rate people with mental illnesses such as major depression with less positive attributes (Cook & Wang, 2010). An independent samples t-test between the number of positive words between the male and female patient was not statistically significant ($p = .14$). However, the male patient, who had a higher average pain intensity and higher level of facial expression of pain, received more positive words than the female patient. Despite having a higher level of pain, Chi-square analyses revealed the male patient had a statistically significant greater percentage of participants underestimate pain intensity compared to the female patient. The findings are consistent with the results of De Ruddere and colleagues (2011), which found the effect of patients' likeability influenced the assessment of the patients' pain intensity *only* in patients expressing high-intensity pain.

Study Limitations and Future Directions

This exploratory research investigated *if, how* and *for whom* a label of psychiatric comorbidity influences the perception of pain in others. This section delineates the methodological limitations of this study, specifically power issues in finding significant effects, ecological validity in vignette research, effectiveness of diagnostic labels, reliability and validity of measures, unrepresentative sample, and the exclusion of relevant study variables. Finally, the clinical implications of this research are discussed.

Power Issues. Multiple models for mediation and moderation were tested in this research. These models have not been corrected for Type I error due to the exploratory nature of this research. While regression analyses are cited as the preferred statistical method for examining interaction effects, concerns have been raised in the literature about the low power this test has to detect true interaction effects (Shieh, 2009). In an influential article on moderation and mediation

analyses in the field of psychology, Frazier, and colleagues (2004) delineate issues associated with finding interaction effects (e.g., sample size, and coarse outcome variable). Attempts were made to address power issues for moderation and mediation analyses in the current study. Using the randomization properties of the survey software, an equal number of participants were randomly assigned to each of the four conditions of the experiment. Unfortunately, participants were dropped due to inattentiveness to experimental manipulation but the group sizes were roughly equivalent and did not differ significantly on any demographic characteristics (age, gender) or study variables (empathic concern, stigma scales such as personal responsibility beliefs, help, pity). Attempts were also made to retain as much data as possible through imputation of missing cells using Expectation Maximization methodology (Dempster, Laird, & Rubin, 1977) instead of missing data alternatives such as case wise deletion. Analyses were conducted separately by patient gender, which resulted in reduced power due to lower sample sizes. However, supplementary analyses were conducted with the entire data to determine whether results differed with increased power. These supplementary analyses showed that, despite a sample size of 371 (n = 174 MDD, n = 197 no MDD) no significant mediation or moderation effects occurred, consistent with what was found when analyses were conducted separately by gender. Despite the precautions taken to ensure adequate power, no interaction or mediation effects were found in the moderation and mediation analyses.

Vignette Methodology. The inherent limitations of vignette research should be highlighted. Experimental vignette methodology is widely used in health research, and specifically in the pain perception literature concerned with understanding the psychosocial factors that influence the assessment of pain in others. A review by Hughes and Huby (2002) found that vignette research provides a number of methodological advantages. In particular, a vignette methodology allows researchers to intensively and systematically investigate areas that

would be unethical to experimentally manipulate. However, despite these advantages, the shortcomings related to the generalizability and ecological validity of vignette research are important to note. Specifically, participants' reaction to a vignette and accompanying video may not predict their reactions and judgments when confronted with an individual with mental illness and/or chronic pain in real-world settings. More research is required to bridge the gap between experimental methodology and clinical situations, as it is a crucial component to understanding and improving pain management in clinical situations. Specifically, systematic extensions of vignette research that tests the generalizability and validity of research findings in real-life settings is needed.

Diagnostic Label. In the current research, a vignette with or without a diagnostic label of depression was used as the experimental manipulation. The results of the psychological distress analysis across conditions indicate that the experimental manipulation was a success. However, it should be noted that there are limitations to the use of a diagnostic label as a strategy to test how patients with comorbid diagnosis of MDD may impact observer perceptions of pain. Individuals in everyday situations may be primed about the presence of depression in others in a more indirect but equally meaningful manner. Specifically, the diagnostic label of depression might not have been enough to trigger a response; the associated behaviour might have been more meaningful. For example, if vignettes had contained a behavioural description of diagnostic criteria of depression such as sadness, disinterest in previously enjoyed activities, restlessness, and inability to concentrate, this may have further impacted the perception of pain intensity. As well, future research should investigate the impact of other diagnostic labels such as generalized anxiety disorder, substance abuse disorder, or the general label of "mental illness" on the perception of pain in others.

Variables Included in Study Protocol. The variables included in this study protocol were selected based on previous empirical research in the areas of pain perception in others as well as a proposed theoretical relationship to the direct effect investigated. Attempts were made in this exploratory research protocol to be inclusive of potential mediating and moderating variables. However the exclusion of potentially important variables should be noted. Some examples of variables that could be included in similar research protocols include measures that assess treatment suggestions, as the comorbid depression might not influence pain intensity estimates but might impact other areas such as *how* a person should be treated for their pain (e.g., anti-depressant medication vs. counseling). As well, future research could include the stigma scale for chronic illness (SSCI; Rao et al., 2009), as stigma against medically unexplained pain which is frequently associated with chronic pain could influence others' pain assessment. Finally, Chi-square analyses revealed a difference in the assessment of the male as opposed to female patients' pain. To understand this difference in terms of gender heuristics, future research could include measures such as gender role expectations in pain assessment (GREP; Wandner et al., 2012).

Measurement Reliability and Validity. Despite the recognition of the prevalence of public stigma towards mental illness and the societal problems it causes, a thorough literature search revealed few reliable and valid measures of mental illness stigma. The Attribution Questionnaire (Corrigan et al., 2003) was chosen for inclusion in this study protocol, as it was one of the few measures that assessed attributions (e.g., personal responsibility) regarding the cause of mental illness. However, despite moderate internal reliability in past research (e.g., Rusch et al., 2005), the reliability of the Attribution Questionnaire subscale for personal responsibility beliefs was low in the present study (i.e., .45). As public stigma towards mental illness is extremely detrimental to individuals with mental illness, more suitable reliable and valid measures are needed to assess stigma against mental illness. As well, the measure to assess stigma that was

used in this research was self-report and prone to social desirability bias effects. Other tests, such as the implicit association test (Goodall, 2011), error-choice tests (Michaels & Corrigan, 2013), or behavioural measures of physical distance between participants and stigmatized others (e.g., Stier & Hinshaw, 2007) could be used to complement self-report mental illness stigma measures in future research. Finally, the Attribution Questionnaire assesses stigma against schizophrenia. The extent to which stigma against schizophrenia extends to other mental illnesses is questionable (e.g., Jorm et al., 2005).

Unrepresentative Sample of Patients and Participants. The male and female patients used in the videos were chosen for inclusion in this study protocol from the UNBC-McMaster database due to their similarity in age and ethnicity. However, it is important to note the specifics of their demographic information were unavailable from the UNBC-McMaster database as participants provided informed consent *only* for videos and still images in future pain assessment research. As such, the similarities (i.e., age and gender) between the patients had to be extrapolated and could not be confirmed. Furthermore, despite being middle-age adults, these patients are not wholly representative of the population of people with chronic pain. More research is needed to understand the factors that influence accuracy in the perception of pain in individuals of different ages and ethnicities. Finally, a fairly homogenous sample (i.e., 74% female, 75.5% Caucasian) of undergraduate participants were recruited from a university setting with the goal of measuring the pain assessment and responses of lay caregivers. The undergraduate students may be less sophisticated and less motivated to take into account the multiple factors that are involved when judging another's pain in a vignette study. The results of this research may not be generalizable to formal and informal caregivers of patients with chronic pain as these participants likely differ significantly in the beliefs and behaviour of the participants in this research. Future research is needed to assess how a chronic pain patients' psychiatric

comorbidity influences the perception and treatment of their pain by informal and formal health care providers.

Stigma of Invisible Disorders. One salient factor that both psychiatric disorders (such as depression) and chronic pain have in common is that they are *invisible* chronic conditions that are both, to some degree, stigmatized by the general public and in the health care community (Jaachim & Acorn, 2000). It is possible that there is a latent or underlying factor that relates stigma towards psychiatric disorders, such as depression, and stigma towards physical health conditions, such as chronic pain. More research is needed to understand the connection between psychopathology and chronic pain. There is, however, progress in this area. In the DSM-5 there is an increasing recognition that somatic symptoms and psychopathology exists along a continuum and changes in the DSM-5 reflect the psychological factors in the chronic pain experience. To this end, there are pain related disorders in the DSM-5 such as somatic symptom disorder with predominant pain or psychological factors that affect other medical conditions (Highlights of Changes, APA 2013). Following the most recent version of the DSM-5, more research is needed to understand if there is a latent underlying factor linking stigma towards invisible disorders, specifically chronic pain and psychopathology.

Clinical Implications

The results of the current research have found that a label of depression did not influence the perception of pain intensity in others and no significant mediation or moderation effects were found. Of note, despite having a comorbid disorder, which is more disabling than either pain or major depression in isolation, no effects were found for a label of major depression on pain intensity ratings in male or female patients. Despite the fact that the results of the current study were contrary to the overall expectations of the research hypotheses, the lack of significant findings is consistent with the findings of other research in lay observers (De Ruddere et al.,

2012) and health professionals (Salmon et al., 2005) indicating the assessment of pain intensity in others is not influenced by psychosocial factors. Research has widely supported the biopsychosocial model of pain, where the experience of pain is influenced by a myriad of biological, social, and psychological factors. It is striking to note the lack of significant findings for the impact of depressive comorbidity, a profound psychosocial stressor, on the assessment of pain intensity in others. One of the main effects that emerged from this research was for perceived psychological distress of the patient across experimental conditions indicating that the psychiatric comorbidity was not disregarded, but did not influence the assessment of pain intensity. It is possible the inattention to psychosocial factors could partially explain why individuals with chronic pain and comorbid psychopathology consistently experience worse quality of life outcomes. Although this research did not find an effect for psychiatric comorbidity it does not rule out the possibility that psychiatric comorbidity may influence the pain perception process. More research is needed to understand the relationship between depression and chronic pain, and how psychiatric comorbidity effects the pain assessment and pain management process.

Conclusion

Pain is a complex personal experience. Despite its intrapersonal nature, pain is experienced and expressed in a social context. Indeed, the adequate treatment of pain depends on the responses of others. Ample research based on the biopsychosocial model of pain communication (Hadjistravoloupolous et al., 2011) has revealed that numerous biological, social, and psychological factors influence the perception of pain in others. This is an important research topic as individuals with chronic pain frequently have comorbid psychiatric illnesses. Epidemiologic studies (e.g., Lepine & Briley, 2004) have indicated that major depressive disorder is one of the most prevalent psychiatric comorbidities to appear with chronic pain. Pain patients with comorbid depression often present with a complex set of overlapping symptoms, with interacting emotional and physical complaints. Despite the fact that depression and pain syndromes are common comorbidities that are more disabling than either condition independently, the relationship between depression and pain is not completely understood (Bair et al, 2003). Based on the biopsychosocial model of pain communication (Hadjistavropoulos, et al., 2011) the factors that influence pain assessment in others are gaining increasing attention in research literature. Although pain is typically presented as a medical symptom, observers' judgments of others' pain are influenced by characteristics of the patient (e.g. genuineness), the situation (e.g., context), and the care provider (e.g., empathy) individually as well as in interaction with another (e.g., interaction between patient genuineness and care provider empathy) (Chinall & Tait, 1995; Tait & Chibnall, 1994; De Ruddere et al., 2011; De Ruddere et al., 2013; Tait, 2013). Systematic research is necessary to study each of the factors that contribute to the perception of pain in order to improve the assessment of pain and the subsequent quality of care provided to the individual in pain.

The primary objective of this exploratory research was to investigate the effects of a comorbid MDD label on the perception of pain in others. To our knowledge this study was the first to examine if a comorbid psychiatric label influences the perception of pain in female and male chronic pain patients. This research has found that perceptions of pain intensity did not differ between MDD and no MDD conditions, but there were significant main effects for variables such as pain genuineness, physical pain attributions, psychological distress, and empathic concern on pain intensity. Due to the prevalence of psychiatric comorbidity with chronic pain, more systematic research is needed to investigate *if, how, and for whom* psychiatric comorbidity influences the perception of pain in others.

References

- Aiken, L. S., & West, S. G. (1991). Interactions Between Categorical and Continuous Variables. In L. S. Aiken & S.G. West (Eds.), *Multiple Regression: Testing and interpreting interactions* (pp. 116-137). California: Sage Publications.
- American Psychiatric Association. (2013). Depressive Disorders. *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.) (pp. 155-168). Arlington, VA: American Psychiatric Publishing.
- American Psychiatric Association (2013). Highlights of Changes. Retrieved from <http://www.dsm5.org/Documents/changes%20from%20dsm-iv-tr%20to%20dsm-5.pdf>.
- Angermeyer, M. C., Breier P., Dietrich S., Kenzine D., & Matschinger H. (2005). Public attitudes toward psychiatric treatment: An international comparison. *Social Psychiatry and Psychiatric Epidemiology* 40, 855–64. doi:10.1111/j.1600-0447.2005.00699.x
- Angermeyer, M. C., & Matschinger, H. (2003). The stigma of mental illness: Effects of labeling on public attitudes towards people with mental disorder. *Acta Psychiatrica Scandinavica*, 108(4), 304-309. doi:10.1034/j.1600-0447.2003.00150.x
- Bailey, S. J., McWilliams, L. A., & Dick, B. D. (2012). Expanding the social communication model of pain: Are adult attachment characteristics associated with observers' pain-related evaluations? *Rehabilitation Psychology*, 57(1), 27-34. doi:10.1037/a0026237
- Bair, M. J., Robinson, R. L., Katon, W., & Kroenke K. (2003). Depression and pain comorbidity: A literature review. *Archive of Internal Medicine*, 163(20), 2433-2445. doi:10.1001/archinte.163.20.2433.
- 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. doi:10.1037/0022-3514.51.6.1173

- Barratt, L.F. (2006). Solving the Emotion Paradox: Categorization and the Experience of Emotion. *Personality and Social Psychology Review*, 10(1), 20-46.
doi: 10.1207/s15327957pspr1001_2
- Bates, M. S., Edwards, W. T., & Anderson, K. O. (1993). Ethnocultural influences on variation in chronic pain perception. *Pain*, 52(1), 101-112. doi:10.1016/0304-3959(93)90120
- Beckes, L., Coan, J.A., & Hasselmo, K. (2012). Familiarity promotes the blurring of self and other in the neural representation of threat. *Social Cognition and Affective Neuroscience*, 8(6), 670-677. doi:10.1093/scan/nss046.
- Bernhardt, B. C., & Singer, T. (2012). The neural basis of empathy. *Annual review of neuroscience*, 35, 1-23. doi:10.1146/annurev-neuro-062111-150536
- Boulanger, A., Clark, A. J., Squire, P., Cui, E., & Horbay, G. L. A. (2007). Chronic pain in Canada: Have we improved our management of chronic noncancer pain? *Pain Research & Management: The Journal of the Canadian Pain Society*, 12(1), 39-47.
- Canadian Pain Society. Pain Fact Sheet. Retrieved from
http://www.canadianpainsociety.ca/pdf/pain_fact_sheet_en.pdf
- Cano, A., Miller, L. R., & Loree, A. (2009). Spouse beliefs about partner chronic pain. *Journal of Pain*, 10(5), 486-492. doi:10.1016/j.jpain.2008.11.005
- Chibnall, J. T., & Tait, R .C. (1995). Observer perceptions of low back pain: Effects of pain report and other contextual factors. *Journal of Applied Social Psychology*, 25(5), 418-439.
doi: 10.1111/j.1559-1816.1995.tb01597
- Chibnall J. T., & Tait R .C. (1999). Social and medical influences on attributions and evaluations of chronic pain. *Psychology & Health*, 14(4), 719-729. doi:10.1080/08870449908410760
- Cohen, J., Cohen, P., West, S. G., & Aiken L. S. (2003). Categorical or Nominal Independent Variables. In J. Cohen, P. Cohen, S.G. West, & L.S. Aiken (Eds.), *Applied Multiple*

- Regression/Correlation Analysis for Behavioral Sciences (3rd ed.)* (pp. 302-351). London, UK: Lawrence Erlbaum Associates.
- Cohen M., Quintner J., Buchanan D., Nielsen M., & Guy L. (2011). Stigmatization of patients with chronic pain: The extinction of empathy. *Pain Medicine, 12*, 1637-1643.
doi:10.1111/j.1526-4637.2011.01264.x
- Coll, M .P., Gregoire, M., Latimer, M., Eugene, F., & Jackson, P .L. (2011). Perception of pain in others: Implications for caregivers. *Pain Management, 1*(3), 257-265.
doi:10.2217/pmt.11.21
- Collins L. M, Graham J. W, & Flaherty B. P. (1998). An alternative framework for defining mediation. *Multivariate Behavioral Research, 33*, 295–312.
doi:10.1207/s15327906mbr3302_5
- Cook, R. D., & Weisberg, S. (1982). Assessment of Influence. In R.D. Cook & S. Weisberg (Eds.), *Residuals and influence in regression (Vol. 5)* (pp. 101-148). New York: Chapman and Hall.
- Cook, T. M., & Wang. J. L. (2010). Descriptive epidemiology of stigma against depression in a general population sample in Alberta. *BMC Psychiatry, 10*(1), 29. doi:10.1186/1471-244X-10-29
- Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist, 59*, 614 -625. doi: 10.1037/0003-066X.59.7.614
- Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of Health and Social Behavior, 44*(2), 162-179. <http://www.jstor.org/stable/1519806>
- Corrigan, P., Rowan, D., Green, A., Lundin, R., River, P., Uphoff-Wasowski, K., White, K., & Kubiak, M.A. (2002). Challenging two mental illness stigmas: Personal responsibility

- and dangerousness. *Schizophrenia Bulletin*, 28(2), 293-309.
- Corrigan, P., Thompson, V., Lambert, D., Sangster, Y., Noel, J.G. & Campbell, J. (2003) Perceptions of discrimination among persons with serious mental illness. *Psychiatric Services*, 54, 1105 -1110. doi:10.1176/appi.ps.54.8.1105
- Craig, K. D. (1999). Emotions and psychobiology. In P. Wall & R. Melzack (Eds.), *Textbook of Pain* (pp. 31-343). New York: Churchill Livingstone.
- Craig, K. D. (2009). The social communication model of pain. *Canadian Psychology*, 50(1), 22-32. doi:10.1037/a0014772
- Craig, K. D., Hyde, S. A., & Patrick, C. J. (1991). Genuine, suppressed and faked facial behavior during exacerbation of chronic low back pain. *Pain*, 46(2), 161-171. doi:10.1016/0304-3539
- 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, 101–108. doi:10.1016/j.jpain.2009.08.008.
- Cremeans-Smith, J. K., Stephens, M. A., Franks, M. M., Martire, L. M., Druley, J. A., & Wojno, W. C. (2003). Spouses' and physicians' perceptions of pain severity in older women with osteoarthritis: Dyadic agreement and patients' well-being. *Pain*, 106(1-2), 27-34. doi:10.1016/S0304-3959(03)00268-9
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog of Selected Documents in Psychology*, 10, 85.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44(1), 113-126. doi: 10.1037/0022-3514.44.1.113
- Davis, M. H. (1996). *Empathy: A social psychological approach*. Boulder: Westview Press.

- Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and cognitive neuroscience reviews*, 3(2), 71-100. doi:10.1177/1534582304267187
- Decety, J., & Moriguchi, Y. (2007). The empathic brain and its dysfunction in psychiatric populations: implications for intervention across different clinical conditions. *BioPsychoSocial Medicine*, 1(1), 22. doi:10.1186/1751-0759-1-22
- Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society. Series B (Methodological)*, 1-38. doi:10.2307/2984875
- Dersh, J., Polatin, P. B., & Gatchel, R. J. (2002). Chronic pain and psychopathology: Research findings and theoretical considerations. *Psychosomatic Medicine*, 64, 773–86. doi: 10.1097/01.PSY.0000024232.11538.54
- De Ruddere, L. D., Goubert, L., Prkachin, K. M., Stevens, M. A. L., Van Ryckeghem, D. M. L., & Crombez, G. (2011). When you dislike patients, pain is taken less seriously. *Pain*, 152(10), 2342-2347. doi:10.1016/j.pain.2011.06.028
- De Ruddere, L. D., Goubert, L., Stevens, M., Williams, A. C. D. C., & Crombez, G. (2013b). Discounting pain in the absence of medical evidence is explained by negative evaluation of the patient. *Pain*, 154(5), 669-76. doi:10.1016/j.pain.2012.12.018
- De Ruddere, L. D., Goubert, L., Vervoort, T., Kappesser, J., & Crombez, G. (2013a). The impact of being primed with social deception upon observer responses to others' pain. *Pain*, 154(2), 221-6. doi:10.1016/j.pain.2012.10.002
- De Ruddere, L. D., Goubert, L., Vervoort, T., Prkachin, K. M., & Crombez, G. (2012). We discount the pain of others when pain has no medical explanation. *The Journal of Pain*, 13(12), 1198-205. doi:10.1016/j.jpain.2012.09.002
- Descartes, R. (1644). *Lectures on the History of Physiology during the 16th, 17th and 18th*

- Centuries*. M Foster (Ed.). Cambridge: Cambridge University Press.
- De Vignemont, F., & Singer, T. (2006). The empathic brain: How, when and why? *Trends in cognitive sciences*, *10*(10), 435-441. doi:10.1016/j.tics.2006.08.008
- De Waal, F. B. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Review of Psychology*, *59*, 279-300. doi:10.1146/annurev.psych.59.103006.093625
- Edwards, L. C., Pearce, S. A., Turner-Stokes, & L., Jones, A. (1992). The pain beliefs questionnaire: An investigation of beliefs in the causes and consequences of pain. *Pain*, *51*(3), 267-72. doi:10.1016/0304-3959(92)90209-T
- Egede, L. E. (2006). Race, ethnicity, culture, and disparities in health care. *Journal of General Internal Medicine*, *21*(6), 667-669. doi: 10.1111/j.1525-1497.2006.0512.x
- Ekman, P., & Friesen, W. V. (1978). *Facial action coding system: A technique for the measurement of Facial Movement*. Palo Alto, CA: Consulting Psychologist Press
- Ekman, P., Sorenson, E. R., & Friesen, W. V. (1969). Pan-cultural elements in facial displays of emotion. *Science*, *164*(3875), 86-88. doi: 10.1126/science.164.3875.86
- Feldman, D. B., & Crandall, C. S. (2007). Dimensions of mental illness stigma: What about mental illness causes social rejection? *Journal of Social and Clinical Psychology*, *26*, 137-154. doi:10.1521/jscp.2007.26.2.137
- Field, A. (2009). *Discovering statistics using SPSS* (3rd Ed.) London, UK: Sage Publications Limited.
- Fishbain, D. A., Cutler, R., Rosomoff, H. L., & Rosomoff, R. S. (1997). Chronic pain-associated depression: Antecedent or consequence of chronic pain? A review. *The Clinical Journal of Pain*, *13*(2), 116-137. doi: 10.1097/00002508-199706000-00006
- Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*, *51*(1), 115-134.

- doi:10.1037/0022-0167.51.1.115
- Gagliese, L., & Katz, J. (2000). Medically unexplained pain is not caused by psychopathology. *Pain Research & Management*, 5(4), 251-257.
- Gatchel, R. J. (2004). Comorbidity of chronic pain and mental health disorders: The biopsychosocial perspective. *American Psychologist*, 59(8), 795-805. doi:10.1037/0003-066X.59.8.795
- Gleichgerrect, E., & Decety, J. (2013). Empathy in Clinical Practice: How Individual Dispositions, Gender, and Experience Moderate Empathic Concern, Burnout, and Emotional Distress in Physicians. *PLoS ONE*, 8(4), e61526.
doi: 10.1371/journal.pone.0061526
- Goffman, E. (1963). Stigma and Social Identity. In E. Goffman (Eds.) *Stigma: Notes on the Management of Spoiled Identity* (pp. 1-40). Englewood Cliffs, NJ: Prentice Hall.
- Goodall, C. E. (2011). An overview of implicit measures of attitudes: Methods, mechanisms, strengths, and limitations. *Communication Methods and Measures*, 5(3), 203-222.
doi:10.1080/19312458.2011.596992
- Goubert, L., Craig, K. D., & Buysse, A., (2009). Perceiving others in pain: Experimental and clinical evidence on the role of empathy. In J. Decety & W. Ickes, (Eds.), *The Social Neuroscience of Empathy* (pp. 153–165). Cambridge: MIT press.
- Goubert, L., Craig, K. D., Vervoort, T., Morley, S., Sullivan, M. J., de, C. W. A. C., Cano, A., & Crombez, G. (2005). Facing others in pain: The effects of empathy. *Pain*, 118(3), 285–288. doi:10.1016/j.pain.2005.10.025
- Graves, R. E., Cassisi, J. E., & Penn, D. L. (2005). Psychophysiological evaluation of stigma towards schizophrenia. *Schizophrenia Research*, 76(2), 317-327.
doi:10.1016/j.schres.2005.02.003

- Green, A. D., Tripp, D. A., Sullivan, M. J. L., & Davison, M. (2009). The relationship between empathy and estimates of observed pain. *Pain Medicine, 10*, 381-392. doi:10.1111/j.1526-4637.2009.00563.x
- Grossman, M., & Wood, W. (1993). Sex differences in intensity of emotional experience: A social role interpretation. *Journal of Personality and Social Psychology, 65*, 1010-1010. doi: 10.1037/0022-3514.65.5.1010
- Hadjistavropoulos, T., & Craig, K.D. (2002). A theoretical framework for understanding self-report and observational measures of pain: A communication model. *Behaviour Research and Therapy, 40*(5), 551-570. doi:10.1016/S0005-7967(01)00072-9
- Hadjistavropoulos, T. & Craig, K.D., & Fuchs-Lacelle, S. (2004). Social Influences and the Communication of Pain In T. Hadjistavropoulos & K.D. Craig (Eds.), *Pain: Psychological Perspectives* (pp.87-112). New York, NY: Lawrence Erlbaum.
- Hadjistavropoulos, T., Craig, K. D., Duck, S., Cano, A., Goubert, L., Jackson, P. L., Mogil, J. S., Rainville, P., Sullivan, M. J. L., de C Williams, A. C., Vervoort, T., & Fitzgerald, T. D. (2011). A biopsychosocial formulation of pain communication. *Psychological Bulletin, 137*(6), 910-939. doi:10.1037/a0023876
- Hadjistavropoulos, H. D., Craig, K. D., Hadjistavropoulos, T., & Poole, G. D. (1996). Subjective judgments of deception in pain expression: Accuracy and errors. *Pain, 65*(2), 251-258. doi:10.1016/0304-3959(95)00218-9
- Hammal, Z., & Cohn, J.F. (2012). Automatic detection of pain intensity. International Conference on Multimodal Interaction, Santa Barbara: CA.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Henningsen, P., Zimmermann, T., & Sattel, H. (2003). Medically unexplained physical

- symptoms, anxiety, and depression: a meta-analytic review. *Psychosomatic medicine*, 65(4), 528-533. doi:10.1097/01.PSY.0000075977.90337.E7
- Hert, M., Correll, C.U., Bobes, J., Cetkovich-Bakmas, M., Cohen, D., Asai, I., Detraux, J., Gautam, S., Moller, H.J., Ndetel, D.M., Newcomber, J.W., Uwakwe, R., Leucht, S. (2011). Physical illness in patients with severe mental disorders. II. Barriers to care, monitoring and treatment guidelines, plus recommendations at the system and individual level. *World Psychiatry*, 10(1), 52-77. doi: 10.1002/j.2051-5545.2011.tb00036.x
- Hill, M. L., & Craig, K. D. (2002). Detecting deception in pain expressions: The structure of genuine and deceptive facial displays. *Pain*, 98(1), 135-144. doi: 10.1016/S0304-3959(02)00037-4
- Hofle, M., Hauck, M., Engel, A. K., & Senkowski, D. (2012). Viewing a needle pricking a hand that you perceive as yours enhances unpleasantness of pain. *Pain*, 153(3), 1074-81. doi:10.1016/j.pain.2012.02.010.
- Holmbeck, G. N. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology*, 65(4), 599-610. doi: 10.1037/0022-006X.65.4.599
- Hughes, R., & Huby, M. (2002). The application of vignettes in social and nursing research. *Journal of Advanced Nursing*, 37(4), 382-386. doi:10.1046/j.1365-2648.2002.02100.x
- Institute of Medicine of the National Academies. *Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research*. Retrieved from <http://www.iom.edu/Reports.aspx>
- International Association for the Study of Pain. Retrieved from <http://www.iasp-pain.org/>

International Association for the Study of Pain. Taxonomy. Retrieved from http://www.iasp-pain.org/AM/Template.cfm?Section=Pain_Definitions

Ishibashi, N. (2005). Barrier or bridge? The language of diagnosis in clinical social work. *Smith College Studies in Social Work, 75*(1), 65-80. doi:10.1300/J497v75n01_01

Joachim, G., & Acorn, S. (2000). Stigma of visible and invisible chronic conditions. Joachim, G., & Acorn, S. (2000). Stigma of visible and invisible chronic conditions. *Journal of Advanced Nursing, 32*(1), 243-8. doi: 10.1046/j.1365-2648.2000.01466.x.
(1), 243-8. doi: 10.1046/j.1365-2648.2000.01466.x.

Jorm, A. F., Mackinnon, A., Christensen, H., & Griffiths, K. M. (2005). Structure of beliefs about the helpfulness of interventions for depression and schizophrenia. *Social Psychiatry and Psychiatric Epidemiology, 40*(11), 877-883. doi:10.1007/s00127-005-0991-x

Kállai, I., Barke, A., & Voss, U. (2004). The effects of experimenter characteristics on pain reports in women and men. *Pain, 112*(1), 142-147. doi:10.1016/j.pain.2004.08.008

Kappesser, J., & Williams, A. C. D. C. (2008). Pain judgments of patients' relatives: Examining the use of social contract theory as theoretical framework. *Journal of Behavioral Medicine, 31*(4), 309-317. doi:10.1007/s/10865-008-9157-4

Kappesser, J., Williams, A. C. D. C., Prkachin, K. M. (2006). Testing two accounts of pain underestimation. *Pain, 124*(1-2), 109-16. doi:10.1016/j.pain.2006.04.003

Keefe, F. J., Lumley, M., Anderson, T., Lynch, T., Studts, J. L., & Carson, K. L. (2001). Pain and emotion: New research directions. *Journal of Clinical Psychology, 57*(4), 587-607. doi:10.1002/jclp.1030

Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. *The Handbook of Social Psychology, 1*(4), 233-265.

- Kroenke, K. (2003a). The interface between physical and psychological symptoms. *Journal of Clinical Psychiatry*, 5(7), 11-18.
- Kroenke, K. (2003b). Patients presenting with somatic complaints: Epidemiology, psychiatric co-morbidity and management. *International Journal of Methods in Psychiatric Research*, 12(1), 34-43. doi:10.1002/mpr.140
- Kroenke, K., Spitzer, R. L., Williams, J. B., Linzer, M., Hahn, S. R., & Brody, D. (1994). Physical symptoms in primary care: Predictors of psychiatric disorders and functional impairment. *Archives of family medicine*, 3(9), 774-9. doi:10.1001/archfami.3.9.774
- Lamm, C., Decety, J., & Singer, T. (2011). Meta-analytic evidence for common and distinct neural networks associated with directly experienced pain and empathy for pain. *Neuroimage*, 54(3), 2492-2502. doi:10.1016/j.neuroimage.2010.10.014
- Lamm, C., Meltzoff, A.N., & Decety, J. (2010). How do we empathize with someone who is not like us? A functional magnetic resonance imaging study. *Journal of Cognitive Neuroscience*, 22(2), 362-376. doi: 10.1162/jocn.2009.21186
- Lauber, C., Falcato, L., Nordt, C., & Rössler, W. (2003). Lay beliefs about causes of depression. *Acta Psychiatrica Scandinavica*, 108(s418), 96-99. doi:10.1034/j.1600-0447.108.s418.19.x
- Lauber, C., Nordt, C., Braunschweig, C., & Rössler, W. (2006). Do mental health professionals stigmatize their patients? *Acta Psychiatrica Scandinavica*, 113(s429), 51-59. doi:10.1111/j.1600-0447.2005.00718.x
- Lehman, A. J., Pratt, D. D., DeLongis, A., Collins, J. B., Shojanian, K., Koehler, B., Offer, R., & Esdaile, J. M. (2011). Do spouses know how much fatigue, pain, and physical limitation their partners with rheumatoid arthritis experience? Implications for social support. *Arthritis Care & Research*, 63(1), 120-127. doi:10.1002/acr.20330.

- Lepine, J.P., Briley, M. (2004). The epidemiology of pain in depression. *Human Psychopharmacology: Clinical & Experimental*, 19(1), S3-7. doi:10.1002/hup.618
- Link, B. G. (1987). Understanding labeling effects in the area of mental disorders: An assessment of the effects of expectations of rejection. *American Sociological Review*, 52, 96–112. doi: 10.2307/2095395
- Link, B. G., Cullen, F. T., Struening, E. L., Shrout, P. E., & Dohrenwend, B. P. (1989). A modified labeling theory approach in the area of mental disorders: An empirical assessment. *American Sociological Review*, 54, 100-123. doi:10.2307/2095613
- Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology*, 27, 363-385. doi:10.1146/annurev.soc.27.1.363
- Link, B. G., & Phelan, J. C. (2010). Labeling and Stigma. In T.L. Scheid & T.N. Brown (Eds.), *A handbook for the study of mental health: Social contexts, theories, and systems*. (pp. 571-587). New York: Cambridge University Press.
- Link, B. G., Phelan, J. C., Bresnahan, M., Stueve, A., & Pescosolido, B. A. (1999). Public conceptions of mental illness: Labels, causes, dangerousness, and social distance. *American Journal of Public Health*, 89(9), 1328-1333. doi: 10.1177/1468017308101818
- Link, B. G., Struening, E. L., Rahav, M., Phelan, J. C., & Nuttbrock, L. (1997). On stigma and its consequences: Evidence from a longitudinal study of men with dual diagnoses of mental illness and substance abuse. *Journal of Health and Social Behavior*, 38(2), 177-190.
- Link, B. G., Yang, L. H., Phelan, J. C., & Collins, P. Y. (2004). Measuring mental illness stigma. *Schizophrenia Bulletin*, 30(3), 511-541.
- Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83(404), 1198-1202.

- doi:10.1080/01621459.1988.10478722
- Loggia, M. L., Mogil, J. S., & Bushnell, M. C. (2008). Empathy hurts: Compassion for another increases both sensory and affective components of pain perception. *Pain, 136*, 168-176.
doi:10.1016/j.pain.2007.07.017
- Looper, K. J., & Kirmayer, L. J. (2004). Perceived stigma in functional somatic syndromes and comparable medical conditions. *Journal of Psychosomatic Research, 57*(4), 373-378.
doi:10.1016/j.jpsychores.2004.03.005
- Lucey, P., Cohn, J. F., Prkachin, K. M., Solomon, P. E., & Matthews, I. (2011, March). Painful data: The UNBC-McMaster shoulder pain expression archive database. In *Automatic Face & Gesture Recognition and Workshops (FG 2011), 2011 IEEE International Conference on* (pp. 57-64).
- Lumley, M. A., Cohen, J. L., Borszcz, G. S., Cano, A., Radcliffe, A. M., Porter, L. S., Schubiner, H. & Keefe, F. J. (2011), Pain and emotion: A biopsychosocial review of recent research. *Journal of Clinical Psychology, 67*, 942–968. doi:10.1002/jclp.20816
- Lynch, M. E., Schopflocher, D., Taenzer, P., & Sinclair, C. (2009). Research funding for pain in Canada. *Pain Research and Management, 14*(2), 113-115.
- MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1*(4), 173-181.
doi:10.1023/A:1026595011371.
- MacKinnon, D. P., & Luecken, L. J. (2008). How and for whom? Mediation and moderation in health psychology. *Health psychology: Official Journal of the Division of Health Psychology, American Psychological Association, 27*(S2), S99. doi:10.1037/0278-6133.27.2
- MacLeod, F. K., LaChapelle, D. L., Hadjistavropoulos, T., & Pfeifer, J. E. (2001). The effect of

- disability claimants' coping styles on judgments of pain, disability, and compensation: A vignette study. *Rehabilitation Psychology*, 46, 417–435. doi:10.1037/0090-5550.46.4.417
- Martel, M. O., Thibault, P., Roy, C., Catchlove, R., & Sullivan, M. J. L. (2008). Contextual determinants of pain judgments. *Pain*, 139(3), 562-568. doi:10.1016/j.pain.2008.06.010
- McBeth, J., Macfarlane, G. J., & Silman, A. J. (2002). Does chronic pain predict future psychological distress? *Pain*, 96(3), 239-45. doi:10.1016/S0304-3959(01)00452-3
- McCracken, L. M. (2005). Social context and acceptance of chronic pain: The role of solicitous and punishing responses. *Pain*, 113, 155–159. doi:10.1016/j.pain.2004.10.004
- McGrath, P. A. (1994). Psychological aspects of pain perception. *Archives of Oral Biology*, 39, S55-S62. doi:10.1016/0003-9969(94)90189-9
- McCluskey, S., Brooks, J., King, N., & Burton, K. (2011). The influence of significant others' on persistent back pain and work participation: A qualitative exploration of illness perceptions. *BMC Musculoskeletal Disorders*, 12(1), 236. doi:10.1186/1471-2474-12-236
- McDivitt, K. E., Turcotte, K., Jassi, A., Holtzman, S. (2013). Pain as a social phenomenon: Does attachment style influence pain perception in others? *Annals of Canadian Psychology Supplement*. 54(2A), 137.
- McWilliams, L. A., & Asmundson, G. J. (2007). The relationship of adult attachment dimensions to pain-related fear, hypervigilance, and catastrophizing. *Pain*, 127(1-2), 27-34. doi:10.1016/j.pain.2006.07.020
- Meana, M. Binik, Y. M., Khalife, S., & Cohen, D. (1999). Psychosocial correlates of pain attributions in women with dyspareunia. *Psychosomatics*, 40(6), 497-502. doi:10.1016/S0033-3182(99)71188-6
- Means-Christensen, A. J., Roy-Byrne, P. P., Sherbourne, C. D., Craske, M. G., & Stein, M. B.

- (2007). Relationships among pain, anxiety, and depression in primary care. *Depression and Anxiety, 1*, 1-8. doi: 10.1002/da.20342
- Melzack, R., & Katz, J. (1999). Pain Management in Persons in Pain. In: Wall PD, Melzack, R. (Eds). Textbook of Pain. Edinburgh: Churchill Livingstone.
- Melzack, R., & Wall, P. D. (1965). Pain mechanisms: a new theory. *Science, 150*, 971-9.
- Michaels, P.J., Corrigan, P.W. (2013). Measuring mental illness stigma with diminished social desirability effects. *Journal of Mental Health, 22*(3), 218-26.
doi:10.3109/09638237.2012.734652
- Miaskowski, C., Zimmer, E. F., Barrett, K. M., Dibble, S. L., & Wallhagen, M. (1997). Differences in patients' and family caregivers' perceptions of the pain experience influence patient and caregiver outcomes. *Pain, 72*(1), 217-226. doi.org/10.1016/S0304-3959(97)00037-7
- Moulin, D., A. J. Clark, Speechley, M., & Morley-Forster, P. K. (2002). Chronic pain in Canada, prevalence, treatment, impact and the role of opioid analgesia. *Pain Research and Management, 7*, 179-184.
- Pennebaker, J. W., Chung, C. K., Ireland, M., Gonzales, A., & Booth, R. J. (2007). The development and psychometric properties of LIWC2007. *Austin, TX, LIWC. Net.*
- Perreault, K., & Dionne, C. E. (2006). Does patient-physiotherapist agreement influence the outcome of low back pain? A prospective cohort study. *BMC Musculoskeletal Disorders, 7*, 76. doi:10.1186/1471-2474-7-76
- Pescosolido, B.A., Martin, J.K., Long, J.S., Medin, T.R., Phelan, J.C., & Link, B.G. (2010). "A disease like any other"? A decade of change in public reactions to schizophrenia, depression, and alcohol dependence. *The American Journal of Psychiatry, 167*(11), 1321-1330. doi: 10.1176/appi.ajp.2010.09121743

- Peters, M. L., & Vancleef, L. M. G. (2008). The role of personality traits in pain perception and disability. *Reviews in Analgesia*, *10*, 11-21.
- Pons, T., Shipton, E., & Mulder, R. (2012). The Relationship between Beliefs about Pain and Functioning with Rheumatologic Conditions. *Rehabilitation Research and Practice*, *2012*, 1-9. doi:10.1155/2012/206263
- Poole, G. D. & Craig, K. D. (1992). Judgments of genuine, suppressed, and faked facial expressions of pain. *Journal of Personality and Social Psychology*, *63*(5), 797-805. doi: 10.1037/0022-3514.63.5.797
- Prkachin, K. M. (2009). Assessing pain by facial expression: facial expression as nexus. *Pain Research and Management*, *14*(1), 53-8.
- Prkachin, K. M., & Solomon, P.E. (2008). The structure, reliability, and validity of pain expression: Evidence from patients with shoulder pain. *Pain*, *139*(2), 267-74. doi:10.1016/j.pain.2008.04.010
- Qualtrics. Retrieved from <http://www.qualtrics.com/>
- Quince, T., Parker, R., Wood, D., & Benson, J. (2011). Stability of empathy among undergraduate medical students: A longitudinal study at one UK medical school. *BMC medical education*, *11*(1), 90. doi:10.1186/1472-6920-11-90
- Rao, D., Choi, S. W., Victorson, D., Bode, R., Peterman, A., Heinemann, A., & Cella, D. (2009). Measuring stigma across neurological conditions: the development of the stigma scale for chronic illness (SSCI). *Quality of Life Research*, *18*(5), 585-595. doi:10.1007/s11136-009-9475-1
- Redinbaugh, E. M., Baum, A., Demoss, C., Fello, M., & Arnold, R. (2002). Factors associated with the accuracy of family caregiver estimates of patient pain. *Journal of Pain Symptom Management*, *23*, 31-8. doi:10.1016/S0885-3924(01)00372-4

- Robinson, M. E., Riley III, J. L., Myers, C. D., Papas, R. K., Wise, E. A., Waxenberg, L. B., & Fillingim, R. B. (2001). Gender role expectations of pain: Relationship to sex differences in pain. *The Journal of Pain, 2*(5), 251-257. doi:10.1054/jpai.2001.24551
- Robinson, M. E., & Wise, E. A. (2003). Gender bias in the observation of experimental pain. *Pain, 104*(1), 259-264. doi:10.1016/S0304-3959(03)00014-9
- Robinson, M. E., & Wise, E. A. (2004). Prior pain experience: Influence on the observation of experimental pain in men and women. *The Journal of Pain, 5*(5), 264-269. doi: 10.1016/j.jpain.2004.04.003
- Rosenfield, S. (1997). Labeling mental illness: The effects of received services and perceived stigma on life satisfaction. *American Sociological Review, 62*, 660-672. doi: 10.2307/2657432.
- Rosenthal, R. (1982). Conducting judgment studies. In K. Scherer & P. Ekman (Eds.), *Handbook of Methods in Nonverbal Behavior Research* (pp. 287-361). New York: Cambridge University Press.
- Roth, D. L., Haley, W. E., Wadley, V. G., Clay, O. J., & Howard, G. (2007). Race and gender differences in perceived caregiver availability for community-dwelling middle-aged and older adults. *The Gerontologist, 47*(6), 721-729. doi: 10.1093/geront/47.6.721
- Rusch, N., Angermeyer, M. C., & Corrigan, P. W. (2005). Mental illness stigma: Concepts, consequences, and initiatives to reduce stigma. *European Psychiatry, 20*(8), 529-539. doi:10.1016/j.eurpsy.2005.04.004
- Saarela, M. V., Hlushchuk, Y., Williams, A. C. D. C., Schürmann, M., Kalso, E., & Hari, R. (2007). The compassionate brain: humans detect intensity of pain from another's face. *Cerebral Cortex, 17*(1), 230-237. doi:10.1093/cercor/bhj141
- Salmon, P., Ring, A., Dowrick, C.F., & Humphries, G.M. (2005). What do general practice

- patients want when they present with medically unexplained symptoms, and why do their doctors feel pressured? *Journal of Psychosomatic Research*, 59, 255-260.
doi:10.1016/j.jpsychores.2005.03.004
- Scheff, T. J. (1966). *Being Mentally Ill: A Sociological Theory*. Chicago: Aldine.
- Scheff, T. J. (1974). The labeling theory of mental illness. *American Sociological Review*, 39, 444-52.
- Schomerus, G., Matschinger, H., & Angermeyer, M. C. (2006). Public beliefs about the causes of mental disorders revisited. *Psychiatry research*, 144(2), 233-236.
doi.org/10.1016/j.psychres.2006.05.002
- Schopflocher, D., R. Taenzer, P., & Jovey, R. (2011). The Burden of Pain in Canada. *Pain Research Management*, 16(6), 445-450.
- Shaw, I. (2002). How lay are lay beliefs? *Health (London)*, 6, 287-299.
doi:10.1177/136345930200600302
- Shieh, G. (2009). Detecting interaction effects in moderated multiple regression with continuous variables power and sample size considerations. *Organizational Research Methods*, 12(3), 510-528. doi:10.1177/1094428108320370
- Singer, T., Seymour, B., O'Doherty, J., Kaube, H., Dolan, R. J., & Frith, C. D. (2004). Empathy for pain involves the affective but not sensory components of pain. *Science*, 303(5661), 1157-1162. doi:10.1126/science.1093535
- Singer, T., Seymour, B., O'Doherty, J. P., Stephan, K. E., Dolan, R. J., & Frith, C. D. (2006). Empathic neural responses are modulated by the perceived fairness of others. *Nature*, 439(7075), 466-469. doi:10.1038/nature04271
- Sloan, T. J., Gupta, R., Zhang, W., & Walsh, D. A. (2008). Beliefs about the causes and consequences of pain in patients with chronic inflammatory or non-inflammatory low

- back pain and in pain-free individuals. *Spine*, 33(9), 966-972.
doi:10.1097/BRS.0b013e31816c8ab4.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological methods*, 7(4), 422-445. doi: 10.1037/1082-989X.7.4.422
- Stier, A., & Hinshaw, S.P. (2007). Explicit and Implicit Stigma Against Individuals With Mental Illness. *Australian Psychologist*, 42(2), 106-117. doi:10.1371/journal.pone.0046016
- Stone A.M., & Merlo, L.J. (2011). Attitudes of college students towards mental illness stigma and the misuse of psychiatric medications. *Journal of Clinical Psychiatry*, 72(2), 134-139. doi:10.4088/JCP.09m05254ecr
- Sullivan, M. J. L., Martel, M. O., Savard, A., & Crombez, G. (2006). The relation between catastrophizing and the communication of pain experience. *Pain*, 122, 282-288. doi:10.1016/j.pain.2006.02.001
- Tabachnick, B. G., & Fidell, L. S. (2001). Organizing, Describing, and Screening Data. In B.G. Tabachnick, & L.S. Fidell (Eds.) *Computer-assisted research design and analysis*. Boston, MS: Allyn and Bacon.
- Tabachnick, B. G., & Fidell, L. S. (2007). Multilevel linear modeling. In B.G. Tabachnick, & L.S. Fidell (Eds.), *Using multivariate statistics, Fifth Edition* (pp. 781-857). Boston, MS: Pearson.
- Tait, R.C. (2013). Pain assessment- An exercise in social judgment. *Pain*, 154(5), 625-626. doi: 10.1016/j.pain.2013.02.010.
- Tait, R. C., & Chibnall, J. T. (1994). Observer perceptions of chronic low back pain. *Journal of Applied Social Psychology*, 24(5), 415-431. doi:10.1111/j.1559-1816.1994.tb00590.x
- Tait, R. C., & Chibnall, J. T. (1997). Physician judgments of chronic pain patients. *Social Science*

- & *Medicine*, 45(8), 1199-1205. doi:10.1016/S0277-9536(97)00033-6
- Tait, R. C., Chibnall, J. T., & Kalauokalani, D. (2009). Provider judgments of patients in pain: Seeking symptom certainty. *Pain Medicine*, 10(1), 11-34. doi: 10.1111/j.1526-4637.2008.00527.x
- Thomas, K. S., McIlvane, J. M., & Haley, W. E. (2012). Effects of diagnostic label and disease information on emotions, beliefs, and willingness to help older parents with osteoarthritis. *Educational Gerontology*, 38(5), 314-327. doi:10.1080/03601277.2010.544599
- Tunks, E. R., Crook, J., & Weir, R. (2008). Epidemiology of chronic pain with psychological comorbidity: prevalence, risk, course, and prognosis. *Canadian Journal of Psychiatry*, 53(4), 224-234.
- Turk, D. C., & Melzack, R. (Eds.). (2010). Self-Report Measures of Pain. In D.C. Turk & R. Melzack (Eds.), *Handbook of pain assessment* (pp. 3-19). New York, NY: Guilford Press.
- Turk, D. C., & Okifuji, A. O. (2002). Psychological factors in chronic pain: Evolution and revolution. *Journal of Consulting and Clinical Psychology*, 70, 678–690.
doi: 10.1037//0022-006X.70.3.678
- Unruh, A. M. (1996). Gender variations in clinical pain experience. *Pain*, 65(2), 123-167.
doi:10.1016/0304-3959(95)00214-6
- Van Brakel, W. H. (2006). Measuring health-related stigma—a literature review. *Psychology, Health & Medicine*, 11, 307–334. doi: 10.1080/13548500600595160
- Villemure, C., & Bushnell, M.C. (2002). Cognitive modulation of pain: How do attention and emotion influence pain processing? *Pain*, 95(3), 195-199.
- Wandner, L. D., Scipio, C. D., Hirsh, A. T., Torres, C. A., & Robinson, M. E. (2012). The perception of pain in others: How gender, race, and age influence pain expectations. *The Journal of Pain*, 13(3), 220-227. doi:10.1016/j.jpain.2011.10.014

- Weiner, B. (1980). A cognitive (attribution)—emotion—action model of motivated behavior: An analysis of judgments of help-giving. *Journal of Personality and Social Psychology*, 39(2), 186-200. doi: 10.1037/0022-3514.39.2.186
- Weiner, B. (1995). Responsibility and Stigmatization. In B. Weiner (Eds.), *Judgments of responsibility: A foundation for a theory of social conduct*. (pp. 53-84). New York, NY: Guilford Press.
- Wells, N., Hepworth, J.T., Murphy, B.A., Wujcik, D., & Johnson, R. (2003). Improving cancer pain management through patient and family education. *Journal of Pain and Symptom Management*, 25(4), 244-356.
- Williams, A. C. (2002). Facial expression of pain: An evolutionary account. *Behavioral and Brain Sciences*, 25, 439-455; discussion 455-488. doi:10.1017/S0140525X02000080
- Williams, L. J., Jacka, F. N., Pasco, J. A., Dodd, S. & Berk, M. (2006). Depression and pain: An overview. *Acta Neuropsychiatrica*, 18, 79–87. doi:10.1111/j.1601-5215.2006.00130.x
- Wright, A., Jorm, A. F., & Mackinnon, A. J. (2011). Labeling of mental disorders and stigma in young people. *Social Science & Medicine*, 73, 498-506. doi:10.1007/s00127-006-0156-x

Appendix A

Consent Form

Study Title: 'How do we perceive pain in others?'

Principal Investigator: **Dr. Susan Holtzman** (250) 807-8730
Assistant Professor, Dept. of Psychology, UBC Okanagan
Contact: susan.holtzman@ubc.ca

Co-Investigator: **Kara Turcotte**
MA student, Dept. of Psychology, UBC Okanagan

Sponsor: This work is supported by an award from the Social Sciences and Humanities Research Council.

You are being asked to take part in a research study that is aiming to better understand the perception of others in a health care setting. This research is a component of the co-investigator's Master's thesis in Psychology at UBC Okanagan. Results obtained from this study may be presented at scholarly conferences and/or published in peer-reviewed journals.

What is the purpose of this study? The main goal of this study is to understand the factors that influence the perception of others in a health care setting.

What am I being asked to do? Following this consent form, you will be asked to **view** four short silent video clips, **read** attached medical history charts, and complete an **online questionnaire**. The questionnaire asks your opinion regarding others in a health context as well as answer questions about aspects of yourself. The questionnaire will take approximately **45 minutes** to complete. Once you have completed your questionnaire, you will be provided with a confirmation number that you will e-mail to us along with your student number in order to receive your SONA participation credits.

Will I be compensated for participating? You will be awarded 1.0 SONA participation credits for participating in this study.

What are the risks of participating? There is a small chance that you will feel distressed by some aspects of this study. For example, you will be asked to view short video clips of adults experiencing shoulder pain and to answer questions about your personality and wellbeing. If you feel any distress as a result of taking part in this study, please feel free to Dr. Susan Holtzman. The investigators of this research will be happy to provide appropriate referrals to community resources if needed. Furthermore, please remain aware that you have the right not to answer any questions you feel uncomfortable answering and you may withdraw from this study at any time.

What are the benefits of participating? There will likely be no direct benefit from participating in this study. However, information obtained from this study may help to increase the current scientific understanding regarding the importance of relationships with others in a health context.

Will my information be kept confidential? All information obtained during this study will be kept strictly confidential. You will be identified on all study-related documents by randomly assigned study numbers only. No names or identifying information will appear on any study records or be used in any publications or presentations of the study results. No identifying information will be transferred outside of a secure location on the UBCO campus and documentation will be shredded after 7 years of being securely stored.

This online survey is hosted by Qualtrics, a websurvey company located in the USA. Similar to websurvey companies such as SurveyMonkey, Qualtrics is subject to the U.S. Patriot Act, which allows authorities access to the records of internet service providers. This survey or questionnaire does not ask for personal identifiers or any information that may be used to identify you. The websurvey company servers record incoming IP addresses or the computer that you use to access the survey but no connection is made between your data and your computer's IP address. If you choose to participate in the survey, you understand that your responses to the survey questions will be stored and accessible in the U.S. according to this Act. The security and privacy policy for the websurvey company can be found at the following link:
<http://www.qualtrics.com/privacy-statement>

Once the data collection phase is complete, all survey data will be transferred to Dr. Holtzman's password protected computer. The data will only be available to the study investigator and trained research assistants for the purposes of analyses. At the completion of the study, the survey data will be stored on Dr. Holtzman's password protected computer in a secure UBC Okanagan office, and on a password protected CD in a locked filing cabinet in a secure UBC Okanagan office.

Can I say 'no'? Your participation in this study is completely voluntary, and you can choose to withdraw from the study at any time. Withdrawal from the study or refusal to participate will not affect your class work in any way.

What if I have any questions about the study? If you have any general questions about the study, please contact the principal investigator Dr. Holtzman at (250) 807-8730.

If you have any concerns about your treatment or rights as a research subject, you may contact the research subject information line in the UBC office of research services at 1 877-822-8598 or the UBC Okanagan research services office at 250-807-8832.

Mental Health Resources

The following resources are available to you (for free) should you need them:

-24 hour crisis line (Kelowna 250-763-9191)

-24 hour mental health information line (pre recorded information 1 800-661-2121)

Consent

By clicking 'next' on the computer screen I am indicating that I have had the opportunity to discuss this study and I have had my questions answered to my satisfaction. I understand that I may withdraw from this study at any time, and I voluntarily consent to participate in this study.

Appendix B

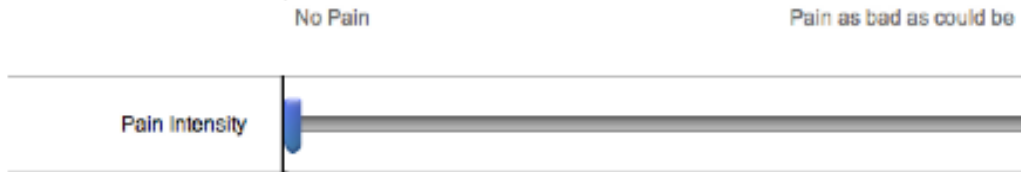
Research Vignettes

Participant	Control Condition	Experimental Condition
Linda Piper	<p>Personal Profile: Patient Name: Linda Piper Gender: Female Age: 58 Height: 5'6 Weight: 129 lbs. History and Physical Conducted by: MD Chief Complaint (CC): Shoulder pain History of present illness (HPI): Mrs. Piper is a 58-year-old Caucasian female. She has been referred for evaluation of shoulder pain with radiation to the right wrist. The pain began about 1.5 years ago. Mrs. Piper was doing home repairs when she fell off of a ladder. Mrs. Piper has reported shoulder pain since the accident and has missed work sporadically as a result of the subsequent pain. Mrs. Piper has undergone extensive diagnostic testing and is awaiting the results of the most recent electrodiagnostic studies to indicate the presence of nerve damage. Psychiatric History: Mrs. Piper does not suffer from any past or present mental health problems.</p>	<p>Personal Profile: Patient Name: Linda Piper Gender: Female Age: 58 Height: 5'6 Weight: 129 lbs. History and Physical Conducted by: MD Chief Complaint (CC): Shoulder pain History of present illness (HPI): Mrs. Piper is a 58-year-old Caucasian female. She has been referred for evaluation of shoulder pain with radiation to the right wrist. The pain began about 1.5 years ago. Mrs. Piper was doing home repairs when she fell off of a ladder. Mrs. Piper has reported shoulder pain since the accident and has missed work sporadically as a result of the subsequent pain. Mrs. Piper has undergone extensive diagnostic testing and is awaiting the results of the most recent electrodiagnostic studies to indicate the presence of nerve damage. Psychiatric History: Mrs. Piper was recently diagnosed with a mood disorder called major depression.</p>
Michael Weatherby	<p>Personal Profile: Patient Name: Michael Weatherby Gender: Male Age: 58 Height: 5'9 Weight: 175 lbs. History and Physical Conducted by: MD Chief Complaint (CC): Shoulder pain History of present illness (HPI): Mr. Weatherby is a 58-year-old Caucasian male. He has been referred for evaluation of shoulder pain with radiation to the right upper arm. The pain began about 2 years ago. Mr. Weatherby was walking in the winter in his neighborhood and slipped and fell on ice. Mr. Weatherby has reported shoulder pain since the accident and has missed work as a result of the subsequent pain. Mr. Weatherby has undergone extensive diagnostic testing yet electrodiagnostic tests are negative for nerve damage. Psychiatric History: Mr. Weatherby does not suffer from any past or present mental health problems.</p>	<p>Personal Profile: Patient Name: Michael Weatherby Gender: Male Age: 58 Height: 5'9 Weight: 175 lbs. History and Physical Conducted by: MD Chief Complaint (CC): Shoulder pain History of present illness (HPI): Mr. Weatherby is a 58-year-old Caucasian male. He has been referred for evaluation of shoulder pain with radiation to the right upper arm. The pain began about 2 years ago. Mr. Weatherby was walking in the winter in his neighborhood and slipped and fell on ice. Mr. Weatherby has reported shoulder pain since the accident and has missed work as a result of the subsequent pain. Mr. Weatherby has undergone extensive diagnostic testing yet electrodiagnostic tests are negative for nerve damage. Psychiatric History: Mr. Weatherby was recently diagnosed with a mood disorder called major depression.</p>

Appendix C

Pain Ratings

What is the pain intensity this individual experienced?



The individual is experiencing psychological distress

1 Strongly Disagree 2 3 4 5 6 7 Strongly Agree

The pain is genuine

1 Strongly Disagree 2 3 4 5 6 7 Strongly Agree

The pain is attributable to psychological factors

1 Strongly Disagree 2 3 4 5 6 7 Strongly Agree

The pain is attributable to physical factors

1 Strongly Disagree 2 3 4 5 6 7 Strongly Agree

Appendix D

Manipulation Check

Based on the medical case history and short video you viewed previously please answer the following questions:

- What is this patient's name?
- How was this patient injured?
- Was this patient diagnosed with a mental illness?

Please write any thoughts, comments, or opinions you have about the participant in this section: