PAIN COMMUNICATION IN ETHNICALLY CONCORDANT AND DISCORDANT
DYADS

By

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Abstract

While ethnicity is often regarded as a factor in pain experience and expression, ethnic pain research has almost exclusively focused on the *intrapersonal* dimension of the pain experience and failed to recognize the complex *interpersonal* nature of the pain experience. The Sociocommunications Model of Pain (Craig, 2009; Hadjistavropoulos & Craig, 2002; Hadjistavropoulos, Craig, & Fuchs-Lacelle, 2004) states that pain behaviours serve as both expressions of the inner experience and communications to other people, and the observer must take into account the social contexts in which the pain expression and report occur. Research in the recent decade has documented reliable evidence that ethnic minorities suffer disproportionately from undertreatment of pain compared to nonminority, but studies examining factors that contribute to such disparities have seldom directly considered the sociocultural context in which the pain experience and assessment take place. This dissertation has two studies. The primary objective of Study 1 is to compare pain report and behaviours in an ethnically concordant versus discordant environment. The primary objective of Study 2 is to investigate the impact of ethnic concordance on the accuracy of observer’s assessment of pain. The Chinese ethnic group was chosen as the focus of the present research because it is the largest ethnic group in Canada and also this group has received little attention in ethnic pain research. Overall, results indicate that ethnic concordance between the person in pain and the observer would influence the sufferer’s pain expression and the observer’s pain assessment. The findings support the Sociocommunications Models of Pain and suggest the importance of considering the interpersonal dimension of the pain experience.
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Co-Authorship

I assumed primary responsibility for the conceptualization, data collection, analysis, and write-up of the research described in this thesis. My supervisor, Dr. Dean Tripp, assisted in all aspects of the research and in the preparation of the manuscripts: he is a co-author on both of the manuscripts.
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Chapter 1: General Introduction

Background and Definition of Pain

Pain is a universal experience, shared by persons of all ages and in all cultures. Derived from the development of scientific inquiry into human anatomy and physiology in the 16th century, pain was believed to be purely a sensory experience resulting from stimulation of specific noxious receptors, usually from physical damage due to injury or disease. This biomedical model of pain had been recognized as inadequate, because there is no consistent relationship between the amount of tissue damage and pain reaction.

With continued pain research through the 20th century, significantly more attention was devoted to both the cognitive and affective quality of pain. Various factors contributed to this change in approach. When using an exclusively biomedical model of pain, health care providers often fail to provide adequate, comprehensive care for patients. It also became clear that by addressing cognitive and emotional features of the individual’s experience of pain, health care professionals can better understand the varying pain responses to apparently similar nociceptive events (e.g., Craig, 2009).

Today, there are a number of theoretical perspectives recognizing affective and cognitive qualities as an essential dimension of a person’s pain experience. “Gate Control Model of Pain” was one of the early models proposed by Melzack & Wall (1965). This model was later refined and referred to as the “Neuromatrix Model of Pain” (Melzack, 1999). This model proposes that tissue damage concurrently activates the affective-motivational and sensory-discriminative components of pain. The nature and severity of pain then becomes a consequence of affective and cognitive mechanisms as well as sensory events derived from tissue damage.
Given that pain is a complex phenomenon, pain is often viewed as a private and subjective experience. The International Association for the Study of Pain (IASP) defines pain as: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey & Bogduk, 1994). This definition of pain incorporates Melzack’s Neuromatrix model (1999) and addresses biological, sensory and affective-emotional components of pain. However, this focus on intrapersonal features of pain, fails to recognize the complex social nature of the pain experience.

Sociocommunications Model of Pain

Research examining communication features of pain is beginning to make it clear that pain is not just private and personal, but often is public and of vital importance to others (e.g., Craig, 2009). Pain serves several important functions. From an evolutionary point of view, pain is an important adaptive and intrapersonal function. The ability to engage in reflexive withdrawal from noxious stimuli prevents risk of tissue damage or danger. As well, in warning of further injury, pain motivates self-care behaviours, such as running away from harm. However, the interpersonal functions of pain, often ignored by theories of pain, are equally important and adaptive. The way an individual decides to express or communicate pain has an impact on his or her chance of receiving helpful attention or even survival. The Sociocommunications Model of Pain (Craig, 2009; Hadjistavropoulos & Craig, 2002; Hadjistavropoulos, Craig, & Fuchs-Lacelle, 2004) provides a framework that integrates both the intrapersonal and interpersonal domains of pain. It states that pain communication is most likely to be effective to the extent that they reflect specific features of both the individual and the social context (e.g., who the
audience is), with consequences varying depending on whether pain expression is appropriate for the person in that place. In turn, care-giving reactions would not be available unless the observer is disposed to be sensitive to these expressive reactions (Figure 1).

According to Craig (2009), fundamental to the Sociocommunications Model is the proposition that the severity of the stimulus instigating pain on the pain sufferer does not directly affect the pain observer’s responsive actions. Rather, there is a sequence of ‘filters’ in pain communication that modulate how the pain experience is expressed by the sufferer, and subsequently, how the observer decodes the incoming painful cues. These ‘filters’ are the product of interacting intrapersonal and interpersonal determinants. Intrapersonal determinants broadly encompass biological substrates, and personal life experiences that affect how pain is experienced, expressed and observed. For example, how an individual signals their distress from a noxious stimulus may depend on the person’s biological and personal disposition. In turn, the observer’s autonomic responses to pain displays may influence how the pain is conceptualized and judged. Interpersonal determinants address the impact of situational contexts, social norms and the relationships between observer and sufferer on one’s pain experience and judgment. For example, it has been found that observers infer higher pain ratings in the presence of a familiar pain sufferer than an unfamiliar individual (Prkachin, Solomon, Hwang, & Mercer, 2001).

From an evolutionary perspective, suppression or amplification of pain behaviours (e.g., paralinguistic vocalization, motor activity, facial expression) in response to the demands of the social situation would be advantageous, whether or not it is
deliberate (Fordyce, 1976; Keefe, Williams & Smith, 2001). When the person in pain expresses pain in observable signs, empathy and help from the observer may be triggered. Similarly, it is also adaptive to be sensitive to another person’s pain. In dangerous situations or settings, the reactions of the pain sufferer could warn the observer to avoid possible harm. Consequently, the well-being of the pain sufferer or the observer may depend upon the observer’s perception of pain in the other person. Detection of pain in others requires both appropriate perceptual sensitivity and an understanding of social and cultural context in which pain appears.
Figure 1. The Sociocommunications Model of Pain (Craig, 2009)
**Definition of Culture, Ethnicity, and Race**

“Culture”, “ethnicity”, and “race” are often used interchangeably. These terms, however, have important distinctions among them. "Culture” refers to the beliefs, customs, language, thoughts, communications, values, and actions of a group of individuals due to ethnicity, race, religion, origin, or current residence (Green, 2004). “Race” refers to populations that look different (i.e. phenotype), have different ancestral roots and imply a genetic basis when considering differential pain perception or health status, suggesting that differences in individuals are fixed or predisposed (Njobvu, Hunt, Pope, & MacFarlane, 1999). Ethnicity, derived from a Greek word meaning "tribe," refers to a group of people within a larger society sharing common ancestral origin, culture, language, religion, and traditions that provide a sense of identity (Williams, 1997). Jones (1997) describes ethnicity as “all those social and psychological phenomena associated with a culturally constructed group identity.” This concept of ethnicity emphasizes the intersection of social and cultural processes in the identification of ethnic groups (Jones, 1997). While “culture”, “ethnicity” and “race” are not the same, they sometimes overlap. For example, African Americans are regarded by others and sometimes themselves to be members of a distinct race, identified by their physical characteristics such as skin colour. At the same time, they have become an ethnic group. This group defines itself partly in terms of its common descent from Africa, a distinct history particularly of slavery, and a broad set of cultures (e.g., language and religion) that are held to capture much of the essence of their identity (Cornell & Hartmann, 2007).


*Pain and Ethnicity*

People grow up absorbed in their culture’s distinctive pattern of thoughts and behaviour. The meaning of pain, the emotional distress experienced, the cognitive and behavioural coping skills exercised, the manner in which pain is communicated to others in an effort to secure help, and the inferences made about the pain behaviours of others are heavily influenced by one’s social and ethnic backgrounds (Bates, 1987). The ethnic background in which a person is born and raised provides numerous learning opportunities about pain. The first important source of learning is the family. Pain behaviours are initially learned by observing other family members. The models chosen are those similar to oneself and those who are different are rejected (Weisenberg, 1982).

From the view of the social comparison’s theory (Festinger, 1952), one learns whether their reaction and responses to pain are appropriate. For example, one may ask, when do I have to grin and bear the pain, or, under what situation it is appropriate to display distress and solicit help? Through the processes of modeling and feedback (e.g., reinforcement), ethnic norms regarding pain are transmitted from generation to generation (Craig, 1989).

Thus, ethnic background plays an important role in determining how pain is perceived, how or whether a person communicates their pain or makes their pain public, and how the person acts or responds to pain experience.

Whereas pain research has dramatically increased in previous decades, relatively little research has directly explored the influence of the sociocultural context on pain experience and pain expression. For example, does being observed by someone of the same ethnicity versus a different ethnicity change one’s pain response? Does a match in ethnicity between observer and sufferer aid the observer’s pain judgment? Evolutionary
theories have suggested that there would be an increase in pain expression in the presence of people who are familiar or similar to us (Williams, 2002). Studies on expressivity of emotions and stress, independent of pain, have also found that individuals are generally more expressive with observers who are of the same ethnicity as the person in distress (Soto, Levenson & Ebling, 2005). Another interesting study has reported that Chinese and American participants are more efficient at emotion recognition for members of their own ethnic group (Elfenbein & Ambady, 2003). Since pain is a stressful and, partly, an emotional experience, one would expect that the nature of relationship with others who are present can have an impact on pain response and pain assessment. Taken together, understanding the role of the ethnic context in pain expression and pain assessment has important clinical implications.

**Ethnic Disparities in Pain**

A growing literature on ethnic disparities related to pain has shown that ethnic minorities who suffered from unrelieved pain were disproportionately higher in number compared with Whites (Anderson, Green, & Payne, 2009; Green, Anderson, Baker et al., 2003; Shavers, Bakos, & Sheppard, 2010). The evidence is fairly consistent even when the severity of injury, socioeconomic status, and insurance status were taken into account (Green et al., 2003). Ethnic minority patients are less likely than White patients to receive any pain medication, (Bernabei, Gambassi, Lapane et al., 1998; Chen, Shofer, Dean et al., 2008; Kposowa & Tsunokai, 2002; Won, Lapane, Gambassi et al., 1999), more likely to wait longer to receive pain medication in the emergency department (Epps, Ware, & Packard, 2008; Lee, Burelbach, & Fosnocht, 2001), more likely to receive lower dosage of analgesics (Cleeland, Gonin, Baez, et al., 1997), and less likely to receive opiates
despite higher pain scores (Chen et al., 2008; Chen, Kurz, & Pasanen, 2005; Heins, Grammas, & Heins et al., 2006; Pletcher, Kertesz, Kohn, & Gonzales, 2008). Minorities are also treated less frequently than Whites in pain clinics (Portenoy, Ugarte, Fuller et al., 2004), under hospice care (O'Mara and Arenella, 2001), and have pain adequately treated while in hospice care (Rhodes, Teno, & Connor, 2007). Further, ethnic disparities in pain management have been reported in a wide range of settings including hospital emergency (Chen et al., 2008; Epps et al., 2008; Heins et al., 2006; Heins, Heins & Gramma et al., 2006; Pletcher et al., 2008; Todd, 2000; Todd, Samaroo, Hoffman, 1993), outpatient clinics and hospitals (Mailis, Yegneswaran, Nicholson et al., 2008; Todd, Deaton, D’Adamo, & Goe, 2000; Todd, Samaroo, & Hoffman 1993), and nursing homes (Barneibe et al., 1998; Won, Lapane, Gambassi et al., 1999). Although ethnic disparities in pain management have been well documented, these findings do not provide a clear understanding of the underlying mechanisms. Thus, the challenge for pain researchers and clinicians is to examine factors that may lead ethnic minority patients prone to have their pain under-managed relative to similar White counterparts.

The literature on ethnic disparities in pain management has frequently ignored the social context in which pain is reported. Since health care providers are predominantly Caucasians in North America, it is possible that minority patients in these studies were less comfortable reporting or expressing their pain to someone of a different ethnic background. Indeed, ethnic similarity has been shown to influence communication between patients and health care providers. For example, when the ethnicity of patients is concordant with that of physicians, patients rate their visits as more involved (Cooper-Patrick, Galo, Gonzales et al., 1999). This result may indicate the possibility that pain
experience could be communicated differently, depending on whether the patient-physician relationship is ethnically concordant. Similarly, pain assessment is subject to biases due to characteristics of the individual in pain and of the observing person. The severity of pain in ethnic minority patients is often underestimated by health care providers (Anderson, Mendoza, Valero et al., 2000; Cleeland, Gonin, Baez et al., 1997), suggesting that the inaccurate assessment of pain may be an important contributor to the under-treatment of pain in ethnic minority patients (Cleeland et al., 1997; Cleeland, Gonin, Hatfield et al., 1994; Calvillo, & Flaskerud, 1993; Lasch, 2002). Health care providers who have a different ethnic background may rely more heavily on personal beliefs and attitudes that do not accurately characterize the patients, resulting in misjudgments of pain intensity. For example, studies showed that the caregiver’s cultural background may influence their ability to understand and empathize with patients of a cultural background different from their own (Flores, 2000; Flores, Abreu, Schwartz et al., 2000). Therefore, ethnic concordance between the observer and pain sufferer may be associated with the accuracy of observer’s pain assessment and the pain sufferer’s reported experience.

Taken together, research that examines the influence of ethnic concordance on pain expression and pain assessment may help in understanding whether medical treatment disparities are related to ethnic discordance. Unfortunately, the role of health care provider’s ethnicity has largely been ignored in the literature and the impact of ethnic concordance has not been investigated seriously. This is most likely due to the difficulty of recruiting comparable samples of minority and nonminority health professionals (Weiss, Foster, & Fisher, 2005). However, the question of whether ethnic
concordance influences sufferer’s pain report and observer’s pain assessment could be examined in a laboratory setting.

Studies conducted in the laboratory setting on ethnic difference in pain have done so from an intrapersonal perspective. For example, experimental studies have investigated whether or not ethnic groups differ substantially in the sensory or discriminatory perception of pain, such as pain threshold, pain tolerance, and pain intensity. The International Association for the Study of Pain (IASP, 2007) defines *pain threshold* as the least experience of pain that an individual can recognize, *pain tolerance* as the maximum amount of pain that an individual is prepared to tolerate, and *pain intensity* is as the level of pain that an individual is experiencing. These studies have primarily focused on differences between African American and Euro-Americans, with the most consistent findings being that African Americans appeared to have lower thermal and ischemic pain tolerances (Campbell, Edwards, & Fillingim, 2005; Campbell, France, Robinson et al., 2008; Castel, Saville, Depuy et al., 2008; Edwards, Doleys, Fillingim et al., 2001; Klatzkin, Mechlin, Bunevicius et al., 2007; Mechlin, Maixner, Light et al., 2005). In general, results from experimental studies have found no ethnic differences in pain thresholds among participants with otherwise similar characteristics (Campbell, Edwards, & Fillingim, 2005; Edwards & Fillingim, 1999). Very few studies have examined other ethnic groups. In a recent laboratory study comparing response to cold pressor pain between Chinese and European Canadians, Chinese reported significantly lower pain tolerance than Euro-Canadian participants, despite both groups reporting similar levels of pain threshold and pain intensity (Hsieh, Tripp, Ji, et al., 2010). While these studies documented intrapersonal ethnic difference in experimental pain
responses, they did not consider the ethnicity of the experimenters, failing to capture an important interpersonal dimension of pain that may significantly influence pain experience.

Study Overview

The main purpose of this research was to examine whether the sociocultural context could influence pain expression and pain assessment. Chinese were chosen as the focus of the present research because it is the largest ethnic group in Canada (Statistics Canada, 2006) and also this group has received very little attention in ethnic pain research. This dissertation reports two laboratory studies. The primary objective of Study 1 was to investigate the impact of ethnic concordance or discordance on the pain sufferer’s pain experience. Chinese participants were exposed to a cold pressor task and randomly assigned to one of the two conditions: a) Chinese milieu (Chinese experimenters and Chinese language), or b) European Canadian milieu (Euro-Canadian experimenters and English language). The hypothesis was that Chinese participants in the Euro-Canadian milieu would report lower pain than participants in the Chinese milieu. The primary objective of Study 2 was to investigate the impact of ethnic concordance on the accuracy of observer’s assessment of pain. Chinese participants and Euro-Canadian participants were recruited to view video clips of Chinese and Euro-Canadian individuals undergoing a painful task. The hypothesis was that participants would report more accurate pain estimation of the individual in pain when there was a match between their ethnicity, in comparison to the condition in which their ethnicity was different.
References


Chapter 2:

Study 1-

The Influence of Ethnic Concordance and Discordance on Verbal Reports and Nonverbal Behaviours of Pain

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Abstract

To examine the influence of ethnic concordance on the pain experience and expression in Chinese in a laboratory setting, 102 Chinese participants were exposed to a cold pressor task under one of the two conditions: a) Chinese milieu (n = 52; Chinese experimenters and Chinese language), or b) European Canadian milieu (n = 50; Euro-Canadian experimenters and English language). A “reference” group with 82 Euro-Canadian participants (in the Euro-Canadian milieu) was included in comparisons. The study found that while both Chinese groups did not differ on pain intensity reported during the cold pressor task, Chinese participants in the Chinese milieu reported significantly higher score in Short Form-McGill Pain Questionnaire-Affective (SF-MPQ-Affective) and displayed more nonverbal behaviour of pain than the Chinese participants in the Euro-Canadian milieu. The study also found that, compared to the Euro-Canadian group, both Chinese groups reported higher pain intensity and SF-MPQ-Affective. The results demonstrated the impact of experimenter’s ethnicity on participant’s pain responses. This study also suggested that research on ethnic disparities in pain treatment should examine ethnic concordance between observer and individual in pain.
Introduction

Ethnic disparities in pain assessment and treatment exist for all types of pain across the life span (Anderson, Green, & Payne, 2009), with multiple clinical studies indicating that ethnic minority patients received less analgesics than White patients following medical procedures (e.g., McNeill, Sherwood, & Starck, 2004; Rust et al., 2004; Todd, Deaton, D’Adamo, & Goe, 2000). Several intrapersonal factors that may contribute to ethnic pain disparities, such as pain thresholds, tolerances, and intensities have been investigated (e.g., Campbell, Edwards, & Fillingim, 2005; Campbell et al., 2008; Gazerani & Arendt-Nielsen, 2005; Hsieh, Tripp, Ji, & Sullivan., 2010; Rahim-Williams et al., 2007; Watson, Latif, & Rowbotham, 2005). However, the current focus on the intrapersonal features of pain fail to capture the complex sociocultural nature of pain experience (Craig, 2009).

Evolutionary theories have suggested that there would be an increase in pain expression in the presence of people who are familiar or similar to us (Williams, 2002). Models such as the Sociocommunications Model of Pain (Hadjistavropoulos & Craig, 2002; Craig, 2009) have also highlighted the importance of the social environment, suggesting that an observer’s presence can influence a suffering person’s pain expression. For example, laboratory studies showed that men report higher pain tolerance and lower pain intensity when reporting to a female versus a male observer (Gijsbers & Nicholson, 2005; Kallai, Burke, & Voss, 2004; Levine & De Simone, 1991). As well, when in the company of experimenters of high professional status, people display greater pain tolerance and lower pain unpleasantness (Campbell, Holder, & France, 2006; Kallai et al.,
2004). In clinical settings, patients typically report pain to physicians whose ethnicity is different from their own. If the caregiver’s gender and professional status could influence pain expression, it is important to consider how pain expression may be related to ethnic concordance.

The importance of healthcare provider’s ethnicity in shaping patient’s evaluations of their care has been documented. For example, when the patient-care provider dyad is ethnically concordant, both Blacks and Whites rate the care they received as more positive (LaVeist & Carroll, 2002; Cooper-Patrick et al., 1999; Malat, 2001). Patient’s satisfaction and involvement in decision making also have been reported higher in ethnically concordant patient-physician dyad (Cooper-Patrick et al., 1999, Cooper et al., 2003; King, Wong, Shapiro, Landon, & Cunningham, 2004; LaVeist & Nuru-Jeter, 2002; LaVeist, Nuru-Jeter, & Jones, 2003; Saha, Komaromy, Koepsell, & Bindman, 1999). However, very little research has directly investigated the potential impact of ethnic concordance on the expression of pain experience. One notable exception is a study conducted by Weisse, Foster, & Fisher (2005), who found that neither ethnic (i.e., African American vs. Euro-American) nor gender concordance influenced verbal pain report and pain tolerance. This study, however, did not include nonverbal pain expressions such as grimaces, paralinguistic vocalization, and protective behaviours. In comparison to verbal pain reports, which primarily depend on a conscious process, nonverbal behaviours are automatic and spontaneous reflections of subjective pain experience. Thus, nonverbal pain behaviours deserve at least equal research attention (Hadjistavropoulos, Craig & Fuchs-Lacelle, 2004). Studies of the influence of ethnic
concordance on nonverbal pain behaviours have yet been undertaken. The results may explain, to some extent, the ethnic disparities observed in pain treatment.

To date, ethnic pain research has primarily focused on African Americans with little data available for other ethnic groups, such as the Chinese. Chinese culture has been influenced by Buddhism, Confucianism and Taoism, all of which discourage the display of emotion (Chen, Miakowski, Dodd, & Pentilat, 2008). There is a prevalent view that since Chinese may be more emotionally stoic, Chinese may report less pain compared to North Americans (Chin, 2005). However, surprisingly little is known about the display rules governing pain expression (Sullivan et al., 2006). Therefore, an important area of study is whether differences exist between Chinese and Euro-Canadian cultures in their norms for public pain expressions. Also, it is unknown whether Chinese individuals would display less nonverbal pain behaviours (i.e., be more “stoic”) than Euro-Canadians.

The objective of this study is to examine experimentally the effect of ethnic concordance on Chinese participants’ pain report and behaviours. A novel aspect of this experiment is the manipulation of language in addition to the ethnicity of the experimenters. A “reference” group with Euro-Canadian participants was included in the comparisons. The hypothesis was that pain reports and behaviours would be different among the participants in the following conditions: 1) Euro-Canadians in the Euro-Canadian milieu (i.e., Euro-Canadian experimenter and English language), 2) Chinese in the Chinese milieu (i.e., Chinese experimenter and Chinese language), and 3) Chinese in the Euro-Canadian milieu. Specifically, it was expected that the Chinese in the Euro-Canadian milieu would report lower verbal pain ratings and display less nonverbal pain behaviours than the Chinese in the Chinese milieu. In addition, based on previous ethnic
comparisons of cold pressor pain between Chinese and Euro-Canadians (Hsieh et al., 2010), it was expected that in this study, both Chinese groups would report higher verbal pain reports and display more nonverbal pain behaviours than would Euro-Canadians. Depressive symptoms and beliefs about appropriate pain behaviours were also investigated, as depression and pain beliefs may be associated with pain reports and behaviours (Keefe, Wilkins, Cook, Crisson, & Muhlbaier, 1986; Nayak, Shiflett, Eshun, & Levine, 2000).

Methods

Participants

Eighty-two European-Canadian ($M = 19.07$ years, $SD = 2.24$ years) and 102 Chinese ($M = 19.57$ years, $SD = 2.21$ years) undergraduate students participated in the study. All participants were Queen’s University full-time students fluent in English. Due to the design of the experiment, for the Chinese participants, only those who could speak, read, and write Chinese fluently were recruited for the experiment. Further, language proficiency is a powerful indicator of involvement with the heritage culture (Lau, Lee, & Chiu, 2004; Kang, 2006). Chinese participants were randomly assigned to one of two conditions: (1) Chinese milieu ($n = 52$; China =20, Hong Kong =23, Taiwan =9), or (2) Euro-Canadian milieu ($n = 50$; China =16, Hong Kong =22, Taiwan =12). The Euro-Canadian participants ($n = 82$), assigned to the Euro-Canadian milieu, were all born and raised in Canada, have not lived outside of Canada for more than six months, and indicated English as their only proficient language. Participants who were enrolled in the introductory psychology course received a bonus course credit for their participation. All
other participants received $10 cash as compensation for their time. Potential participants who had reported pain lasting more than three months, or whose pain symptoms might be exacerbated by exposure to pain-provoking stimuli, were excluded from the study. Participants who had reported previous frostbite on their non-dominant hand were also excluded.

**Experimenters**

Six Euro-Canadian (ages: 20 – 23 years) and six Chinese (ages: 20 – 24 years) female research assistants wore a white lab coat throughout the entire experiment. The Euro-Canadian experimenters, all born and raised in Canada, were responsible for running the Euro-Canadian participants and the Chinese participants in the Euro-Canadian milieu. The Chinese experimenters tested all of the Chinese participants in the Chinese milieu. The Chinese experimenters, speaking fluent Mandarin or Cantonese, were born in China, Hong Kong, or Taiwan. They were responsible for running the Chinese milieu.

The experimenters were either “instructors” or “observers”. The instructors were responsible for administering questionnaires and explaining the cold pressor task to the participants but were not present during the cold pressor task. The “observers”, who could not be seen by the participants, communicated with the participants during the cold pressor task through an intercom and recorded their verbal pain reports. This was done to eliminate potential effect of the variation of experimenter’s appearance and nonverbal cues on participants’ pain reports and behaviours during the cold pressor task (Rosenthal, 1976; Orne, 1962).
Apparatus, Material and Measures

Cold Pressor (CP) machine. Acute pain was induced using a cold pressor machine, which is a re-circulating, double-bucket system with a built-in refrigeration unit. The temperature of the water was kept constant at 2-3°C by an internal thermostat. The CP machine consisted of a 22 inch by 29 inch outer casing that houses a 10 by 12 inch bucket which was filled to the brim with water. Compared to other forms of laboratory-induced pain, the cold pressor pain comes closest to the quality, duration, and urgency of clinical pain (Turk, Meichenbaum, & Genest, 1983).

Video recorder. Participants’ non-verbal actions were videotaped using a digital video camera located ten feet away from the participant, providing a live feed to a monitor located in an adjoining room. This setup allowed the experimenter to view and ensure the body and facial position of participants during the pain induction task are fully captured by the camera so that coding of behaviour can be successfully performed following the study.

Depression. Depressive symptoms were assessed using the 20-item Centre for Epidemiological Studies Depression Scale (CES-D; Appendix A), which inquires about depressive symptoms within the last week (Radloff, 1977). Response options on the CES-D were rated on a 4-point Likert scale (0 = rarely, 3 = most of the time). Higher score represented more symptoms of depression. In the present study, the Cronbach’s alpha was .88 for the Euro-Canadians, .92 for the Chinese in the Chinese milieu, and .85 for the Chinese in the Euro-Canadian milieu.
**Pain Beliefs.** The Appropriate Pain Behaviour Questionnaire (APBQ; Appendix B), a 14-item self-report questionnaire, was used to measure individual beliefs in the social acceptability of various pain expressions in the presence of others (Nayak et al., 2000). These expressions include grimacing, crying, talking about the pain, bending over or holding painful site. The original questionnaire was developed to explore sex differences and has two forms (e.g., which best describes what you believe are appropriate ways for males/females to respond to pain in the presence of others). For the present study, the questionnaire was modified to make it applicable to everyone (e.g., “which best describes what you believe are appropriate ways to respond to pain in the presence of others”). Participants indicated their agreement on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). A high total score (maximum 98) indicate that the belief that behavioural responses to pain in the presence of others are appropriate. In the present study, the Cronbach’s alpha was .84 for the Euro-Canadians, .82 for the Chinese in the Chinese milieu, and .78 for the Chinese in the Euro-Canadian milieu.

**Verbal Report of Pain**

**Pain Intensity.** Participants rated the intensity of their pain during the CP task on a Numerical Rating Scale (NRS; Appendix C). In the present study, an 11-point NRS was used (0 = no pain, 10 = extreme pain). Participants were prompted to rate their pain every 15 seconds until they reached the 1-minute ceiling time. All NRS ratings for each participant were then averaged to give a global pain intensity score. The validity and ease of administration of NRS has been well documented with a variety of populations (Jensen & Karoly, 2001).
**Short Form-McGill Pain Questionnaire.** The sensory and affective components of pain were assessed using the Short-Form McGill Pain Questionnaire (SF-MPQ; Melzack, 1987; Appendix D). This measure required participants to reflect on their current pain experience by ranking 15 pain descriptors on a 4-point Likert scale (0 = none to 3 = severe). The sensory subscale ranges from 0-33 and affective subscale ranges from 0-12. The SF-MPQ has been translated into Chinese language (Hui & Chen, 1989; Appendix E). In the present study, the Cronbach’s alphas for the Euro-Canadians were: Full scale = .80, Affective = .70, Sensory = .78. For the Chinese in the Chinese milieu, the alphas were: Full scale = .78, Affective = .71, Sensory = .75. For the Chinese in the Euro-Canadian milieu, the alphas were: Full scale = .90, Affective = .81, Sensory = .84

**Nonverbal Pain behaviours**

Participants’ nonverbal behaviours during the cold pressor task were recorded using a video camera. Two trained coders, who were blind to experimental hypotheses, independently coded the video clips. The coding scheme used in this study followed the protocol used in previous research (Follick, Ahern, & Aberger, 1985; Keefe & Block, 1982; Prkachin, Hughes, Schultz, Joy, & Hungt, 2002; Romano et al., 1991; Sullivan, Adams, & Sullivan, 2004). The following pain behaviours were coded: Neck Arching (neck arches backwards or to the side), Bouncing (rhythmic bouncing of the knee), Grimacing (obvious facial display of distress that include brow lowering, narrowing of the eyelids, cheek raising, nose wrinkling, upper lip raising, closing of the eyelids), Vocalization (e.g., “holy geez” or paraverbal production such as grunting, grasping, or sighing), Guarding (abnormally stiff or rigid movement of the immersed arm post
immersion), and Stimulation (actions that stimulate the immersed arm post immersion). Each video clip was 120 seconds long, with 60 seconds for water immersion and 60 seconds for post-immersion. The duration of the pain behaviour is the time, in seconds, elapsed from the onset of the behaviour to its termination. For the purpose of coding and reliability checking, each video clip was divided into 24 5-second intervals. Coders provided a frequency count (1 = present, 0 = absent) for the intervals and recorded the duration of each pain behaviour. Before coding the video clips from this experiment, the two coders underwent training and met an overall satisfactory reliability coefficient of Cohen’s Kappa = .76 for coding video records from previous studies. The training video clips contain all pain behaviours. The primary coder (Chinese male) coded all of the current experiment’s video clips. The secondary coder (Euro-Canadian female) scored approximately 20% of the clips to establish inter-coder reliability. The reliability checks were conducted four times throughout the coding process. A total of 36 video clips, with 12 clips from each experimental group, were selected to establish reliability. Inter-coder reliability for the present study was calculated using Cohen’s Kappa and percentage agreement (See Table 1). Discrepancies were resolved through discussion. A total score of pain behaviour was calculated by adding the duration of all nonverbal pain behaviours.
Table 1

*Nonverbal Pain Behaviour Reliability*

<table>
<thead>
<tr>
<th>Pain Behaviour</th>
<th>Kappa</th>
<th>Percent Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck Arching</td>
<td>.80</td>
<td>91</td>
</tr>
<tr>
<td>Bouncing</td>
<td>.80</td>
<td>94</td>
</tr>
<tr>
<td>Grimacing</td>
<td>.85</td>
<td>96</td>
</tr>
<tr>
<td>Vocalization</td>
<td>.92</td>
<td>98</td>
</tr>
<tr>
<td>Guarding</td>
<td>.75</td>
<td>95</td>
</tr>
<tr>
<td>Stimulation</td>
<td>.71</td>
<td>89</td>
</tr>
</tbody>
</table>

Procedure

Ethics approval was obtained from the General Research Ethics Board at Queen’s University, Canada. Participants were recruited from undergraduate psychology classes at the University as well as through advertisements posted on the campus. In the Euro-Canadian milieu, the experimenters were Euro-Canadians, and the experiment instructions and questionnaires were in English. In the Chinese milieu, the experimenters’ place of origin (i.e., China, Hong Kong, Taiwan) matched that of the participant, and the experiment instructions and questionnaires were in Chinese. In addition, the experiment instruction for the Chinese milieu was given in either Cantonese or Mandarin, depending on the preference of the participant. These steps were taken to maximize ethnic concordance. The questionnaires and experiment instructions were translated into Chinese by several bilingual Chinese research assistants who were born in mainland China, Hong Kong or Taiwan, and had lived in Canada for at least four years. For the questionnaires, the English versions were first translated into Chinese by three
bilingual research assistants then verified by two doctoral graduate students who are proficient in both languages. Next, back-translation, a procedure widely used in cross-cultural psychological research (e.g., Brislin, 1970; Heine, 2010; Peng & Nisbett, 1999; Peng & Morris, 1994) was used to check consistency of meaning, which was done by a professional translator. Finally the translations were checked again by the two bilingual Chinese doctoral graduate students in psychology to ensure they were free of error. For the experiment protocol, three bilingual research assistants who speak Mandarin checked the Mandarin instructions and another three who speak Cantonese checked the Cantonese instructions to ensure they sounded natural.

Two female experimenters were present during the study, one was the “instructor” during the explanation phase of the experiment and the other was the “observer” during the CP task phase. All experimenters read a script to ensure the standardization of the experimental protocols. The “instructor” explained the general purpose of the study to the participants. Participants were told about the filming during the cold pressor task. Any questions from the participant were addressed and informed consent was obtained. Subsequently, participants completed the study measures (i.e., demographics, CES-D, APBQ) in random order. The participants in the Chinese milieu condition chose either the traditional character version or simplified character version of the questionnaires, depending on their preference. Following the completion of the questionnaires, the “instructor” introduced the participants to the CP and they seated the participants on the side of the CP that allowed their non-dominant arm to be immersed in the water. The “instructor” reminded the participants that they should give their best effort to remain their hand in the water for 60 seconds. However, they can withdraw their hand if they...
want to stop the experiment before the ceiling time. Instructions were reviewed again with the participants before the “instructor” left the CP room (see Appendix F).

After the “instructor” left the CP room, participants were prompted by the “observer” through the intercom to put their hand in the water and report their pain rating on a scale of 0 to 10 every 15 seconds until the ceiling time of 60 seconds. Throughout the experiment, the participants could not see the “observer”. Immediately after the CP task, participants completed the SF-MPQ reporting the current pain experience. All participants included in this study completed the one-minute cold pressor task. A thorough debriefing was conducted following the completion of the study.

**Preliminary Data Analyses**

Descriptive statistics were computed, normality of each variable was assessed, and the significance of group differences on continuous variables was calculated by one-way ANOVA. No outliers were detected. The distributions for the Nonverbal Pain Behaviour total and SF-MPQ-Affective were found to violate the assumptions of normality and homogeneity of variances. Thus, Kruskal-Wallis H test was used to test group difference in these variables. The significance of these results was not different from the ANOVA results; therefore the parametric results were retained. Since group comparisons were *a priori* for all pain variables, omnibus ANOVAs for NRS Pain Intensity, SF-MPQ-Sensory, SF-MPQ-Affective, and Nonverbal Pain Behaviours were not performed (Tabachnik & Fidell, 2007). Because there were more planned comparisons than degrees of freedom for effect, Bonferroni adjustment was utilized to set *p* value at < .017 (*α*=.05/3) to control for family-wise Type I error rate (Tabachnik &
Fidell, 2007). For the psychological variables (i.e., CES-D and APBQ), Bonferroni adjustment was used to set $p$ value at .025 ($\alpha=.05/2$) to control for Type I error for the overall F tests. Tukey’s test was chosen as the post hoc test for the psychological variables with $p$ value set at < .017 ($\alpha=.05/3$). Correlational analyses were conducted to examine associations between psychological variables and pain variables. If CES-D or APBQ were found to be correlated with pain measures and have significant group differences, they would be entered as covariates in an Analysis of Covariance (ANCOVA) in the follow up analysis.
Results

Pain Stimulation Check

Data from the NRS and SF-MPQ confirmed that the cold pressor induced an experience quantitatively and qualitatively similar to pain described by patients with painful conditions. Table 2 shows NRS pain intensity ratings across four time points for each group. The ratings increased as time elapsed, which suggested that the one-minute CP task did not appear to have a floor or ceiling effect. Table 3 shows the percentages of participants who endorsed each pain descriptor from SF-MPQ. The cold pressor appeared to produce pain that may be clinically relevant, since the total mean score reported in this experiment was similar to SF-MPQ total scores associated with pain conditions, such as mucositis, musculoskeletal pain, post-surgical pain, and arthritis (Melzak & Katz, 2001).

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian (n = 82)</th>
<th>Chinese-Chinese milieu (n = 52)</th>
<th>Chinese-EC milieu (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>NRS at 15 s</td>
<td>3.76</td>
<td>2.35</td>
<td>4.90</td>
</tr>
<tr>
<td>NRS at 30 s</td>
<td>5.23</td>
<td>2.43</td>
<td>6.79</td>
</tr>
<tr>
<td>NRS at 45 s</td>
<td>6.27</td>
<td>2.31</td>
<td>7.96</td>
</tr>
<tr>
<td>NRS at 60 s</td>
<td>6.91</td>
<td>2.32</td>
<td>8.83</td>
</tr>
</tbody>
</table>
Table 3

*Frequency and Percentage of Endorsement of SF-MPQ Pain Descriptor by Group*

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian (n = 82)</th>
<th>Chinese-Chinese milieu (n = 52)</th>
<th>Chinese-EC milieu (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
</tr>
<tr>
<td>Throbbing</td>
<td>62</td>
<td>75</td>
<td>30</td>
</tr>
<tr>
<td>Shooting</td>
<td>29</td>
<td>35</td>
<td>43</td>
</tr>
<tr>
<td>Stabbing</td>
<td>53</td>
<td>64</td>
<td>35</td>
</tr>
<tr>
<td>Sharp</td>
<td>65</td>
<td>79</td>
<td>46</td>
</tr>
<tr>
<td>Cramping</td>
<td>29</td>
<td>35</td>
<td>17</td>
</tr>
<tr>
<td>Gnawing</td>
<td>35</td>
<td>42</td>
<td>17</td>
</tr>
<tr>
<td>Hot-burn</td>
<td>38</td>
<td>46</td>
<td>31</td>
</tr>
<tr>
<td>Aching</td>
<td>53</td>
<td>64</td>
<td>45</td>
</tr>
<tr>
<td>Heavy</td>
<td>39</td>
<td>47</td>
<td>18</td>
</tr>
<tr>
<td>Tender</td>
<td>32</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td>Splitting</td>
<td>42</td>
<td>51</td>
<td>29</td>
</tr>
<tr>
<td>Tiring/Exhausting</td>
<td>12</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Sickening</td>
<td>9</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Fearful</td>
<td>22</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>Punishing</td>
<td>41</td>
<td>51</td>
<td>44</td>
</tr>
</tbody>
</table>
**Ethnicity**

A one-way ANOVA examined within ethnic group differences for all variables (i.e., China versus Hong Kong versus Taiwan). No significant ethnic difference was found for all variables, Chinese milieu, $F_s \leq 1.39$, $p_s \geq .23$. Euro-Canadian milieu, $F_s \leq 2.39$, $p_s \geq .11$.

**Demographics**

Table 4 shows demographics, the group means, standard deviations and $p$-values for CES-D and APBQ. Age and sex ratios did not differ across groups, $F_s \leq 1.13$, $p_s \geq .32$.

| Table 4 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| **Means and Standard Deviations for Demographics, CES-D and APBQ by Group** |
| | Euro-Canadian ($n = 82$) | Chinese-Chinese milieu ($n = 52$) | Chinese-EC milieu ($n = 50$) | $p$-values |
| | $M$ | $SD$ | $M$ | $SD$ | $M$ | $SD$ | $M$ | $SD$ |
| Age | 19.07 | 2.24 | 19.59 | 2.72 | 19.56 | 1.54 | .32 |
| % female | 72 | 73 | 62 | 62 | .39† |
| CES-D | 9.20 | 6.91 | 12.31 | 9.07 | 10.24 | 7.02 | .08 |
| APBQ | 36.10a | 7.80 | 31.96b | 6.52 | 34.72 | 5.97 | .004* |

*Note. For follow-up comparisons, the different letters indicate significant group differences at $p < .017$.† Kruskal-Wallis nonparametric procedure; * Overall $F$-test, $p < .025$; CES-D = Center for Epidemiologic Studies Depression Scale; APBQ = Appropriate Pain Behavior Questionnaire.
Depression

An ANOVA on CES-D was conducted to examine the level of depression across the three conditions. No significant difference in depression was found, $F(2,181) = 2.67$, $p = .08$. Thus, CES-D was not entered as a covariate.

Pain Behavior Beliefs

The ANOVA on APBQ was significant, $F(2,181) = 5.58$, $p = .004$, $partial \eta^2 = .06$. Follow-up Tukey tests were conducted to evaluate pairwise differences among the means. The Chinese participants in the Chinese milieu scored significantly lower than the Euro-Canadian participants ($p = .003$). In other words, Chinese participants in the Chinese milieu believed that it is less appropriate to exhibit pain behaviours than the Euro-Canadian participants. There was no significant difference for other group comparisons. APBQ was not entered as a covariate because this variable was not significantly correlated with any dependent measures (Table 7-9).

Pain Measures

Table 5 shows the group means and standard deviations for each pain measure. Group comparisons showed that Chinese participants in Chinese milieu ($p < .001$, $\eta^2 = .12$) and Chinese participants in the Euro-Canadian milieu ($p = .01$, $\eta^2 = .06$) reported significantly higher pain intensity than Euro-Canadians. For SF-MPQ total score, pairwise comparisons showed that Chinese participants in the Chinese milieu reported higher pain than Euro-Canadians, $p = .01$, $\eta^2 = .07$, but other comparisons were not significant. For SF-MPQ Sensory, none of the pairwise comparison was significant, $p$
In contrast, all comparisons for SF-MPQ Affective were significant. Chinese participants in the Chinese milieu reported significantly higher SF-MPQ-Affective than Chinese in the Euro-Canadian milieu, $p = .02$, $\eta^2 = .05$, and Euro-Canadians, $p < .001$, $\eta^2 = .28$. Chinese participants in the Euro-Canadian milieu also reported significantly higher affective pain than Euro-Canadians, $p = .007$, $\eta^2 = .07$. For nonverbal pain behaviours, Chinese participants in the Chinese milieu displayed significantly more pain behaviours than Chinese participants in the Euro-Canadian milieu, $p = .009$, $\eta^2 = .07$, and Euro-Canadians, $p < .001$, $\eta^2 = .17$. Table 6 shows the means and standard deviation of each nonverbal pain behaviour by group. Table 7 displays sex differences of each pain measure in Chinese and Euro-Canadian participants.

Table 5

Means and Standard Deviations of Pain Measures by Groups

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian (n = 82)</th>
<th>Chinese-Chinese milieu (n = 52)</th>
<th>Chinese-EC milieu (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Pain Intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-MPQ total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonverbal total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note. Since group comparisons were a priori for all pain measures, omnibus ANOVAs were not performed. Different letters indicate significant group differences while the same letters indicate no group differences after Bonferroni adjustment setting $p &lt; .017$.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6

Median (in seconds) and Number of Participants Displaying Nonverbal Pain Behaviours by Groups

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian (n = 82)</th>
<th>Chinese-Chinese milieu (n = 52)</th>
<th>Chinese-EC milieu (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mdn</td>
<td>Freq*</td>
<td>Mdn</td>
</tr>
<tr>
<td>Neck-Arch</td>
<td>1.5</td>
<td>42</td>
<td>20.0</td>
</tr>
<tr>
<td>Bounce</td>
<td>0</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Vocal</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Grimace</td>
<td>0</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Guard</td>
<td>0</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Stimulate</td>
<td>14.5</td>
<td>80</td>
<td>23.5</td>
</tr>
</tbody>
</table>

* Number of participants in each condition displaying behaviour

Table 7

Means and Standard Deviations of Pain Measures by Sex and Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian</th>
<th>Chinese</th>
<th>p</th>
<th>p</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>p</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Pain Intensity</td>
<td>5.81</td>
<td>5.1</td>
<td>.20</td>
<td>7.1</td>
<td>6.4</td>
</tr>
<tr>
<td>SF-MPQ total</td>
<td>14.41</td>
<td>9.6</td>
<td>.02</td>
<td>17.9</td>
<td>14.4</td>
</tr>
<tr>
<td>Sensory</td>
<td>12.73</td>
<td>8.1</td>
<td>.01</td>
<td>13.7</td>
<td>11.5</td>
</tr>
<tr>
<td>Affective</td>
<td>1.76</td>
<td>1.5</td>
<td>.61</td>
<td>4.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Nonverbal total</td>
<td>39.38</td>
<td>34.6</td>
<td>.53</td>
<td>66.7</td>
<td>47.9</td>
</tr>
</tbody>
</table>
Correlations between Variables

Correlations between verbal pain report, nonverbal pain behaviours and psychological variables for each group are shown in Table 8, 9, and 10. APBQ scores were significantly different between Euro-Canadian group and Chinese in Chinese milieu group, but this variable was not significantly correlated with any dependent measures. Thus, any ethnic difference found in these pain measures cannot be explained by APBQ. Finally, no significant group difference was found in CES-D.
Table 8  
*Correlations between Variables for Euro-Canadians (n = 82)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CESD</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. APBQ</td>
<td>.11</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Pain NRS</td>
<td>.03</td>
<td>.15</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SFMPQ-Sensory</td>
<td>.11</td>
<td>.21</td>
<td>.50‡</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SFMPQ-Affective</td>
<td>.23*</td>
<td>.21</td>
<td>.41‡</td>
<td>.52‡</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>6. Nonverbal behave.</td>
<td>.09</td>
<td>.18</td>
<td>.50‡</td>
<td>.18</td>
<td>.14</td>
<td>--</td>
</tr>
</tbody>
</table>

* p < .05; † p < .01; ‡ p < .001

Table 9  
*Correlations between Variables for Chinese in the Chinese milieu (n=52)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CESD</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. APBQ</td>
<td>.02</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Pain NRS</td>
<td>.30*</td>
<td>.03</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SFMPQ-Sensory</td>
<td>.42†</td>
<td>-.05</td>
<td>.57‡</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SFMPQ-Affective</td>
<td>.39†</td>
<td>-.15</td>
<td>.51‡</td>
<td>.39†</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>6. Nonverbal behave.</td>
<td>.12</td>
<td>-.16</td>
<td>.33*</td>
<td>.15</td>
<td>.42†</td>
<td>--</td>
</tr>
</tbody>
</table>

* p < .05; † p < .01; ‡ p < .001

Table 10  
*Correlations between Variables for Chinese in the Canadian milieu (n=50)*

<table>
<thead>
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<td>.25</td>
<td>.31*</td>
<td>.45‡</td>
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<td>.23</td>
<td>.17</td>
<td>.43†</td>
<td>.57‡</td>
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* p < .05; † p < .01; ‡ p < .001
Discussion

This is the first study to examine whether an ethnically concordant or discordant environment would influence Chinese participants’ verbal report of pain and nonverbal behaviour of pain. A unique aspect of this study is the manipulation of the social context that included language. While both Chinese groups did not differ on pain intensity reported during the cold pressor task, Chinese participants in the Chinese milieu reported significantly higher SF-MPQ-Affective pain and displayed more nonverbal behaviour of pain than the Chinese participants in the Euro-Canadian milieu.

The results provided initial evidence for the importance of social contexts in which pain is communicated and the influence of the person to whom pain is reported. The presence of ethnically concordant and discordant environment appeared to have an impact on the communication of pain. The results were consistent with previous research, which showed that nonverbal displays of pain can differ depending on whether the observers are strangers, family or social group members (Schmidt & Cohn, 2001). The findings that non-verbal displays of pain was higher in the ethnically concordant conditions also fit well with the evolutionary theories, which suggest that there would be an increase in pain behaviours in the presence of people who are similar or familiar to us because they may render aid (Green, 2002; Williams, 2002). It is possible that Chinese participants in the ethnically concordant group felt more comfortable expressing pain to someone of the same ethnicity. Research on ethnic concordance between health care providers and patients provided some support for this assertion. In general, ethnic concordance has shown to be positively correlated with patient satisfaction (Cooper-Patrick et al., 1999), receipt of needed medical care (Saha et al., 1999), feeling of
provider empathy (Garcia, Paterniti, Romano, & Kravitz, 2003), and reduced stress
(Bates, Rankin-Hill, & Sanchez-Ayendez, 1997). Taken together, these findings suggest
that Chinese participants in the discordant condition may have inhibited their expressions
because they may perceive the Euro-Canadian experimenter as a member of a social out-
group, or that the Chinese participants in the concordant condition perceived the
experimenters who were of same ethnicity and spoke their native language would be
more understanding of their expressions of pain and consequently more inclined to
express pain. These speculations have not been directly examined in this study, although
it will be interesting and useful to pinpoint which of these mechanisms contribute most to
the influence of ethnic concordance on pain expressions.

It is interesting to note that the effect of ethnic context was observed in nonverbal
pain behaviours but not for pain intensity ratings during the cold pressor task. This may
be because pain intensity rating is not a natural form of expression of the pain experience.
(Hadjistavropoulos, Craig, & Fuschs-Lacelle, 2004; Sullivan, Adams, & Sullivan, 2004).
The pain intensity ratings were generated in response to experimenter’s request
intermittently throughout the cold pressor task. Conversion of the pain sensation into a
numerical value requires conscious effort. On the other hand, pain behaviours were
produced more spontaneously and they do not require conscious reflection on the pain
experience. These differences in response-related process may explain why only
nonverbal pain behaviours but not pain intensity ratings during cold pressor task were
affected by the ethnic context (Sullivan et al., 2004).

The only verbal report of pain that showed significant difference between the two
Chinese groups is SF-MPQ-Affective, which was measured immediately after the cold
pressor task. Some researchers have argued that ratings of pain unpleasantness (e.g., MPQ-Affective scale) reflect affective-motivational aspects of pain, whereas ratings of pain intensity reflect the sensory-discriminative aspects of pain (Harkins, 1996; Harkins, Price, & Martelli, 1986). Sensory-discriminative aspects of pain are those that describe the location, intensity, and duration of painful stimuli, while affective-motivational aspects of pain describe how pain is qualitatively experienced (Main & Spanswick, 2000). Thus, it is theorized that ethnic differences in pain responses may be most apparent for the affective-motivational dimension of pain because it is more influenced by psychosocial factors than the sensory-discriminative aspects of pain (Edwards & Fillingim, 1999; Riley et al., 2002; Sheffield, Biles, Orom, Maixner, & Sheps, 2000). Our findings that Chinese participants in the Chinese milieu reported higher SF-MPQ-Affective score than the Chinese participants in the Euro-Canadian milieu but not SF-MPQ-Sensory appeared to be consistent with this assertion.

The study also found that, compared to the Euro-Canadian group, both Chinese groups reported higher pain intensity and SF-MPQ-Affective. These differences are generally consistent with previous research on the ethnic differences in pain between Chinese and Euro-Canadians in a cold pressor task, (Hsieh et al, 2010) as well as between African Americans and Whites in experimental pain (Campbell et al., 2008; Edwards & Fillingim, 1999; Edwards, Fillingim, & Keefe, 2001; Edwards, Doleys, Fillingim,& Lowery, 2001). The current study further extended previous research on ethnic differences in pain between Chinese and Whites by measuring nonverbal behaviour of pain and it was found that both Chinese groups exhibited more pain behaviours overall than the Euro-Canadian group.
Whereas there was no significant difference in APBQ between the two Chinese groups, or between the Chinese in the Euro-Canadian milieu and the Euro-Canadian group, Chinese participants in the Chinese milieu believed that it is less appropriate to exhibit pain behaviours than the Euro-Canadian participants. A possible reason for such a difference could be the language of the questionnaire. Ji, Nisbett, & Zhang (2004) have found that an enhanced cultural effect was found when Chinese participants from China and Taiwan were tested in Chinese rather than in English. The Chinese language may have primed the participants to answer the questionnaire in a way that is more consistent with the Chinese cultural rules of display, which encourages stoicism (Holroyd, 2005). Interestingly, despite this difference in beliefs regarding appropriate pain behaviours, Chinese participants in the Chinese milieu displayed higher nonverbal behaviour of pain than the Euro-Canadian participants. In our study there was no significant correlation between APBQ and verbal and nonverbal measures of pain in all groups. Therefore, one should not always equate report of stoic beliefs to physical discomfort with absent or diminished experience as there is a potential for discordance between display rules and the experience of pain. As well, at least with experimentally induced acute pain, the stereotyped view that Asians do not show pain behaviours cannot be generalized to this healthy university-aged sample.

The present results provide a foundation for future studies by showing the potential impact of pain observers who are of different ethnicity. Ethnic discordance should be considered in the disparities of pain treatment observed in the ethnic minority (Anderson et al., 2009). It is possible that in clinical settings, where ethnic patients often find themselves in ethnically discordant environments, similar patterns of pain behaviours
found in the current study may have been present. That is, these ethnic patients may show
greater nonverbal behaviours and reporting lower pain scores to healthcare providers who
are of different ethnicity. These behaviours then may lead clinicians to judge pain
inaccurately and thus prescribe lower doses of analgesics. Furthermore, ethnic minorities
may have more difficulty than Whites in communicating their pain clearly and effectively
to their healthcare providers (Calvillo & Flaskerud, 1993; Lumley et al., 2005; Nguyen,
Ugarte, Fuller, Hass, & Portenoy, 2005; Nicholson, Rooney, Vo, O’Laughlin, & Gordon,
2006; Shapiro, Benjamin, Payne, & Heidrich, 1997; Waldrop & Mandry, 1995). Clinical
settings, such as emergency rooms, where the health care providers and patients are
usually unfamiliar with each other, may be particularly prone to problems involving
effective pain communication. Providers who do not know their patients may rely more
heavily on stereotypes, personal beliefs, and attitudes that may not accurately characterize
the patients or their pain behaviour, which, in turn, may negatively impact their care
(Shavers, Bakos, & Sheppard, 2010).

The study has several limitations. First, it is unclear to what extent the laboratory
findings in this study can be generalized to pain-reporting behaviours of actual patients in
a clinical setting. The social interaction of physician and patient is quite different from
the interaction between laboratory experimenters and research participants. The
participants in this study were healthy university students who were tested by
experimenters who were also university students. Still, researchers have found that
Chinese people value interpersonal relationships and pay more attention to the social
environment than do Americans (Ji, Schwarz & Nisbett, 2000). This tendency to attend to
the social environment and interpersonal relationships is reinforced in family and school
and it may be carried over to all environments and relationships in general (Markus & Kitayama, 1991). Nevertheless, future research in clinical setting is needed to determine whether present findings are clinically significant.

Second, it is difficult to establish the extent of the effect of ethnic concordance if only the ethnicity of the experimenter, but not the language of the experiment protocol and questionnaire, was manipulated. Different results could be obtained depending on the testing language (Ji et al., 2004). Similarly, since the Chinese participants in our studies were bilinguals, it is difficult to establish the extent of the impact of ethnic concordance for Chinese Canadians who only speak English or for Chinese individuals who only speak Chinese. In future research, investigations and comparisons should be made between monolingual and bilingual Chinese in order to find out what role language contributes to the effect of social context on pain reports and behaviours.

Third, since Chinese participants were not asked whether they deliberately altered their nonverbal pain behaviours during the cold pressor task, the degree to which we can speculate this is done consciously remains to be established. It is not clear whether the effect of ethnic concordance exerted directly on verbal and nonverbal expression, or indirectly on these expressions via an influence on the pain experience and then subsequently translated into corresponding verbal and behavioural changes. The effect of ethnic concordance on pain may operate on a level that is not conscious. Pain expression can be categorized as primarily automatic, such as reflexive actions and facial expressions, and primarily controlled, such as verbal self-report. Hadjistavropoulos and Craig (2002) reported that nonverbal expressions of pain are less vulnerable to distortion.
than verbal report because nonverbal expressions are relatively more reflexive and less dependent on conscious processes. Nevertheless, both forms of pain expressions show evidence of social modulation and they are not necessarily conscious. For example, even infants display sensitivity to social context, where they showed lower pain expressivity when mothers have a dismissive style of responding to the children (Pillai Riddell, Stevens, Cohen, Flora, & Greenberg, 2007). Therefore, the participants in the present study may not be consciously aware of the effect of the social context on their expression of pain.

In summary, the current findings support the assumptions of the Sociocommunications Model of Pain, emphasizing the sociocultural aspects of pain experience and expression (Craig, 2009; Hadjistavropoulos & Craig, 2002; Hadjistavropoulos, Craig, & Fuchs-Lacelle, 2004). Ethnic concordance exerts an impact on verbal report and nonverbal behaviours of pain, where individuals in pain displayed greater pain expressions in an ethnically similar environment. In addition, the present study replicated and expanded previous research conducted by Hsieh and colleagues (2010) that Chinese reported higher affective pain and displayed more nonverbal behaviours compared to Euro-Canadians.
References


Peng, K. & Nisbett, R. E., (1999), Culture dialectics and reasoning about contradiction, American Psychologists, 54, 741-754


Chapter 3:

Study 2 -

The Influence of Ethnic Concordance and Discordance on Pain Judgment

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Queen’s University, Kingston, Ontario
Abstract

Fifty Chinese and 50 European Canadian undergraduates were recruited to examine whether a match in Chinese or European Canadian ethnicity between the observer and the sufferer would have an influence on the observer’s assessment of pain. Participants viewed video clips displaying painful facial expressions of Chinese and Euro-Canadian individuals, and estimated the level of pain experienced by these individuals. Results indicate that observers exhibited greater sensitivity to different pain intensities and changes in pain across time when they rate sufferers of the same ethnicity. However, the influence of ethnic concordance on numerical pain rating was not observed. Further, both Chinese and Euro-Canadian participants had lower accuracy when they estimated the pain ratings of Chinese sufferers. Overall, these findings lend support to the Sociocommunications Model of Pain, and have important clinical implications for pain assessment.
Introduction

Accurate assessment of pain is a prerequisite for adequate pain treatment. According to the Sociocommunications Model of Pain (Craig, 2009; Hadjistavropoulos & Craig, 2002; Hadjistavropolous, Craig, & Fuchs-Lacelle, 2004), perception of pain may be impacted by a number of psychological, behavioural, and sociocultural factors. They may include the behaviours of the person who sends the pain signal, the observer’s sensitivity to features of the sufferers’ pain behaviour, and the observer’s attitudes and beliefs regarding pain. The pain message must be decoded accurately and understood by observers if they are to provide adequate care.

Pain assessment is subject to biases stemming from the characteristics of the patients and observers (e.g., health care providers), including matches in their ethnic background or ethnic assumptions about pain. Ethnic disparities in pain treatment have been reported across a variety of medical conditions and treatment settings (Anderson, Green, & Payne, 2009) and pain assessment has been identified as an important factor in the undertreatment of ethnic minority patients. For example, African American patients were nearly two times more likely to have their pain underestimated by their physicians (Stanton, Panda, & Chen et al., 2007). Providers who are not familiar with their patients may rely more heavily on ethnic stereotypes and presumptions, which may not accurately reflect the patient’s pain behaviour. For instance, physicians in the emergency department were more likely to perceive Native-American patients as exaggerating their pain compared to other groups (Miner, Biros, Trainor et al., 2006).
The ethnic background of the observer is shown to influence their judgment of pain in others. In an experimental study, Xu and colleagues (2009) asked Chinese and Caucasian college students to rate video clips depicting a Caucasian or Chinese face with neutral expressions receiving painful or non-painful stimulation applied to the cheeks. They reported that Chinese participants gave higher pain intensity and unpleasantness ratings to both groups than Caucasian participants. Xu’s study was consistent with Davitz, Sameshima, and Davitz (1976) finding that East Asian nurses attributed higher pain ratings than American nurses upon reading descriptions of East Asian patients in pain. Davitz et al. (1976) speculated that Asian nurses, perhaps due to their stoic beliefs regarding public display of pain, may have distinguished between overt and covert pain and thus inferred more pain than was observable through verbal or non-verbal expressions. On the other hand, American nurses may assume congruence between pain experience and pain behaviour. Whereas both studies raised the possibility that observer’s ethnicity has an impact on one’s pain judgment, it is unclear whether higher ratings of pain reflected higher pain estimation accuracy, or just a tendency to infer more pain regardless of the sufferer’s pain behaviours and ethnicity. Further, the “accuracy” of pain assessment is not limited to the extent to which an observer correctly rates the intensity of pain experienced by the sufferer. Whether or not an observer can be sensitive to the changes in pain intensity is an equally important concern. Sensitivity refers to the ability to tell the difference between levels of pain, independent of the overall level of pain reports (Green, Tripp, Sullivan et al., 2009).

The review of research on pain judgments indicates an overall bias towards the underestimation of pain (Ferguson, Gilroy, & Puntillo, 1997; Guru & Dubbinsky, 2000;
Prkachin, Solomon, & Ross, 2007; Rundshagen, Schnabel, Standl et al., 1999; Solomon, 2001; Thomas, Robinson, Champion et al., 1998). Yet, to date, there has been no research that examines the accuracy of pain assessment between ethnically concordant and discordant dyads. In other words, is the observer’s assessment of pain more accurate when the observer’s ethnicity matches that of the pain sufferers’, as opposed to when their ethnicity does not match? Further, does an observer’s belief about appropriate pain behaviour in public play a role in pain estimation accuracy?

The objective of the present study is to examine whether a match in Chinese or European Canadian ethnicity between the pain observer and the pain sufferer have an impact on the observer’s pain estimation accuracy. The hypotheses were: 1) Observers would have smaller estimation error when judging ethnically concordant sufferers than discordant sufferers, and 2) Observers in the ethnically concordant condition would show better performance in tracking changes in pain intensity, in comparison to those in the ethnic discordant condition. In addition, belief about appropriate pain behaviour in public was examined to assess whether Chinese observers would hold a stoic belief regarding display of pain. Pain belief would be included as a potential covariate if the Chinese and Euro-Canadian observers differed significantly on this variable.

Methods

Participants

Fifty Euro-Canadians (19 males & 31 females, age: $M = 19.02, SD = 1.44$) and 50 Chinese (16 males & 34 females, age: $M = 21.08, SD = 2.88$) from Queen’s University participated in the study. For Chinese participants, only those who could speak, read, and
write Chinese fluently were recruited, as language proficiency has been shown to be a powerful indicator of involvement with the heritage culture (Lau, Lee, & Chiu, 2004; Kang, 2006). The selection criteria for Euro-Canadian participants were that they must be born in Canada with European descent, have not lived outside of Canada for more than 6 months, and indicate English as their only proficient language. All participants received $5 cash or 0.5 course credit if they were enrolled in the introductory psychology course.

Measures and Stimuli

Demographics. The demographic questionnaire asked for participants’ sex, place of birth, and second language proficiency.

Pain Beliefs. The Appropriate Pain Behaviour Questionnaire (APBQ; Appendix B), a 14-item self-report questionnaire, was used to measure individual beliefs in the social acceptability of various pain expressions in the presence of others (Nayak et al., 2000). These expressions include grimacing, crying, talking about the pain, bending over or holding painful site. The original questionnaire was developed to explore sex differences and has two forms (e.g., which best describes what you believe are appropriate ways for males/females to respond to pain in the presence of others). For the present study, the questionnaire was modified to make it applicable to everyone. Participants indicated their agreement on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). A high total score (maximum 98) indicates the belief that behavioural responses to pain in the presence of others are appropriate. In the present study, the Cronbach’s alpha was .83 for the Euro-Canadians, .75 for the Chinese.

Task Video clips. A series of 36 five-second video clips showing facial expression were taken from a previous pain study. Permission to use this video data for future
research was provided by these participants at the time of that study. The clips consisted of six Euro-Canadians and six Chinese, split by sex. This previous pain study documented verbal ratings of pain from 0 (no pain) to 10 (extreme pain) at specified times during a cold pressor task. Each video subject provided three video clips taken at the 5th second, the 20th second and the 40th second of the cold pressor task experience. All of the subjects in the video clip had their overall pain intensity ratings in the average range. As well, they must exhibit some variability across the three ratings (e.g., rating of 3 at 5th second, rating of 5 at 20th second, and rating of 8 at 40th second). If there was none or very little variability in the video subject’s ratings (e.g., 5, 5, 5, or 9, 9, 10), they would not be included in the video stimuli. These multiple sequences from the same individual provided variations in exhibited pain, and also allowed for the measurement of the observer’s sensitivity to changes in pain. Video clips were selected to ensure that the pain intensity and pain expression were matched and comparable in the video clips across both ethnic groups and sex.

The Facial Action Coding System (FACS; Ekman, Friesen & Hager, 2002) was used to code facial action units (AUs) that are related to pain for the entire five second clip in one-second segments. The pain-related AUs include: brow lowering, tightening of the orbital muscles surrounding the eye, nose wrinkling/upper lip raising, and eye closure (Prkachin, 1992; 2005; Williams, 2002). Each pain-related AU was scored as present or absent during each 1-second segment. AUs were also coded for intensity on a 5-point intensity scale, which varied from 1 = minimal action to 5 = maximal action. Intensity coding is more subjective than frequency coding. Two judges, blind to the pain ratings reported by the pain sufferers and observers, viewed and coded the pain-related AUs in
the video clips. One of the judges was a certified FACS coder. Inter-rater scoring reliability was calculated using the formula recommended by the developers of FACS (Ekman & Friesen, 1978). The proportion of agreement on actions recorded by two coders was calculated relative to the total number of actions coded as occurring by each of the coders (i.e., Number of Agreements / [Number of Agreements + Number of Disagreements]). Agreement of 75% has been deemed satisfactory reliability of FACS coding (Ekman & Friesen, 1978). The FACS coders demonstrated 88% of inter-rater reliability. Disagreement was resolved through discussion. The intensity scores for these four actions were summed across all five 1-second segments to give a pain behaviour score for each five-second video clip (Prkachin, 2005).

The total sequence of 36 five-second video clips was shown to the participants in this study (“pain observers”). These clips were shown on a projector screen with an interval of five-second blank tape preceding and following each clip. As the present study focused on the judgment of facial expressions associated with pain, the clips did not come with any audio component in order to minimize auditory influence on judgment. The sequence of the video clips was randomly determined. To counterbalance any potential practice or order effects, half of the participants viewed the 36 video clips in one order while the other half were presented with the reverse order. Participants in the present study were not informed that the pain sufferers in the video clips were undergoing cold pressor tasks.

Practice Video Clips. Two five-second ‘practice’ video clips were administered prior to presenting the 36 task video clips. The two practice video clips were exactly the same in nature as the task video clips, with the exception that the sufferer in the practice
clips was not of Euro-Canadian or Chinese decent. The video subject in the practice clips was a male from the Middle East. Since the sole purpose of the practice clips was to familiarize participants to the speed and characteristics of the video stimuli, pain rating estimates for the practice clip were not recorded.

*Estimates of Pain in Others.* Estimates of the pain experienced by the sufferers in the video clips were recorded on a single page answer sheet. This sheet used the 11-point Numerical Rating Scale (NRS; 0= No pain; 10= Extreme pain) and provided answer slots for participants to record their estimates in the order that they viewed the video clips.

*Accuracy indices.* Accuracy was measured for each participant observer using three indices. 1) *Difference scores* (DS) for each of the three pain ratings (at 5th s; 20th s; 40th s) were determined by computing the absolute value of the difference between the observer’s pain estimates and the sufferer’s pain ratings. Higher values reflected greater discrepancy (i.e., lower accuracy). 2) *Covariation* of actual-inferred pain was computed by calculating the within-subject correlation between estimated pain ratings and actual reported pain ratings across all 36 video stimuli. Higher values indicated greater covariation and increased sensitivity to different pain intensities across sufferers. 3) *Within-sufferer difference scores* (WDS) were computed by calculating the difference between sufferer’s first and last pain ratings, at the 5th s and 40th s respectively. Difference of less than or equal to +1 or -1 was classified as no change, a difference of more than +1 or -1 was classified as increased pain or decreased pain respectively. The same classification scheme was used for the observer’s estimated ratings. The number of matches across stimuli was counted with higher values indicating greater sensitivity to changes over time within sufferer’s pain ratings (Figure 1).
All three indices were necessary for assessment as no single index could exclusively reflect inferential accuracy (Sullivan et al., 2006; Green et al., 2009). For example, measuring just the discrepancy between the estimated and actual pain ratings (DS index) would be subject to over- or under-estimation biases, as well as overlooking the level of observer’s sensitivity to changes in pain. Similarly, high accuracy in the WDS and covariation index would indicate that subjects were able to detect changes in pain but it would fail to demonstrate the proximity of their estimations to the sufferer’s own reports.

Procedure

Ethics approval was obtained from the General Research Ethics Board at Queen’s University, Canada. Participants were recruited from undergraduate psychology classes at the University as well as through advertisements posted on the campus. Participants were
given a letter of information and consent form to review and sign prior to commencing the research tasks. Participants were tested alone in a laboratory setting. After watching each five-second video clip, participants rated the level of pain being experienced by the subject in the video clip using the 11-point Numerical Rating Scale. The observer participants continued in the manner of viewing and estimating pain levels for all 2 practice and 36 five-second task video clips. After completing all ratings, participants were given demographics and APBQ. Finally, the experimenter addressed any questions that the participants may have.

**Data Analyses**

Descriptive statistics were computed, normality of each variable was assessed, and the significance of group differences on continuous variables was calculated by t-tests. No distributions were found to violate assumptions of normality and homogeneity of variances. Three 2 X 2 Mixed models Analysis of Variance (ANOVA) were conducted. The dependent variables were Difference Scores, Covariation, and Within-sufferer Difference Scores, and the independent variables were ethnicity of pain sufferers and observers. Belief regarding appropriate pain behaviours was investigated to determine whether it meets the criteria to serve as a covariate. If APBQ was found to be correlated with DS, Covariation or WDS and significantly different between two ethnic groups, it would be entered as a covariate in subsequent analysis of covariance (ANCOVA).
Results

Video Stimuli Manipulation Checks

To ensure that the video clips displayed compelling cues for observers to judge pain, ANOVA was performed to examine whether pain ratings increased at later time points, and simple regression was conducted to examine whether pain ratings were predictive of the pain behaviour cues (i.e., FACS scores). Pain ratings from the sufferers were found to increase significantly at later video time points, \( F(2,33) = 41.12, p < .001, \) partial \( \eta^2 = .71 \) Sufferers exhibited greater facial expressions of pain in their video clips when they reported more pain, \( \beta = .47, t(34) = 3.11, p < .01 \). There were no significant differences in the duration of facial expressions of pain across the video time points, \( F(2,23) = .92, p > .05 \). Thus, video clips appeared to serve as an effective stimulus.

To evaluate the relationship between pain variables and ethnic characteristics of sufferers depicted in the video clips, the present study conducted two 2(ethnicity) x 3 (time points) ANOVAs on mean pain ratings and pain behaviour scores (i.e., FACS). The self-reported pain ratings and pain behaviours are presented by ethnicity in Table 1. As shown in Table 1, Euro-Canadian and Chinese sufferers had similar pain ratings and FACS scores, \( Fs(1, 30) < 2.30, ps > .05 \), and there were no ethnic differences in pain ratings or FACS scores within each time point. This analysis indicated that the pain intensity and pain expression were matched and comparable in the video clips for both ethnic groups.
Table 1

Pain Intensity and FACS of Chinese and Euro-Canadian Sufferers in a Cold-Pressor Task at Set Time Points

<table>
<thead>
<tr>
<th>Ethnicity of pain sufferer</th>
<th>Chinese Mean (SD)</th>
<th>Euro-Canadian Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Intensity Ratings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th second</td>
<td>3.70 (1.97)</td>
<td>4.30 (1.21)</td>
</tr>
<tr>
<td>20th second</td>
<td>6.17 (1.72)</td>
<td>6.83 (1.33)</td>
</tr>
<tr>
<td>40th second</td>
<td>9.00 (1.26)</td>
<td>8.83 (0.75)</td>
</tr>
<tr>
<td>FACS scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th second</td>
<td>5.01 (3.03)</td>
<td>4.41 (3.27)</td>
</tr>
<tr>
<td>20th second</td>
<td>5.51 (3.87)</td>
<td>5.80 (3.66)</td>
</tr>
<tr>
<td>40th second</td>
<td>7.20 (5.37)</td>
<td>7.29 (3.90)</td>
</tr>
</tbody>
</table>

Demographics

Table 2 shows the group means, standard deviations and p-values for demographics and APBQ. Sex ratios did not differ between groups but age was significantly different between groups, t(98) = -4.52, p < .001, η² = .28 with the Chinese group being older than Euro-Canadians.

Table 2

Percentage of Female, Means and Standard Deviation of Age and APBQ by group

<table>
<thead>
<tr>
<th></th>
<th>Euro-Canadian (n = 50)</th>
<th>Chinese (n = 50)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>% female</td>
<td>62.0</td>
<td>68.0</td>
<td>.53†</td>
</tr>
<tr>
<td>Age</td>
<td>19.02</td>
<td>1.44</td>
<td>21.08</td>
</tr>
<tr>
<td>APBQ</td>
<td>36.30</td>
<td>7.18</td>
<td>34.08</td>
</tr>
</tbody>
</table>

Note. APBQ = Appropriate Pain Behavior Questionnaire. † Mann-Whitney U nonparametric procedure
Pain Behavior Beliefs

A t-test was conducted to test difference in pain beliefs between the two ethnic groups. No significant difference in APBQ scores was found between the groups, \(t(98) = 1.70, p > .05\); thus, the APBQ was not used as a covariate in the following ANOVA models.

Correlations among Variables

To determine the potential associations between ABPQ and the three inferential accuracy indices, Table 3 presents the values from a Pearson correlation. Although age differed significantly between groups, there was no significant association of age with any of the three accuracy indices, \(p > .05\). Thus, group difference found in the accuracy indices cannot be explained by age. As for APBQ, whereas it was associated with one of the accuracy index, there was no significant difference between the groups. Therefore, APBQ could not explain the ethnic effects found. All of the three accuracy indices were moderately correlated with each other, \(p < .05\). This is consistent with our expectation that each index represents a somewhat unique aspect of inferential accuracy.
Table 3

Pearson Correlations among Observer Measures

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>APBQ</th>
<th>DS</th>
<th>Covariation</th>
<th>WDS</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>----</td>
<td>- .18</td>
<td>-.17</td>
<td>.17</td>
<td>.07</td>
</tr>
<tr>
<td>APBQ</td>
<td>----</td>
<td></td>
<td>-.21*</td>
<td>-.16</td>
<td>.13</td>
</tr>
<tr>
<td>DS</td>
<td>----</td>
<td></td>
<td></td>
<td>-.25*</td>
<td>-.39**</td>
</tr>
<tr>
<td>Covariation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.40**</td>
</tr>
<tr>
<td>WDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the < 0.001 level (2-tailed).

DS- Difference Score accuracy index; WDS- Within-Sufferer Difference Score.

Ethnicity and Accuracy in Estimating Other’s Pain.

The present study conducted three sets of 2 x 2 Mixed model ANOVA with the three inferential accuracy indices as dependent variables (Difference Score, Covariation, WDS) to assess whether ethnic concordance between pain observer-sufferer was associated with higher pain estimation accuracy. All three 2 x 2 Mixed model ANOVAs had the same within-group independent variable (sufferer ethnicity: Chinese/Euro-Canadian) and between-group independent variable (observer ethnicity: Chinese/Euro-Canadian). Table 4 presents the mean and standard deviations for Chinese and Euro-Canadian participants within observer group, and between observer groups. Figures 2-4 illustrate the main effects and interactions between sufferer and observer ethnicity.
Table 4

*Mean Accuracy Index Scores Within and Between Observer Ethnic Groups*

<table>
<thead>
<tr>
<th>Accuracy index</th>
<th>Observer ethnicity</th>
<th>Sufferer ethnicity</th>
<th>Mean (M)</th>
<th>SD</th>
<th>Mean (M)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference Scores</td>
<td>Chinese</td>
<td>3.95</td>
<td>.77</td>
<td>3.35</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>Euro-Canadian</td>
<td>3.83</td>
<td>.72</td>
<td>3.33</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covariation</td>
<td>Chinese</td>
<td>.41</td>
<td>.12</td>
<td>.27</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>Euro-Canadian</td>
<td>.34</td>
<td>.14</td>
<td>.34</td>
<td>.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WDS</td>
<td>Chinese</td>
<td>2.34</td>
<td>1.22</td>
<td>2.26</td>
<td>1.01</td>
<td></td>
</tr>
<tr>
<td>Euro-Canadian</td>
<td>1.82</td>
<td>1.14</td>
<td>2.52</td>
<td>1.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 100. WDS - Within-sufferer Difference Scores.*

*Difference Score Index (DS).* A 2 (Observer: EC vs. Chinese) x 2 (Sufferer: EC vs. Chinese) mixed model ANOVA was conducted to evaluate the effect of ethnic concordance on DS. The dependent variable was the difference score between the observer’s pain estimates and the sufferer’s pain ratings. The results revealed that the main effect for sufferer ethnicity was significant $F(1, 98) = 120.64, p < .001$, $\text{partial } \eta^2 = .55$. As shown in Figure 2, both Euro-Canadian and Chinese observers had significantly smaller difference scores when estimating the pain of Euro-Canadian sufferers ($M = 3.34$) than that for Chinese sufferers ($M = 3.89$). The main effect of observer ethnicity was not significant, $F(1, 98) = .20, p > .05$. Thus, there was no overall difference in DS of Euro-Canadian observers ($M = 3.58$) compared to Chinese observers ($M = 3.65$). The interaction of sufferer and observer ethnicity was also not significant, $F(1, 98) = 1.00, p > .05$. $\text{partial } \eta^2 = .01$. In general, both ethnic groups were more accurate in estimating the pain intensity of Euro-Canadian sufferers than Chinese sufferers.
Figure 2. Mean difference scores of Euro-Canadian and Chinese observers between sufferer’s ethnic groups.

In order to investigate whether the observer’s estimation was over- or under-, the average ratings reported by the observers and pain sufferers were analyzed (Table 5). Observers’ estimated ratings were less than the actual pain ratings reported by the sufferers, signifying the presence of underestimation.
Table 5

*Averaged Pain Ratings from Observers and Sufferers by Ethnicity*

<table>
<thead>
<tr>
<th></th>
<th>Observers</th>
<th></th>
<th>Sufferers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Chinese</td>
<td>3.21</td>
<td>1.26</td>
<td>6.67</td>
<td>2.19</td>
</tr>
<tr>
<td>Euro-Canadian</td>
<td>3.35</td>
<td>1.87</td>
<td>5.94</td>
<td>1.95</td>
</tr>
</tbody>
</table>

*Covariation Index.* A 2 (Observer: EC vs. Chinese) x 2 (Sufferer: EC vs. Chinese) mixed model ANOVA was conducted to evaluate the effect of ethnic concordance on the observer’s sensitivity to different pain intensities exhibited across sufferers (see Figure 3). The dependent variable was the covariation index. The analysis showed no main effect of observer ethnicity, $F(1, 98) = .007, p > .05$. There was a significant main effect of sufferer ethnicity, $F(1, 98) = 20.08, p < .001$, partial $\eta^2 = .17$, but this main effect was qualified by a significant interaction between observer and sufferer ethnicity, $F(1, 98) = 20.30, p < .001$, partial $\eta^2 = .17$.

Follow-up univariate and repeated measures ANOVAs for between and within observer groups were conducted. Within the Chinese observer group, they were significantly better at detecting variability in pain for Chinese sufferers than for Euro-Canadian sufferers, $F(1, 49) = 42.50, p < .001$, partial $\eta^2 = .47$. For Euro-Canadian participants, no difference was found for sufferer ethnicity, $p > .05$. Comparing between ethnic groups, Euro-Canadian observers were significantly more sensitive than Chinese observers to different levels of pain exhibited by Euro-Canadian sufferers, $F(1, 98) = 7.07, p = .009$, partial $\eta^2 = .07$, and Chinese observers were more sensitive than Euro-Canadian observers to Chinese sufferers levels of pain, $F(1, 98) = 8.56, p = .004$, partial
\[ \eta^2 = .08. \] Thus, covariation index scores were significantly higher in ethnically concordant dyads than the discordant dyads, but overall there was no difference between observer ethnic groups. In other words, participants in general were better at tracking pain changes when their ethnic background matched with that of the sufferers than when their ethnic background does not match with that of the sufferers.

*Figure 3.* Mean covariation scores of Euro-Canadian and Chinese observers across sufferer ethnic groups.
Within-sufferer Difference Scores (WDS). A 2 (Observer: EC vs. Chinese) x 2 (Sufferer: EC vs. Chinese) mixed model ANOVA was conducted to evaluate the effect of ethnic concordance on the observer’s sensitivity to different pain intensities exhibited within the sufferers. The dependent variable was the WDS. The analysis showed no main effect of observer ethnicity, $F(1, 98) = .56, p > .05$. There was a significant main effect on sufferer ethnicity, but this main effect was qualified by a significant interaction between observer and sufferer ethnicity, $F(1, 98) = 7.92, p = .006$, partial $\eta^2 = .08$ (see Figure 4).

Follow-up univariate and repeated measures ANOVAs for between and within observer groups were conducted, respectively. Between observer groups, Chinese observers were more sensitive to changes in Chinese sufferers’ pain than Euro-Canadian observers, $F(1, 98) = 4.85, p = .03$, partial $\eta^2 = .05$. Euro-Canadian observers had higher WDS for Euro-Canadian sufferers than Chinese observers but this difference was not significant, $F(1, 98) = 1.59, p > .05$. Within ethnic groups, Euro-Canadian observers were significantly better at detecting pain changes across time when the sufferer was Euro-Canadian than when the sufferer was Chinese, $F(1, 49) = 14.91, p < .001$, partial $\eta^2 = .23$. Within the Chinese observer group, the WDS index was higher for the Chinese sufferer than the Euro-Canadian sufferer, but this difference was not significant, $F(1, 49) = .146, p > .05$. In sum, these analyses show that observers in general were more sensitive or better at tracking pain changes within each sufferer when their ethnicity match that of sufferer’s than when their ethnicity does not match.
Figure 4. Sum of within-sufferer difference scores of Euro-Canadian and Chinese observers across sufferer ethnic groups.
Discussion

The objective of the present study was to investigate potential ethnic influences on pain estimation accuracy. In agreement with the hypothesis, two of the three accuracy indices were higher when there is a match in ethnicity between observer and pain sufferer. The Chinese and Euro-Canadian’s covariation and WDS scores were generally greater for ethnically concordant dyads. The results indicate that observers show greater sensitivity to different pain intensities and changes in pain across time when they rate sufferers of the same ethnicity. These findings lend support to the Sociocommunications Model, which suggests that shared culture may result in greater accuracy in pain assessments (Craig, 2009).

However, the effect of ethnic concordance on inferential accuracy is only partially supported in the difference score index. As hypothesized, Euro-Canadian observers made significantly more underestimation when assessing the pain of Chinese sufferers than Euro-Canadian sufferers. Yet, it was unexpected that Chinese observers also made more discrepant pain estimations for Chinese sufferers than Euro-Canadian sufferers. Nevertheless, the finding that all observers made greater underestimation for Chinese sufferers is consistent with Anderson and colleagues’ critical review (2009) that health care providers may engage in pain underestimation for ethnic minorities.

The present findings show that ethnically concordant dyads were more sensitive to changes in pain intensities. As suggested by Craig (2009), one possible explanation for this effect is that ethnic concordance elicits a sense of kinship that enhances sensitivity to individuals in pain. In support of the familiarity effect, Pillai-Riddell and Craig (2007)
contrasted pain estimation ratings of parents, pediatricians and nurses looking at video of unfamiliar infants undergoing a routine immunization injection. They found parents inferred the highest pain for infants compared with health care professionals, despite the fact that these infants did not share familial ties to the parents. This finding suggests that the familiarity effect is not exclusive to actual intimate relationships, and that it can occur in situations that resemble kinship relations. Perhaps an ethnically concordant dyad is another context that can evoke a sense of shared closeness. Indeed, Elfenbein and Ambady (2003) reported that Chinese and American participants are more efficient at emotion recognition for members of their own culture. They suggested that this in-group advantage is due to the individual’s familiarity with understanding facial expressions of a culturally similar other. Likewise, the dyads in this study may trigger a sense of cultural familiarity that motivates observers to be more attentive to the sufferer’s cues. This tendency for an in-group advantage has received meta-analytical support (Elfenbein & Ambady, 2002; Matsumoto, 2002).

Ethnically concordant dyads showed greater accuracy in detecting changes in pain. One potential explanation for this finding is that the observers were more attentive to facial expressions of ethnically similar others. In support of this in-group advantage, research from the accuracy of eyewitness assessments has shown that individuals encode more facial information and make less identification errors when they view ethnically similar faces (Meissner & Brigham, 2001; Meissner, Brigham, & Butz, 2005). In the present study, individuals may use more efficient modes of processing when judging pain expressions of in-group members, due to factors such as familiarity with facial morphology or higher motivation to decode expressions by in-group members, thus
evoking higher sensitivity in distinguishing different pain intensities and increases in pain over time.

Another interesting finding in this study was that the trend for higher inferential accuracy found in the WDS and covariation indices was not observed in the difference score index. It was unexpected that higher inferential pain accuracy for ethnically concordant dyads on DS is only observed in the Euro-Canadian but not in the Chinese group. The finding that Chinese observers also made more rating errors when judging Chinese sufferers than Euro-Canadian sufferers was surprising. These pain underestimations cannot be explained by the inhibition of painful expressions in the Chinese sufferer group because the analysis of the stimuli using FACS coding have shown that both ethnic groups displayed similar painful facial cues and had corresponding self-reported pain ratings. Perhaps this pain underestimation may be related to cultural decoding rules, which are different from the pain display rules measured in this study. Cultural decoding rules are culturally prescribed rules for managing the perception and interpretation of others’ expressions that are learned early in life (Matsumoto & Ekman, 1989). Matsumoto (1989) found that cultures that encourage more collectivistic orientations perceived less intensity in expressions of negative emotions such as anger, fear, and sadness, so as not to disrupt group harmony. Although pain was not examined, it is possible a similar cultural decoding process was present (“not disrupt group harmony”) that led the Chinese observers in the present study to lower their interpretation of pain expression exhibited by Chinese sufferers. Another possible mechanism for this unexpected finding could be explained by the differential experience and frequency of contact between the ethnic groups. For example, members of
minority ethnic groups may recognize emotion expressions displayed by members of majority more quickly than majority can recognize minority, and in some cases, an out-group advantage actually occurs where minority recognizes the majority’s emotion expression better than their own group (Elfenbein & Ambady, 2002). However, these explanations for the unexpected finding is largely speculative, since the contact hypothesis is only weakly supported according to many authors (Sporer, 2001) and there has been no research on the nature of pain decoding rules between different cultures.

Nevertheless, what is apparent is that the ethnicity of sufferers affects the observer’s pain inferential accuracy. In our study, no group differences in painful facial cues and pain reports between Euro-Canadian and Chinese sufferers were presented in the stimuli, but observers still perceived differences in pain experiences between sufferer’s ethnic groups. This suggests that the judgment of pain is not an objective process, but rather it involves the personal attributions of both the observer and sufferer. The present findings are in line with the Sociommunications Model of Pain in showing that assessment of pain is dependent upon psychosocial or cultural variables of persons other than the pain sufferer (Craig, 2009; Hadjistavropoulos & Craig, 2002; 2004). Consistent with the predictions of the model, the observer’s ethnic disposition (intrapersonal determinant) indeed interacts with the cultural context (interpersonal determinants) in which pain is assessed. Previous pain assessment literature has speculated that culture exerts both intrapersonal and interpersonal influences, but no research to date has provided evidence supporting these suggestions (Craig, 2009; Finley, Kristjansdottir, & Forgeron, 2009; Hadjistavropoulos & Craig, 2002; 2004). In summary,
the present study lends support to the assertion that both the culture of the observer and the culture of the sufferer have an impact on observer’s accuracy on pain estimation.

Another aim of the study was to investigate whether ethnic groups differed on their beliefs regarding appropriate pain behaviours in the presence of others. APBQ was found to be negatively associated with DS index, but it was not significantly correlated with other accuracy indices. Further, the result indicated that in our sample, Chinese and Euro-Canadians have similar levels of beliefs regarding pain behaviour in public, and therefore, APBQ is unlikely to be an explanation for the ethnic effects observed.

Clinical Implications

It is well-documented in literature that judging pain in others is difficult (e.g., Craig, 2009), and it seems clear from the current results that it is even more challenging to judge the pain of ethnically dissimilar individuals. There is a large pain underestimation for ethnic minorities in the clinical settings (Anderson, Green, & Payne, 2009; Shavers, Bakos, & Sheppard, 2010). The fact that all participants in this study, regardless of their ethnicity, underestimated the pain of Chinese sufferers significantly more than that of Euro-Canadian sufferers mirrors the disparities shown in health care for minority patients. This implies that health care providers should consider taking additional measures when assessing the pain of patients from different ethnic groups. For example, the use of communicating clear expectations for postoperative pain behavior and pain reporting to attending healthcare providers may be helpful in alleviating culturally-based hesitations about such communications (Greenwald, 1991). Having multiple patient assessment checks may also help overcome some communication barriers between care providers and patients across ethnic groups. Emphasizing on the
match between individuals in pain and their caregivers in their cultural expectations of pain may address some of the burdens in health care treatment for ethnic minority patients.

Limitations and Future Research

There are several limitations to the current study. First, the use of experimentally induced painful facial expressions may represent an ecologically weak milieu compared to pain behaviours induced by clinical pain conditions (e.g., injury, illness). Since individuals are not usually exposed to experimental pain in the normal context, this inexperience may have downgraded the emotional salience of the sufferer’s painful expressions depicted in the present video clips. Additionally, the short duration of the video may have also constrained the participant’s ability to infer more pain. Perhaps improving these ecological weaknesses of experimentally induced pain expressions and the length of the video clip would promote greater association of DS and ethnic concordance than what is observed in the present study. However, it is important to note that even in the absence of clinical pain, ethnicity still manifested differences in pain assessment. Future studies should consider examining other pain belief variables, such as pain decoding rules, to elucidate the underlying mechanism in the underestimation of Chinese individuals.

Whereas the utilization of FACS to assess the amount of painful behaviour exhibited is validated in literature (Deyo, Prkachin, & Mercer 2004; Prkachin & Solomon, 2008), it does not preclude the possibility that other gestures, not accounted for by FACS, could have aided (or impeded) the judgment of pain in the present study. For example, there could have been something in the manner in which Chinese sufferers encoded their
pain that accounts for the significant underestimation of this ethnic minority’s pain in both the current findings and other findings. To understand why the pain of this ethnic minority group is underestimated, future research should consider taking a holistic approach, including gestures and intensity of tone and voice, in examining how Chinese sufferers convey their pain experience.

Another aspect that deserves more attention in future research is acculturation, an issue that the present study did not focus in depth. Despite the fact that the criterion of language proficiency as a control for acculturation is well supported in literature (Kang, 2006; Weaver & Kim, 2008), the current sample of Chinese participants may be expected to present as more ‘Westernized’ in comparison to Chinese living in Asia. High acculturation would be expected to mask differences between Western and Eastern attitudes and beliefs towards pain and assimilate the ethnic groups (Tsai, Chu, Lai & Chen, 2008). This is not the case in the present study because ethnic differences in pain judgment accuracy are observed. Thus, regardless of the debatable adequacy of using language to control for acculturation, the Chinese participants in this study are still significantly different from Euro-Canadian participants. What remains uncertain is how different levels of acculturation in Chinese observers would affect the pain assessment accuracy for Chinese and Euro-Canadian sufferers. This would be an interesting research avenue for future studies.

Using physiological measures, such as the fMRI or ocular tracking devices may provide another perspective and better understanding of the results observed in the study. Some researchers have argued that the in-group advantage may be a consequence of the relatively more proficient holistic processing typically used for in-group faces, as
opposed to the use of feature or piecemeal processing for faces of out-groups (Rhodes, Brake, Taylor, & Tan, 1989). Comparisons of eye movements in ethnically concordant or discordant dyads might provide important information that could help training to improve pain judgment accuracy.

Finally, the present study’s sample of undergraduate students as observers may limit the generalizability of the current results to other populations. Given that the participants in this study are young in age and are in general good health, it is likely that their limited exposures to traumatic or clinical pain could affect their perceptions and assessments of persons in pain (Prkachin, Mass & Mercer, 2004). Perhaps having observers with more encounters with pain could alter the results found for DS. The present study demonstrated that the effects of ethnicity on pain judgment accuracy are notable even within an undergraduate sample, although a broader sample base is required for future research to increase the generalizability of the present study effects.

In summary, ethnicity has a significant impact on how observers assess pain. The present study suggests that ethnic concordance is related to a heightened ability to monitor painful facial expressions of persons in pain, but it does not necessarily promote less rating estimation errors. Both the ethnicity of the pain observer and the ethnicity of the sufferer interact to influence pain estimation accuracy, and these effects are prominent even in the absence of group difference in the belief regarding appropriate pain behaviours. The current findings suggest the importance of ethnic factors in the assessment of pain and offer support to the Sociocommunications Model of Pain (Craig, 2009; Hadjistavropoulos & Craig, 2002; Hadjistavropoulos, Craig, & Fuchs-Lacelle,
2004). Studying pain judgments in these ethnic dyads may have relevance to clinical assessments and diagnosis of pain, and implications for health caregivers.
References


Chapter 4: General Discussion

The goal of this dissertation was to investigate the influence of sociocultural context on pain expression and pain assessment. Both studies investigated the interpersonal nature of pain. Overall, the results supported the hypotheses that ethnic concordance between the pain sufferer and observer would influence pain expression and pain assessment. In the first study, Chinese participants in ethnically concordant condition reported higher affective pain and exhibited more nonverbal behaviours than participants in the discordant condition. In the second study, observers appeared to be more sensitive to changes in pain when judging pain of ethnically concordant individuals than discordant individuals. The findings of these two studies contribute to the literature and overall provide support for the Sociocommunications Model of Pain and highlight the importance of the interpersonal dimension of pain experience.

Implications of Findings

Failure to consider social and cultural context, including who is present, when assessing pain could lead to inaccurate perceptions of the individual in pain. Underestimating the pain in others, particularly in the clinical contexts, may evolve into inadequate medical attention and ultimately poor quality of medical treatments.

The present studies suggest that health care providers should be aware of the potential inhibiting effect of the presence of an ethnically discordant care provider on patient’s report of pain, especially on nonverbal behaviours. Nonverbal displays of pain produced in the clinical context may be spontaneously inhibited and represent a response
typically given to strangers rather than an expression typically given to potentially sympathetic care providers (Schmidt, 2002). The tendency to inhibit nonverbal displays of pain in the presence of helpful caregivers who are of different ethnic background may reflect an evolved tendency for self-protection from strangers that would have been adaptive in our evolutionary history but is no longer helpful today. Further, as demonstrated, it is more challenging to judge the pain experience of someone who is of a different ethnic background. As a consequence, there runs a risk of pain underestimation and undertreatment for minority groups. The result from the present research suggests that it is important for health professionals to pay closer attention to the nonverbal behaviours of pain, as these behaviours may provide insight to the sufferer’s pain experience. In addition, observers should consider taking additional measures when assessing the pain of patients from different ethnic groups. For example, communicating clear expectations for pain behavior and pain reporting, along with the presence of trained interpreters in the clinical settings may be helpful.

Future Directions

Future laboratory and clinical studies are suggested to extend this line of research. First, an experimental study that further examines the influence of ethnicity on pain expression is needed. From the present research, it is difficult to establish the extent of the effect of ethnic concordance if only the ethnicity of the experimenter, but not the language of the experiment protocol and questionnaire, was manipulated. Further, since the Chinese participants in our studies were bilinguals, it is difficult to establish the extent of the impact of ethnic concordance for Chinese Canadians who only speak English. Thus, the first follow-up experimental study will recruit Chinese participants who speak English
only and manipulate the ethnicity of experimenters in order to separate the effect of ethnicity and language. As well, the experiment will include a condition of Euro-Canadian participants with Chinese experimenters speaking in English. This condition can clarify the effect of ethnic concordance on Euro-Canadians. In addition, participants will be asked to what extent their pain report and nonverbal behaviours are altered intentionally. This additional question may help to clarify whether the effect of ethnic concordance exerted directly on pain expression or indirectly on expression via an impact on the pain experience. Third, a clinical study is planned to investigate the effect of ethnic concordance on pain judgment accuracy among health care professionals. Minority and nonminority health care providers will be asked to estimate the pain expression of ethnically concordant and discordant sufferers to see if the current findings generalize to health care professionals. As well, further research is needed to examine why pain rating estimation was lower when assessing Chinese individuals, even among Chinese observers. It is intriguing that ethnic concordance exerted an effect on tracking pain changes both within and between individuals, but this accuracy in sensitivity tracking does not translate into more accurate pain ratings. The potential difference in cultural decoding rules and the impact of frequency of contact between the majority and minority groups need to be investigated to elucidate the mechanisms underlying such a discrepancy in pain rating estimation.

As our society continues to be increasingly diverse, the number of ethnically discordant interactions in the health care setting will likely increase, a situation that reinforces the importance of incorporating cultural competency training. Weissman, Gordon, & Bidar-Sielaff (2004) defined a culturally competent individual as one who is
aware of “1) their own cultural and family values, 2) their personal biases and assumptions about individuals with values that differ from theirs, 3) accepts cultural differences between themselves and individual patients, 4) is capable of understanding the dynamics of the differences, and 5) is able to adapt to diversity” (p. 715). This definition makes it clear that a pain observer or caregiver should interpret the pain behaviours or verbal reports generated by the patient in a sociocultural communication context. The results obtained from this dissertation speak to the importance of extending the current focus on biological determinants of pain to psychological and sociocultural parameters.
References


Appendix A

CES-D

INSTRUCTIONS: Check the statement that best describes how often you felt or behaved this way, during the past week.

<table>
<thead>
<tr>
<th></th>
<th>Rarely or none of the time (Less than 1 day)</th>
<th>Some or little of the time (1-2 days)</th>
<th>Occasionally or a moderate amount of time (3-4 days)</th>
<th>Most or all of the time (5-7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don’t bother me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my family or friends.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. I felt that I was just as good as other people.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. I felt depressed.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. I felt hopeful about the future.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9. I thought my life had been a failure.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10. I felt fearful.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11. My sleep was restless.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12. I was happy.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13. I talked less than usual.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>15. People were unfriendly.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>16. I enjoyed life.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>17. I had crying spells.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18. I felt sad.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19. I felt that people disliked me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>20. I could not get “going”.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Appendix B

APBQ

Please answer the following questions by picking the number, which best describes what you believe are appropriate/inappropriate ways to express/respond to pain IN THE PRESENCE OF OTHERS.

1. It is acceptable to cry when in pain. _____
2. It is okay to communicate pain to others. _____
3. It is all right to frown when in pain. _____
4. I feel sympathy towards people who are displaying pain. _____
5. It is unacceptable to tell others about pain. _____
6. I believe people should keep pain private. _____
7. It is all right to groan when in pain. _____
8. It is appropriate to ignore pain. _____
9. I regard it a sign of weakness to show pain. _____
10. It is okay to get sympathy from others when in pain. _____
11. It is acceptable to complain when in pain. _____
12. It is appropriate to lie down when in pain. _____
13. It is unacceptable to bend over/clutch at the area in pain. _____
14. I should be able to tolerate pain in most circumstances. _____

1  3  5  7
Strongly disagree       Strongly agree
Appendix C

Numerical Rating Scale (NRS)

0 1 2 3 4 5 6 7 8 9 10

No pain  Extreme pain
Appendix D

SF-MPQ

Rate how much the following words describe your pain. Indicate the severity of each pain experience word by shading the circle under “None”, “Mild”, “Moderate”, “Severe”.

<table>
<thead>
<tr>
<th>Word</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throbbing</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Shooting</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Stabbing</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Sharp</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Cramping</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
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<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Hot-Burning</td>
<td>O₀</td>
<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
</tr>
<tr>
<td>Aching</td>
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<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
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<td>Heavy</td>
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<tr>
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<td>O₁</td>
<td>O₂</td>
<td>O₃</td>
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</table>
請用以下的詞彙描述感受的疼痛。請在“無”“輕微”“中等”“強烈”的圓圈中塗滿，以說明各種疼痛的嚴重程度。

<table>
<thead>
<tr>
<th></th>
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<th>中等</th>
<th>強烈</th>
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<td>折磨人的</td>
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Appendix F

Cold Pressor Task Instruction

“Here is a quick summary: In a while I will leave this room and I will NOT be observing you. There is another experimenter in the other room who will observe you through the camera and talk to you through this intercom. She will ask you to put your hand all the way to the bottom of the water tank with fingers spread apart. After you put your hand in the water, you will hear the word “report” four times. Whenever you hear the word ‘report’, say a number on this pain scale that best describes how you are feeling. Remember to try your best to keep your hand in the water for one minute. When the time is up, the observer will tell you to take out your hand. You can also stop the experiment anytime by withdrawing your hand.”