CONTEXTUAL INFLUENCES IN DECODING PAIN EXPRESSIONS:
EFFECTS OF PATIENT AGE, INFORMATIONAL PRIMING, AND OBSERVER
CHARACTERISTICS

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Amy Jean Diane Hampton, candidate for the degree of Doctor of Philosophy in Clinical Psychology, has presented a thesis titled, *Contextual Influences in Decoding Pain Expressions: Effects of Patient Age, Informational Priming, and Observer Characteristics*, in an oral examination held on November 30, 2017. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

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Abstract

According to clinical and experimental research, nonverbal expressions of pain are key components in its assessment. Theoretical formulations of pain specify that various contextual influences, or factors unrelated to the pain experience (e.g., patients’ age), significantly moderate observers’ interpretation of nonverbal pain expressions. Such contextual factors have been found to alter observers’ assessment of younger adults’ pain; however, the systematic study of such influences within the context of the older adult has been limited. The purpose of this study was to examine the effects of contextual factors on decoding facial pain expressions in both younger and older adults. A total of 165 participants (82 nursing students and 83 non-nursing students) were recruited. Participants were randomly assigned to one of three priming conditions: (1) information about the possibility of secondary gain [misuse]; (2) information about the frequency and undertreatment of pain in the older adult [undertreatment]; or (3) neutral information [control]. Subsequently, participants viewed eight videos of older adults and eight videos of younger adults expressing pain nonverbally. Following each video, participants rated their perception of the individual’s pain intensity, unpleasantness, and condition severity as well as their willingness to help and sympathy, patient deservingness of financial compensation, and how negatively/positively they feel towards the individual (i.e., valence). Mixed-model analyses were conducted to determine the main effects and interactions across prime conditions (misuse vs. undertreatment vs. control), observer type (nursing and non-nursing students), and stimulus persons’ age (older vs. younger stimulus persons) on observers’ estimates.
Results demonstrated that observers’ ratings varied as a function of stimulus persons’ age, observer type, and informational priming condition. More specifically, observers ascribed greater levels of pain and rated differently (e.g., greater sympathy) older stimulus persons compared to younger. Observer type and stimulus persons’ age also interacted to influence observers’ ratings. That is, in comparison to non-nursing students’ ratings of younger adults, nursing student endorsed higher ratings of younger adults’ pain and compensation deservingness. Additionally, priming conditions interacted with both observer type and stimulus persons’ age to moderate observers’ valence towards the stimulus person. In general, this interaction demonstrated that observers primed with information about the undertreatment of pain in older persons reported more positive valence towards older patients and priming observers with information about the misuse of the health care system attenuated their valence ratings towards younger patients. Finally, the undertreatment of pain in older adults prime also influenced observers’ pain estimates indirectly though observers’ valence towards the stimulus persons. More specifically, observers in the undertreatment prime condition reported more positive valence towards stimulus persons. The higher valence subsequently resulted in higher ratings of pain and affected other ratings (e.g., willingness to help) of both younger and older patients.

In summary, results support the influence of contextual features in interpreting others’ pain. Findings from this study add specificity to the theoretical formulations of pain by clarifying the role of several contextual factors on observers’ interpretations of nonverbal pain expressions of older and younger persons.
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Dedication

I would like to dedicate this thesis to my parents, my partner, and my cohort.

Pops and Lu, thank you for instilling the importance of further learning in me throughout my life. Your continuous encouragement and support has been an essential element of this project and my graduate training.

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List of Abbreviations

Action Unit (AU)

Analysis of Variance (ANOVA)

Facial Action Coding System (FACS)

Index of Facial Pain Expressions (IFPE)

International Association for the Study of Pain (IASP)

Mean (M)

Multivariate Analysis of Variance (MANOVA)

Numeric Rating Scale (NRS)

Standard Deviation (SD)

Visual Analogue Scale (VAS)
CHAPTER 1: Literature Review

1.1. General Overview

Twenty percent of Canadians report experiencing chronic pain, with a higher frequency in older persons (Schopflocher, Taenzer, & Jovey, 2011). Almost one in three community dwelling (i.e., older adults who are currently not residing in a long-term care facility) Canadians 65 years and older experience chronic pain (Schopflocher et al., 2011). Such pain is associated with numerous negative psychological concerns and physical consequences, including loneliness, depression, increased morbidity, and dependency on others. Despite the negative sequelae of pain, it tends to be underassessed and undertreated in older persons (Brown, Kirkpatrick, Swanson, & McKenzie, 2011; Currie & Wang, 2004; Jacobs, Hammerman-Rozenberg, Cohen, & Stessman, 2006; Reyes-Gibby, Aday, & Cleeland, 2002).

It is often not the individual with pain but others, such as health care professionals, who assess pain and facilitate access to evidence-based interventions. Given the importance of receiving appropriate treatment, it is pivotal to explore factors that alter observers’ interpretations of others’ pain. Such contextual factors – separate from the individual experiencing pain – can have direct implications for that individual with pain.

Mounting evidence has demonstrated that many contextual factors play a role in the interpretation of pain signals (Hadjistavropoulos et al., 2011). For example, the evaluation of facial expressions of pain in younger adults has been found to vary as a function of the presence of confirming medical evidence and psychosocial problems (De Ruddere, Goubert, Vervoort, Prkachin, & Crombez, 2012; De Ruddere, Goubert, Stevens,
de C Williams, & Crombez, 2013; De Ruddere et al., 2014). While theoretical formulations emphasize the role of these contextual influences (e.g., Hadjistavropoulos et al., 2011), they provide insufficient specificity on the nature of such influences.

Despite the accumulating empirical evidence demonstrating the importance of contextual variables in evaluating pain, the effects of these factors in decoding pain expressions of older adults is largely unexplored. The overarching purpose of the present study was to examine the effects of contextual variables on observers’ perceptions of pain as function of age and other contextual factors. Specifically, the effects of two informational primes (compared to a neutral control prime) on observers’ judgments were explored. The two informational primes included: (a) information about the possibility of deception due to perceived secondary gain as a result of having a medical condition; and (b) the prevalence and undertreatment of pain in older adults. A second purpose of the study was to clarify whether these contextual variables produce the same effect on nursing students as compared to non-nursing students, given the important role played by nurses in pain assessment and management. In general, it was expected that clarification of factors that influence interpretations of pain could improve both pain assessment and management through the development of interventions designed to improved accuracy of health care professionals’ evaluations of patients’ pain.

1.2. Pain

Pain is a complex experience that involves dynamic interactions across immune, sensory, hormonal, and inflammatory processes in the periphery, spinal cord, and brain (Feizerfan & Sheh, 2014). Importantly, the natural presentation of pain has led this experience to be classified as either acute or chronic. While acute pain is provoked by a
specific disease or injury and implies a rapid onset and/or brief course, chronic pain refers to pain that persists beyond the normal time of healing (Feizerfan & Sheh, 2014). Given the complexity of the pain experience, the transition from acute to chronic pain is multifaceted. For example, it has been proposed that acute pain can alter biological processes that can result in increased susceptibility for the development of chronic pain (Feizerfan & Sheh, 2014). Regardless of the transitional process, chronic pain is generally considered more difficult to assess and treat because it can persist even after the known injury/tissue damage has healed (Grichnik & Ferrante, 1991). This is concerning given this high prevalence of chronic pain across Canada and its’ detrimental effects.

Approximately one in five Canadians aged 15 years and older experiences chronic pain (i.e., pain that occurs more days than not for a minimum of three months; Reitsma, Tranmer, Buchanan, & Vandenkerkhof, 2011; Schopflocher et al., 2011). Given this high prevalence, it is not surprising that chronic pain is one of the most costly health conditions in Canada. Chronic pain is more financially burdensome than cancer, heart disease, and human immunodeficiency virus combined (Phillips & Schopflocher, 2008; Schopflocher et al., 2011). It is estimated that chronic pain costs the Canadian health care system $6 billion annually and employers a staggering $37 billion annually (e.g., job loss, sick days; Phillips & Schopflocher, 2008; Schopflocher et al., 2011). Not surprisingly, chronic pain is globally recognized as an exhaustive and increasing burden on health care systems, employers, and society in general (Breivik, Eisenberg, & O’Brien, & 2013; Dagenais, Caro, & Haldeman, 2008). These high socioeconomic impacts are related to the substantial debilitating effects of chronic pain to the individual.
Chronic pain is associated with both physical and psychosocial concerns. Individuals with chronic pain are at an increased risk of physical disability, morbidity, and other severe medical conditions (Lapane, Quilliam, Chow, & Kim, 2012; Reitsma et al., 2011; Soldato et al., 2007). They are also more prone to mental health concerns, including depression and anxiety (Lapane et al., 2012; Reitsma et al., 2011; Soldato et al., 2007). In general, lower quality of life and decreased social satisfaction are also more frequent in those who experience chronic pain (Lapane et al., 2012; Reitsma et al., 2011; Soldato et al., 2007). Importantly, however, the occurrence and sequela of chronic pain significantly varies depending on the age of the individual with pain (Riley, Wade, Robinson, & Price, 2000). Acknowledging these systematic differences over the lifespan are essential for the appropriate assessment and treatment of chronic pain.

1.2.1. Pain across the lifespan. Given an increased prevalence of health conditions (e.g., arthritis) that often accompany aging, it is not surprising that older persons are more prone to experience pain (Hunt et al., 2015; Thomas, Peat, Harris, Wilkie, & Croft, 2004). In Canada, community dwelling adults 65 years of age and older (i.e., adults not living in long-term care facilities) are almost twice as likely to experience chronic pain as persons 35 years of age and younger (Schopflocher et al., 2011). Global estimates suggest that between 25% to 63% of community dwelling older persons experience chronic pain (depending on the pain duration criterion used; Brown et al., 2011; Jacobs et al., 2006; Jakobsson, Klevsgard, Westergren, & Hallberg, 2003; Moulin, Clark, Speechley, & Morley-Forster, 2002; Reitsma et al., 2011; Schopflocher et al., 2011). In contrast, estimates suggest that only 20% to 40% of adults ages 18 to 50 experience chronic pain (Johannes, Le, Zhou, Johnston, & Dworkin, 2010; Tsang et al.,
Despite these variations, most authorities agree that the occurrence of chronic pain substantially increases among older persons.

This trend is especially troubling given Canada’s rapidly aging population. Between 1970 and 1980, less than 10% of Canadians were 65 years and older, but by 2041, it is expected that almost one in four Canadians will fall in that age range (Statistics Canada, 2008). Given the aging population and prevalence of chronic pain in older persons, it is expected that chronic pain will become an even more prominent health issue in Canada’s future. In turn, developing an understanding of the unique issues related to pain in older persons is a pressing concern.

Consistent with lifespan development theories (see Boyd, Bee, & Johnson, 2015 for review), it is hypothesized that individuals are confronted by distinct concerns, roles, and problems at each stage of life. As such, it is not surprising that chronic pain affects unique aspects of individuals’ livelihoods, depending on their age. Specifically, older adults with chronic pain are significantly more likely to be inactive, house bound, socially isolated, and dependent on others in completing daily life activities (Jacobs et al., 2006; Reyes-Gibby et al., 2002; Sofaer-Bennett et al., 2007). They are also more prone to have poor self-perceived health status, even after controlling for objective health status, socio-demographic characteristics, and access to medical care (Reyes-Gibby et al., 2002). Mental health concerns, loneliness, and poor relationship satisfaction are also more frequent in older persons with chronic pain (Brown et al., 2011; Currie & Wang, 2004; Jacobs et al., 2006; Reyes-Gibby et al., 2002).

In comparison, the impact of chronic pain on younger persons is particularly destructive to their vocational functioning. Several research groups have demonstrated
that chronic pain is a strong predictor of reduced ability to work (Blyth, March, Brnabic, & Cousins, 2004; Saastamoinen, Leino-Arjas, Laaksonen, & Lahelma, 2005; Stewart, Ricci, Chee, Morganstein, & Lipton, 2003). For example, in a large-scale investigation where over 4800 individuals with chronic pain completed in-depth interviews, 61% of participants endorsed being “less able” or “unable” to work outside their home (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). Moreover, almost 20% of the total sample had lost their job due to pain (Breivik et al., 2006). This inverse relationship between chronic pain and vocational functioning is concerning considering adults ages 25 to 44 account for almost half of Canada’s work force (Statistics Canada, 2015). Less than 4% of older persons (ages 65 years and older) compose Canada’s labour force (Statistics Canada, 2015). As such, younger persons are far more likely to seek financial compensation as a result of missed work due to chronic pain.

Recognizing such differences between older and younger adults is essential to identify factors that may alter the assessment and treatment of pain. This is critical since it is often not the individual with pain but others (e.g., health care professionals) who evaluate their pain and subsequently grant access to effective pain treatment. Given the high costs of pain on individuals, employers, and healthcare systems, it is evident that developing strategies to help overcome barriers to effective pain care is an important area of investigation.

1.2.2. Pain assessment and management. Since pain is a prevalent, costly, and growing concern, it is not surprising that a variety of evidence-based pain management strategies have been developed. Both pharmacological (e.g., analgesics) and nonpharmacological (e.g., cognitive-behavioural therapy) treatments have been related to
improved outcomes in patients with pain, including older persons (Dahl, Wilson, & Nilsson, 2004; Hoffman, Papas, Chatkoff, & Kerns, 2007; Martell et al., 2007; Morone, Greco, & Weiner, 2008; Veehof, Oskam, Schreurs, & Bohlmeijer, 2011). Results from these investigations suggest that chronic pain can be effectively managed across the lifespan. Despite the promising results of pain treatments, chronic pain is highly underrecognized and undertreated (Breivik et al., 2006).

For example, although approximately 70% of individuals with chronic pain that Breivik et al. (2006) interviewed were using nonpharmacological pain management strategies, most were using therapies with limited evidence of effectiveness. Few of these individuals were involved in empirically supported approaches (e.g., multidisciplinary and cognitive-behavioural treatment programs), which have consistently been found to have significant, lasting effects (Breivik et al., 2006). Pharmacological strategies were also not effectively implemented to control individuals’ chronic pain. Over two-thirds of the sample reported that their pain medications did not consistently reduce their pain, suggesting that pharmacological strategies may not be effectively prescribed and/or used in an effective manner (Breivik et al., 2006).

This alarming rate of inadequate treatment of chronic pain appears most frequently in older persons (Gauthier & Gagliese, 2011; Herman, Johnson, Ritchie, & Parmelee, 2009; Horgas & Elliott, 2004). Specifically, researchers have found that there is a lower recognition of older persons’ pain and a greater likelihood that older adults will receive suboptimal pain management (Denny & Guido, 2012; Hwang, Richardson, Harris, & Morrison, 2010). Given the high prevalence and severe impact of chronic pain, particularly among older persons, identifying factors that are leading to this
undertreatment is important. As such, the initial steps of treatment provisions (i.e., the assessment process) is a pivotal area of research.

According to the International Association for the Study of Pain (IASP), pain is defined as “an unpleasant sensory and emotional experience that is associated with actual or potential tissue damage, or described in terms of such damage” (IASP, 2012). Given the inclusion of both physical and psychological properties in the definition of pain, relying solely on biological indices to assess pain is insufficient. While various valid and reliable pain assessment tools that assist in the operationalization of others’ pain exist, patients’ subjective pain experience is often assessed through unstandardized methods (Breivik et al., 2006; Manias, Gibson, & Finch, 2011). For example, nurses at a hospital were found to use standardized measures only about half of the time when assessing patients’ pain, relying primarily on their own judgements (Manias et al., 2011). Since pain is often assessed through such unstructured methods, understanding factors that may affect this process warrants significant attention.

The overarching purpose of this study was to identify factors that affect observers’ evaluations of pain. Given the differences in pain across the lifespan, an emphasis of this research is exploring the interaction between contextual factors that may influence observers’ interpretations of others’ pain and the age of the individual with pain (i.e., younger vs. older adults). Since factors that affect observers’ judgements of individuals with pain over the lifespan are not well understood, this study involved a structured experimental design. This was selected to maximize control for confounding variables. Given the emphasis on identifying contextual factors that alter observer judgements of pain, the theoretical framework guiding this investigation is the
communications model of pain (Hadjistavropoulos & Craig, 2002; Hadjistavropoulos et al., 2011; Prkachin & Craig, 1995). The following section is an introduction of this model and highlights the contributions of results from this study to the model.

1.3. Communications Model of Pain

The communications model of pain (e.g., Hadjistavropoulos & Craig, 2002; Hadjistavropoulos et al., 2011; Prkachin & Craig, 1995) is a comprehensive conceptualization where contextual processes affecting pain are emphasized. More specifically, this model takes into account earlier, empirically supported theories and published evidence (e.g., the internal experience of pain as depicted in the gate control theory and neuromatrix model; psychological influences; Melzack & Wall, 1965; Melzack, 1999), while adding to the conceptualization of pain by focusing on pain communication and pain as a social/psychological experience. It is the only known model that conceptualizes pain within a dynamic communication process, where factors affecting the observer and expresser are explicitly delineated.

In general, the communications model of pain was framed based on an A→B→C communication process that was described by Rosenthal (1982). Pain is depicted as an internal experience (A) that is encoded in expressive behaviour (B) and then decoded by observers who may choose to intervene (C). Given that variables of interest for this proposed study are contextual factors that are affecting observer interpretations, Step C of this model is the most pertinent to the present investigation. According to the communications framework, however, all steps are related; hence each step has been reviewed.
1.3.1. Step A: The internal experience. The internal experience of pain is dynamically affected by biological, psychological, and sociocultural parameters (Hadjistavropoulos, et al. 2011). This idea stems from the highly influential gate control theory of pain and the neuromatrix model (e.g., Melzack & Wall, 1965; Melzack, 1999).

Gate control theory and neuromatrix model. While incorporating the role of tissue damage and ascending nociceptive (i.e., sensory information sent to the brain that may then be interpreted by the brain as pain) messages to the brain, Melzack and Wall (1965) also attributed an active role of the central nervous system in the determination of the pain experience. The acknowledgement that psychosocial factors affect the pain experience shifted the field of pain. The theory provided a foundation for understanding the subjectivity of the pain experience, which often presents assessors with challenges in their efforts to accurately evaluate pain.

In positing the mechanisms of the pain experience, Melzack and Wall (1965) hypothesized that pain may be a result of peripheral injury and nociceptive information. These researchers specified that nociceptive information encounters a gating mechanism, located in the spinal dorsal horn, which modulates the transmission of nerve impulses. The transmission of the messages is dependent on the activation of the gating mechanism; in other words, the transition of sensory signals is dependent on whether the gate is “open” or “closed.” They proposed that the opening and closing of this gating mechanism is activated and inhibited by specific fibres, with the activation of small A myelinated fibres initiating the action potential of the gate and quickly transmitting nociceptive information to the brain. In contrast, large C unmyelinated fibres inhibit the
action potential of the gate preventing the nociceptive information from being perceived as pain. These large C fibres carry non-nociceptive information, such as the feeling of touch or pressure. Importantly, these features of Melzack and Wall's (1965) theory has received strong empirical support (e.g., Basbaum & Fields, 1984; Bjordal, Johnson, & Ljunggreen, 2003; Humphries, Johnson, & Long, 1996; Julien & Marchand, 2006; Kim, Jeong, Jung, & Kim, 2011).

Despite their advancements in depicting the physiological processes of pain, the key revolutionary feature of the theory is their recognition of the role of the brain in the pain experience. That is, Melzack and Wall (1965) proposed that the gating mechanism is also affected by transmissions through fibres descending from the brain’s supraspinal regions. Consequently, the brain is recognized to play an active role in the experience of pain; it is not simply a passive receiver of messages. As such, psychological processes including thoughts, emotions, and beliefs can exert their influence on the pain experience.

This created a framework to explore the relationship between pain and a variety of psychosocial, factors such as mood, emotions, social context, and cultural background (e.g., Craig & Weiss, 1971; Hadjistavropoulos et al., 2011; Rainville, Bao, & Chretien, 2005; Sullivan, Adams, & Sullivan, 2004; Sullivan, Rouse, Bishop, & Johnston, 1997; Tang et al., 2008; van Laarhoven et al., 2012). Moreover, this theory allowed for psychological strategies to be recognized as potentially effective in the management of pain. Importantly, this theory has been supported in empirical studies. Research has supported both the influence of descending messages from the brain (e.g., Price, 2000; Rainville et al., 2005) and the influence of social and psychological factors on the experience (e.g., Craig & Weiss, 1971; Hadjistavropoulos et al., 2011; Rainville et al.,
Although the gate control theory provided a comprehensive understanding of the pain experience, not all forms of pain were adequately explained. Pain that was not associated with peripheral input was still not well understood. For example, the gate control theory could not account for phantom limb pain (i.e., pain occurring in a limb that is amputated and is no longer there) given the absence of peripheral stimulation. As a result, Melzack (1999) supplemented the theory with the neuromatrix model of pain.

According to the neuromatrix model, a widespread network of neurons (called the neuromatrix) continuously processes information and forms characteristic patterns of neuronal loops (called the neurosignature; Melzack, 1999). The neuromatrix is determined by genetic and sensory influences. The elicitation of the neurosignature is influenced by a variety of inputs, including sensory experiences (e.g., somatic receptors) and visual and other sensory inputs that alter cognitive interpretations. Also, cognitive and emotional inputs from other brain regions and neural modulation patterns that are inherent to all brain functions may also elicit activation of the neurosignature. Finally, the neurosignature is also thought to be influenced by the activation of the stress-response. This activation of the neurosignature results in the experience of pain. Once the neurosignature is established, peripheral stimuli are not necessary to elicit its activation. Therefore, the neurosignatures may continue to be active after tissue healing.

The continued activation of the neuromatrix explains pain that occurs without a clear pathogenic sign (Melzack, 1999). Phantom limb pain can be explained as a continued activation of the neurosignature, despite the absence of nociceptive
information sent from the amputated limb. The neuromatrix model also allowed for the relationship between pain and tissue damage to be understood better within a cohesive model.

Following the advent of the gate control theory and the neuromatrix model, a variety of biopsychosocial models of pain, including the communications model, emerged. According to these models, pain occurs through dynamic and continuously evolving interactions among biological (e.g., predispositions, medical ailments), psychological (e.g., emotional state, cognitions), and social factors (e.g., culture, social context; see Hadjistavropoulos et al., 2011 for review). In turn, researchers became increasingly interested in exploring psychological, environmental, and social factors in relation to pain. The communications model was one of the few biopsychosocial models to incorporate such features in the pain experience. As identified previously, it is also the only model that also incorporates factors that alter observers’ interpretations of pain expression.

1.3.2. Step B: Encoding and expressing pain. The internal experience of pain typically results in the pain message being encoded in expressive behaviour. Like all forms of communication, pain expressions may come in the form of both verbal and nonverbal behaviours. Both forms of expression provide important information about the subjective experience of pain (Hadjistavropoulos, LaChapelle, MacLeod, Snider, & Craig, 2000; Manne, Jacobsen, & Redd, 1992).

Nonverbal expressions are considered to be heavily reliant on reflexive automaticity, while verbal expressions are thought to be largely reliant on cognitive executive mediation processes (Hadjistavropoulos & Craig, 2002; Hadjistavropoulos et
For example, wincing or reflexively pulling away from a painful stimulus (i.e., nonverbal expressions) occurs without substantial cognitive activity. In contrast, higher order cognitive functions, including language and knowledge of rating systems, are inherently required for individuals to verbally describe their pain (Green, Hadjistavropoulos, & LaChapelle, 2000; Manne et al., 1992).

One variable of interest has been the influence of age on encoding and expressing pain. Interestingly, older persons often provide lower verbal pain ratings compared to younger persons (Cutler, Fishbain, Rosomoff, & Rosomoff, 1994; Gagliese & Melzack, 2003; Gagliese, Weizblit, Ellis, & Chan, 2005; Turk, Okifuji, & Scharff, 1995). This is particularly apparent in rating systems that query sensory/affective aspects of pain (compared to rating systems that exclusively evaluate the intensity/severity features of pain; Gagliese & Katz, 2003; Gagliese & Melzack, 2003; Gagliese et al., 2005; Gibson & Helme, 2001). Although the conscious processes of pain encoding differ with age, facial pain-related grimaces are consistent across the lifespan (Kunz, Mylius, Schepelmann, & Lautenbacher, 2008; Kunz, Mylius, Schepelmann, & Lautenbacher, 2009). This finding is informative for the assessment of pain as it may suggest that nonverbal pain expressions are valuable in understanding the pain experience across the lifespan.

Operant processes also influence pain expressions. For example, it has been suggested that secondary gain (e.g., avoidance of aversive responsibility) can increase the display of pain behaviours and verbal reports of pain (e.g., Block, 1997; Craig, 1996; Fordyce, 1996; Loeser, 1996; Merskey, 1996a; Merskey, 1996b). Given past research demonstrating that providing observers with information about the possibility of secondary gain due to pain within the health care system can affect assessors’ ratings of
pain (e.g., De Ruddere et al., 2013), this type of informational priming about secondary gains is a key variable of interest in this investigation.

Operant conditioning model of pain. Fordyce’s operant conditioning model of pain was one of the first to account for the role of contextual factors in the pain experience (Fordyce, 1976). Fordyce applied principles of behaviourism to explain how external factors affect individuals with pain. Consistent with the behavioural approach, he postulated that people express pain as a function of potential rewards (e.g., receiving support from others, monetary compensation) and punishments. Individuals then learn the relationship between their behaviours and consequences, which increase the likelihood of engaging in specific behaviours over time (e.g., help seeking).

In terms of pain, Fordyce indicated that those with pain can express both maladaptive and adaptive pain behaviours. These behaviours can be reinforced by external factors and result in increased or decreased occurrence of this action. This relationship, between behaviours and social reinforcement, has been demonstrated in several empirical investigations (e.g., Asmundson, Jacobson, Allerdings, & Norton, 1996; Romano et al., 1995; Romano, Jensen, Turner, Good, & Hops, 2000). Nonetheless, the operant model became the subject of intense controversy when Fordyce proposed that secondary gain is largely responsible for pain chronicity in individuals (with low back pain) who lacked signs of organic pathology (e.g., Block, 1997; Craig, 1996; Fordyce, 1996; Loeser, 1996; Merskey, 1996a; Merskey, 1996b).

According to the operant model, individuals with pain without organic pathology were theorized to be exaggerating their symptoms or malingering to receive secondary gain, such as financial compensation (Fordyce, 1976). In response, compensation
organizations adopted policies in attempt to safeguard themselves against fraudulent presentations. The responsibility of determining the validity of claimants’ pain subsequently fell on the health care professionals who assessed these claimants. This resulted in heated debate. Given that pain was understood to be both a biological and a psychosocial experience (e.g., Block, 1997; Craig, 1996; Fordyce, 1996; Loeser, 1996; Merskey, 1996a; Merskey, 1996b), it was argued that lack of organic evidence was not sufficient to suggest that individuals’ pain behaviours were solely driven by secondary gains (e.g., Block, 1997; Craig, 1996; Fordyce, 1996; Loeser, 1996; Merskey, 1996a; Merskey, 1996b). For example, researchers have demonstrated that organic pathology is often not identified by diagnostic procedures due to instrument limitations (Giles & Crawford, 1997). Given the controversies associated with understanding nonverbal pain behaviours, exploring the potent impact of observer/assessor characteristics became an increasingly important consideration in the pain experience.

1.3.3. Step C: Decoding expressive behaviour. Understanding factors that affect observers’ interpretations of pain messages, including possible biases, is essential to the comprehension of pain. According to the communications model, once the pain message is expressed, observers may decode it and subsequently attempt to intervene. This is a central component of the communications model that is not explicitly emphasized in other models (e.g., the operant conditioning model). Yet, the task of decoding senders’ pain cues is complex; various factors influence the sender/observer transaction (Hadjistavropoulos, Ross, & von Baeyer, 1990; Hadjistavropoulos, McMuctry, & Craig, 1996; Hadjistavropoulos & Craig, 2002; Kallai, Barke, & Voss, 2004; Levine & De
Simone, 1991). Moreover, the process of decoding nonverbal expressions differs from the process of decoding verbal reports.

As expected, verbal reports are often easier for observers to decode. These generally involve explicit rating systems (e.g., rating pain on a 0 to 10 scale, where 0 = no pain and 10 = extreme pain) or verbal descriptions of the pain (e.g., burning, stabbing, throbbing). In contrast, nonverbal expressions are more difficult to interpret because they are often ambiguous, which may lead observers to provide discrepant ratings (between observers and individuals with pain; Hadjistavropoulos et al., 1990; Hadjistavropoulos et al., 1996; Kallai et al., 2004; Levine & De Simone, 1991). Essentially, observers are more likely to be influenced by contextual, often-unrelated, factors when interpreting nonverbal pain expressions in comparison to verbal reports. Since the relationships between contextual factors and decoding pain expressions have been established, specifying variables that affect observers’ reports has received attention. A more comprehensive understanding of factors that influence interpretations of pain, prior to intervention, may improve both pain assessment practices and increase the provision of effective pain management.

Several contextual variables have been found to impact the interpretation of pain expressions of younger adults (e.g., De Ruddere et al., 2012; De Ruddere et al., 2013; De Ruddere, Goubert, Vervoort, Kappesser, & Crombez, 2013; De Ruddere et al., 2014; Hadjistavropoulos et al., 1996; Kappesser, Williams, & Prkachin, 2006; Prkachin, Berzins, & Mercer, 1994; Pronina & Rule, 2014). For example, gender of both the observer and individual with pain have been found to influence observers’ ratings (Beaupre et al., 1997; Cano, Johansen, & Geisser, 2004; Riva, Sacchi, Montali, &
Frigerio, 2011). Specifically, observers are more likely to underestimate pain of female targets (compared to the targets’ own reports; Beaupre et al., 1997; Cano et al., 2004; Pronina & Rule, 2014; Riva et al., 2011). Yet gaps in the literature exploring contextual factors and pain exist. Community dwelling older adults have been largely overlooked in research where judgements of pain expressions were evaluated. This is problematic since the age of the individual expressing pain is one contextual factor known to affect the decoding process.

*The age of the individual with pain.* In well-controlled laboratory studies, both health care professionals and lay people estimated that that older persons were experiencing greater levels of pain than younger persons (Hadjistavropoulos et al., 2000; Lautenbacher, Niewelt, & Kunz, 2013). Importantly, younger and older adults’ pain expressions were quantified and balanced to ensure that attributing greater pain to older persons was not a by-product of older persons actually expressing more pain. Based on these findings, it may be concluded that observers are more prone to perceive older persons as experiencing greater pain than younger persons, even when these two groups objectively express similar levels of pain. Nonetheless, when Bartley and Fillingim (2013) asked health care professionals to evaluate pain expressions of an older and younger virtual human (i.e., avatar) expressing pain, Caucasian health care professionals provided higher pain ratings when evaluating pain in a younger virtual human, compared to the older virtual human. While, the opposite was found for non-Caucasian health care professionals. Non-Caucasian health care professionals provided higher pain ratings when judging pain expressions of the older virtual human, compared to the younger virtual human (Bartley & Fillingim, 2013). Given that Bartley and Fillingim (2013) did
not use actual stimulus people (but avatars), this inconsistency may be attributed to this methodological difference. That is, observers may not be responding to avatars in the same way they may respond to actual persons. Regardless of the methodological differences, these investigations all demonstrate the influence of contextual features of pain.

Given these findings, one within-subject main effect that was explored in the present investigation is the differences in observers’ evaluations of pain expressions depending on the age of the individual expressing pain (younger vs. older). Since a key methodological difference between Bartley and Fillingim’ study (2013) and the aforementioned studies (Hadjistavropoulos, Craig, Hadjistavropoulos, & Poole, 1996; Hadjistavropoulos et al., 2000; Lautenbacher et al., 2013), was the use of avatars instead of real patients, it is hypothesized that results will be consistent with research that involved real patients. More specifically, it is hypothesized that older persons will be judged as having greater pain than younger persons.

**Observers’ professional experience.** In a laboratory study, Prkachin, Solomon, Hwang, and Mercer (2001), demonstrated that health care professionals tended to underestimate patients’ pain in comparison to family members who had lived with an individual with chronic pain. Consistently, Hadjistavropoulos et al. (1998) demonstrated that nurses assigned lower pain ratings to pain patients than did lay people. This underestimation has also been supported in various health care settings (Choiniere, Melzack, Girard, Rondeau, & Paquin, 1990; Lenburg, Glass, & Davitz, 1971; Modić Stanke & Ivanec, 2008; Perry & Heidrich, 1982; Prkachin et al., 2001; von Baeyer, Johnson, & McMillan, 1984). More specifically, nurses are particularly prone to
underestimate patients’ pain in real-world circumstances (e.g., hospitals; Duignan & Dunn, 2008; Puntillo, Neighbor, O’Neil, & Nixon, 2003). One hypothesis is that this underestimation may be related to nurses being exposed to pain more frequently. The frequent exposure is thought to lead to a desensitization process, which results in nurses being more prone to underestimate the intensity expressed (Choiniere et al., 1990; von Baeyer et al., 1984). This is concerning given nursing is the largest health profession in Canada. As such nurses play a pivotal role in the provision of health care services, which includes pain management (Desai, Chaturvedi, & Krishnaswamy, 2014).

Despite nurses’ central role in pain assessment and access to treatment, few studies have explored nurses’ perceptions of older and younger adults’ pain expressions in a controlled laboratory study. Lay people are often used as judges in these studies due to the substantial barriers to the recruitment of nurses for research (Jacobson, Warner, Fleming, & Schmidt, 2008; Kajermo, Nordstrom, Krusebrant, & Bjoervell, 2000; Roxburgh, 2006). Barriers include lack of time and independence from the health care organization and lack support from senior staff (Jacobson et al., 2008; Kajermo et al., 2000; Roxburgh, 2006). Given the difficulties recruiting nurses, researchers have explored the impact of health care training on the decoding process of pain by using students studying health care professions, including nursing students, as participants. To further support using nursing students in lieu of nurses, it has been demonstrated that nurses’ work experience (i.e., years of experience) does not impact their ratings of individuals expressing pain (Prem et al., 2011) and pain knowledge (Wilson, Journal of Clinical Nursing).
Given that health care professionals evaluation of others’ pain often differs from that of lay people, one purpose of this study was to explore differences between nursing students’ and non-nursing students’ interpretations of others’ pain. Based on previous research with practicing nurses (e.g., Duignan & Dunn, 2008; Hadjistavropoulos et al., 1998), it was hypothesized that nursing students will rate others’ pain lower, perhaps because they are exposed to information about illness and suffering that leads to a possible desensitization, which minimizes their reactions to painful expressions (Choiniere et al., 1990; von Baeyer et al., 1984). Examining this contextual variable (i.e., observer background training) in isolation, however, provides less information regarding the impact of external features in pain evaluation. As such, the effect of professional experience along with age of the individual expressing pain and other contextual factors was examined.

**Priming with information.** Not all contextual factors are as overt as the age of the individual with pain and professional experience of the observer. In a series of studies in the 1970s, Meyer and Schvaneveldt identified that exposure to one stimulus can indirectly influence the response to another stimulus. This phenomenon is known as *priming*, or the process of activating particular constructs, schemas, or attitudes that can affect future behaviour (Meyer & Schvaneveldt, 1971; Meyer, Schvaneveldt, & Ruddy, 1975; Schvaneveldt & Meyer, 1973).

In a series of seminal laboratory experiments, Bargh, Chen, and Burrows (1996) demonstrated that activating particular constructs through priming can result in significant behavioural changes, outside of the awareness of participants. In one study, Bargh et al. (1996) exposed participants to two different word tasks. One task involved
words that were not related to any constructs [control condition], while the other task had words related to the concept of “being old” [aging prime condition]. Unbeknownst to participants, their walking speed was measured upon exiting the laboratory once they completed the word task. Although participants reported being unaware of the theme of the word task, those exposed to about the theme of “being old” walked more slowly upon exiting the laboratory than those who were not. The same research group expanded their studies to examine other concepts, such as rudeness and stereotypes (Bargh et al., 1996). All of which have demonstrated the potent effects of priming on individuals’ actions.

Since Bargh et al.’s (1996) seminal studies, the effects of priming have been examined in relation to a variety of concepts. De Ruddere et al. (2013) are the only researchers to study the effects of priming on the interpretation of pain expressions. This important study by De Ruddere et al. (2013) revealed that priming observers with information about the possibility of deception within the health care system affected their perceptions of others’ pain. These findings are pivotal for this present investigation. A primary goal of this study was to investigate how priming with different types of information impacts the evaluation of pain expressions exhibited by older and younger adults.

*Social deception.* According to Cosmides (1998), humans are highly sensitive to cues about social deception (e.g., cheating). The ability to detect dishonesty is beneficial because it protects individuals from being exploited by others (Cosmides, 1989). Since pain is a social experience, the belief of the genuineness of the pain displayed by others has been a variable of interest. Researchers anticipated that the more suspicious observers are of others’ pain, the more tentative observers are when evaluating this pain. This is
particularly evident in the aforementioned controversies that followed the operant conditioning model of pain.

As identified previously, individuals with pain may mangle pain behaviours to receive secondary benefits (e.g., assistance; Fordyce, 1976). As such, evaluating if patients’ pain is genuine is a prominent concern in the compensation process for individuals who lose income due to chronic pain (Hadjistavropoulos, 2013). Insurance/worker’s compensation organizations often emphasize the important role of health care professionals (who often function as assessors) in determining the validity of claimants’ pain; however, as discussed, assessing others’ pain is challenging, especially when the assessors believe that the lack of organic evidence suggests that individuals expressing pain may be malingering. According to the communications model, such beliefs are theorized to affect assessors’ judgments.

Given the interest in this topic, interpretations of adults’ pain expressions have been examined as a function of observers being provided with social deception cues. Results from these investigations have demonstrated that observers who were explicitly told (i.e., not primed) that some individuals expressing pain may have faked their pain were found to generally provide lower pain estimates for all patients (Kappesser et al., 2006; Poole & Craig, 1992). These observers also underestimated patients’ pain (i.e., compared to patients’ ratings; Kappesser et al., 2006). In contrast, providing observers with information intended to reduce social deception (e.g., supportive medical evidence), resulted in higher pain estimates, more sympathy towards the individual expressing pain, and greater positive evaluations of the individual with pain (De Ruddere et al., 2012; De Ruddere et al., 2013; De Ruddere et al., 2014). Although these findings demonstrate the
impact of cueing observers about social deception on their interpretation of pain
expressions, this information was explicit. The scripts provided to observers clearly stated
that some of the individuals expressing pain they will observe were faking their pain.

By contrast, implicit primes represent an important area of study. For example, does reading a newspaper article about the misuse of the health care system later affect the reader’s interpretation of others’ pain? In order to examine the effects of implicit primes, De Ruddere et al. (2013) conducted a structured laboratory study where non-health care professionals were randomly assigned to receive information about the misuse of the health system (e.g., some people visit a physician not because they are ill but because they want a prescription for medication they do not need or because they want a medical note when they are not ill) or neutral texts (i.e., general description of the health care system; De Ruddere et al., 2013). Subsequently, all participants rated pain expressions of four adults (44-55 years of age). As anticipated, results demonstrated that those who were primed with information about the possibility of health care system misuse had a significantly greater negative valence towards patients than those who were not primed with this information, which resulted in significantly lower estimates of the others’ pain. De Ruddere et al. (2013) concluded that observers judged others’ pain more harshly when they were primed to the possibility of social deception in the health care system. As explained previously, it is suspected that this result is related to humans being highly sensitive to cues about social deception, since detecting social deception may be protective from being exploited (Cosmides, 1989).

Considering De Ruddere et al.’s (2013) findings, a focus of this study was to examine the effect of priming observers with information about the misuse of the health
care system on their ratings of younger and older persons displaying pain. It was hypothesized that priming about misuse of the health care system may play a prominent role in altering how pain expressions are judged, particularly pain expressions of younger adults. Since Fordyce’s (1976) operant conditioning model, the misuse of the health care system in relation to pain behaviours has attention. Given that younger adults are more prone to require benefits (as younger persons are more likely to be working), it was expected that this informational prime would be more likely to affect observers’ ratings of younger persons’ pain.

The undertreatment of pain in older persons. Another important topic in the interpretation of pain expressions surrounds the pervasive undertreatment of pain in older persons (Gauthier & Gagliese, 2011; Herman et al., 2009; Horgas & Elliott, 2004). The tendency to undertreat pain in older compared to younger patients is likely due to a combination of complex factors (Gauthier & Gagliese, 2011; Herman et al., 2009; Horgas & Elliott, 2004). More specifically, the overreliance on stereotypes and prejudices towards older individuals is a concerning societal problem (Butler, 1969; Penson, Daniels, & Lynch, 2004). Myths about older persons are thought to promote negative biases towards them (Brown, 2004). For instance, older persons are often stereotyped as having difficulties hearing, remembering, and thinking independently and are commonly characterized as “ineffective” (Brown, 2004). Although a communal issue, these biases towards older persons are particularly problematic in healthcare services (Penson et al., 2004).

The effects of stereotypes on older persons’ pain management have received some attention. Pain is often characterized as a “natural” part of aging (Penson et al., 2004). As
such, health care professionals may be more likely to believe that it should be “endured” (Penson et al., 2004). This misconception about pain and aging has been observed in nurses and nursing students (Brown, Bowman, & Eason, 1999; Carr, 2007; Holroyd, Dahlke, Fehr, Jung, & Hunter, 2009; Tse, Vong, & Ho, 2012).

Consistent with the communications model, this belief about pain in old age are believed to interfere with health care professionals’ ability to decode pain expressions in older persons. In support of this idea, relationships between health care professionals’ (i.e., nurses) attitudes and their actions towards older persons in pain have been explored. Consistent with expectations, nurses with biased attitudes towards older persons have been found to be less likely to be aware of the need to perform appropriate pain assessments on older persons (Ben Natan, Ataneli, Admenko, & Har Noy, 2013). Conversely, educational interventions, involving information intended to correct myths associated with pain and older age have led to better knowledge about pain and improved attitudes towards pain assessments practices and provision management strategies (Baier et al., 2004; Cleeland et al., 2003; Ghandehari et al., 2013; Jones et al., 2004; Kaasalainen et al., 2012; Manias et al., 2011; Rosemann, Joos, Laux, Gensichen, & Szecsenyi, 2007; Tornkvist, Gardulf, & Strender, 2003; Tse et al., 2012). For example, Tse et al. (2012) provided nurses in a long-term care facility with eight, one-hour education sessions about general pain information, psychological well-being of older adults, and pain assessment and management strategies. Results demonstrated that nurses who completed the education sessions had better knowledge of and attitudes towards pain in older persons. Residences of this facility also experienced significant gains, including reduced pain and increased happiness and life satisfaction. Although Tse et al.’s (2012) intervention is one
of many, similarities across these educational initiatives are pronounced: they are time-intensive (one hour to four full days of courses) and focused on a breadth of topics about pain in older populations (e.g., barriers to pain assessment, reviewing a variety of pain assessment tools, etc.; Baier et al., 2004; Cleeland et al., 2003; Ghandehari et al., 2013; Jones et al., 2004; Kaasalainen et al., 2012; Manias et al., 2011; Rosemann et al., 2007; Tornkvist et al., 2003; Tse et al., 2012). Yet, brief, focused training sessions about decoding pain expressions have also led to significant changes in interacting with individuals with pain (e.g., Solomon, Prkachin, & Farewell, 1997), suggesting that even the provision of a small amount of information has the capacity to alter health care professionals’ behaviours towards those with pain.

Given these findings (e.g., Baier et al., 2004; Cleeland et al., 2003; Jones et al., 2004; Kaasalainen et al., 2012; Manias et al., 2011), it is plausible that exposure to information regarding the undertreatment of pain in older persons may affect the decoding process of pain. This is of interest in the present investigation. More specifically, a purpose of this study was to determine whether an informational prime about pain undertreatment in older persons would differentially impact ratings of pain of older vs. younger patients. Understanding the effects of receiving information about pain on observers’ judgments of older persons’ pain is a novel contribution of this investigation. It was expected that these findings would add to the understanding of observers’ judgements of pain in older adults.

1.4. Purpose, Research Questions, and Hypotheses

The overarching purpose of this study was to determine the effects of three contextual variables (the age of the individual expressing pain, observers’ professional
experience, and informational primes) on observers’ judgments of nonverbal pain expressions. Specifically, the goals of the current study were:

1. To replicate previous research by examining whether observers’ interpretations of pain expressions vary as a function of the age of the individual expressing pain.

2. To replicate previous research by examining differences between nursing students and non-nursing students’ judgments of others’ pain.

3. To examine observers’ interpretations of pain expressions as a function of different informational primes in relation to the age of the individual expressing pain (younger vs. older) as well as the observer professional experience (nursing student vs. non-nursing student). Specifically, the effects of two priming texts, a social deception text regarding the misuse of the health care system and an informational text about the undertreatment of pain in older adults, in relation to a control, were explored in terms of pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and valence ratings.

4. To conduct exploratory analyses examining the effect of gender of the individual expressing pain, priming conditions (control, misuse, undertreatment), and observers’ background experience on participants’ pain, sympathy, willingness to help, deservingness of financial compensation, and valence ratings.

**Hypothesis I.** Consistent with previous research (Hadjistavropoulos et al., 1996; Hadjistavropoulos et al., 2000; Lautenbacher et al., 2013), it was hypothesized (hypothesis I) that observers would judge older persons’ pain intensity, pain unpleasantness, and pain condition severity as being higher than those of younger
persons’ pain, despite having controlled for level of non-verbal pain expressiveness were controlled for.

**Hypothesis II.** Given that health professionals often rate others’ pain lower than lay people (Hadjistavropoulos et al., 1998; Prkachin et al., 2001), it was also hypothesized that nursing students will provide lower pain intensity, pain unpleasantness, and pain condition severity ratings than non-nursing students.

**Hypothesis III.** It was hypothesized that observers who were presented with the undertreatment of pain in old age prime would provide higher valence ratings for older persons compared to younger persons. This was expected given that several researchers (e.g., Ghandehari et al., 2013; Jones et al., 2004; Tse et al., 2012) have found that providing individuals with information about pain in older adults has led to significant changes in their understanding and interpretation of pain expressions of older persons. Since the effects of this prime in relation to observers’ professional experience have not been examined, this was the first study to explore the interaction between this prime and observer professional experience (nursing student vs. non-nursing student).

**Hypothesis IV.** Since De Ruddere et al. (2013) found that priming observers about the possibility of health care system misuse affected their interpretations of adults aged 44-55 and that disability compensation due to pain is more likely at a younger age, it was hypothesized that the misuse prime would lead to lower valence ratings for younger adults (hypothesis IV). Since the effects of this prime in relation to observers’ professional experience have not been examined, this was the first study to explore the interaction between this prime and observers’ professional experience (nursing student vs. non-nursing student).
CHAPTER 2: Method

2.1. Participants

This study was approved by the University of Regina and the University of Saskatchewan Research Ethics Board (see Appendix A). A power calculation with 1-beta of .80, an alpha level ($\alpha$) of .05 and an assumed medium effect size (Erdfelder, Faul, & Buchner, 1996) was conducted focusing on the analysis requiring the greatest number of participants (i.e., the analysis of variance examining group differences on evaluations of pain expressions). It was determined that a sample of 162 would be required. A total of 165 participants were recruited. In total, 83 nursing students and 82 non-nursing students completing the study. As displayed in Table 1, there were no differences between nursing students and non-nursing students in terms of age, years of university, or gender.

Participants were randomly assigned to a priming condition (or control) through restricted randomization by their background experience to ensure equal group sizes. Refer to Table 2 for group sizes.
Table 1: Demographics by Observer Background

<table>
<thead>
<tr>
<th>Observer Background</th>
<th>Main Effect</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Non-nursing</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Years of University</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11 (13)</td>
</tr>
<tr>
<td>Female</td>
<td>72 (87)</td>
</tr>
</tbody>
</table>

Table 2: Condition and Group Sample Size

<table>
<thead>
<tr>
<th>Observer Type</th>
<th>Prime Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>Non-nursing</td>
<td>28</td>
</tr>
<tr>
<td>Nursing</td>
<td>28</td>
</tr>
</tbody>
</table>
2.1.1. Nursing students. As identified in the literature review, nursing was selected because it is the largest health profession in Canada – there are over 800,000 nurses in Canada (including registered nurses, nurse practitioners, and licensed practical nurses; Canadian Institute for Health Information, 2015). Given the substantial portion of nurses that comprise the population of health care providers, nurses have an integral role in the provision of health care services, including pain management. Students in their 3rd and 4th year of nursing were recruited because, by this point in their program, they have received education about pain and have had clinical experiences with pain patients. Accordingly, the inclusion criteria for this group was (a) 3rd or 4th year university student enrolled in a nursing program, (b) 18 years and older, and (c) speak English fluently. Participants were compensated with $15.00.

2.1.2. Non-nursing students. This group consisted of undergraduate students who were not studying nursing. Undergraduate students enrolled in other programs were recruited. Inclusion criteria for these students were (a) a university student, (b) at least 20 years of age (nursing students were 3rd or 4th year and, therefore, likely to be at least 20 years of age), and (c) speak English fluently. Participants were compensated with $15.00.

2.1.3. Recruitment. Recruitment was conducted by advertising the study at the University of Regina and the University of Saskatchewan through posters (see Appendix B), online postings, announcements during university classes, handing-out flyers to students, and seeking support from faculty to encourage students to participate in the study. An effort was made to balance the age group of the non-nursing students with that of the nursing students by recruiting non-nursing students who were 20 years or older (nursing students were in their 3rd or 4th year and, therefore, likely to be at least 20 years
of age). After the 82 nursing students had completed the study, it was recognized that the age inclusion criteria for remaining the non-nursing students needed to be increased to ensure that the two groups were not significantly different as a function of age. As such, for the final 12 non-nursing students, the inclusion criterion was altered to have participants be at least 23 years old.

2.2. Measures

2.2.1. Demographic questionnaire. A brief questionnaire was used to collect demographic information and to ensure that all participants met the eligibility requirements (see Appendix C).

2.2.2. Visual analogue scales (VASs). VASs are widely used self-report measures of subjective experiences (see Appendix D; Folstein & Luria, 1973; Gift, 1989; Huskisson, 1983; McCormack, Horne, & Sheather, 1988; Price, McGrath, Rafii, & Buckingham, 1983; Wilkie, Lovejoy, Dodd, & Tesler, 1990). VASs have been demonstrated to be a valid and reliable methods of assessing subjective experiences (Cella & Perry, 1986). Specifically, test-retest reliability of rating scales ranges from 0.50 to 0.83 (Cella & Perry, 1986) and scores have been shown to be highly related to more comprehensive batteries of emotion/affective states (Davies, Burrows, & Poynton, 1975). In terms of pain, VAS have shown to be valid as they are sensitive to small changes in pain intensity (Price et al., 1983) and are highly related with other self-report measures of pain (e.g., the Descriptor Differential Scales and Pain Intensity Number Scale; Doctor, Slater, & Atkinson, 1995; Wilkie et al., 1990).

Consistent with similar research designs (De Ruddere et al., 2013; Lautenbacher et al., 2013; MacLeod, LaChapelle, Hadjistavropoulos, & Pfeifer, 2001), VASs were used
to assess six variables. That is, participants were asked to rate the pain intensity and pain unpleasantness of the patient in the video. They were also asked to estimate the severity of the person’s pain condition. Moreover, participants were asked to rate their inclination to help and how much sympathy they felt towards the person in the video. Finally, participants were asked how deserving the person in the video was of financial compensation for his/her pain.

2.2.3. Valence scale. Participants were asked to evaluate the patients in terms of how negative/positive they felt towards the individual (see Appendix D). This is consistent with a De Ruddere et al.’s (2013) investigation where observers were primed with the misuse of the health care system. Like this investigation, valence was evaluated with a 21-point Likert scale, where -10 represented “very negative,” 0 represented “neutral,” and +10 represented “very positive.” Similar rating scales have been used by several other research groups to assess participants’ valence towards stimuli (Crawford & Henry, 2003; Kanske & Kotz, 2012). These scales have been shown to be valid and reliable indicator of valence and sensitivity to change (Crawford & Henry, 2003; De Ruddere et al., 2013; Kanske & Kotz, 2012).

2.2.4. Demand characteristics assessment. At the end of the study, observers were asked to respond to one open-ended question regarding what they thought the purpose of the study was. This exit-question was developed for the purposes of this study to better assess if participants were responding in a particular way as a function of beliefs that the priming scripts were intended to influence responses (see Appendix E).

2.2.5. Post-study questionnaire. After viewing all videos, participants were asked to respond to five open-ended questions regarding what influenced their ratings. More specifically, questions asked observers to list factors that influenced their ratings of
pain, willingness to help, sympathy, patient deservingness of financial compensation, and how positively/negatively they felt towards the patient. This exit-questionnaire was developed for the purposes of this study to better understand the factors that influenced participants’ responses (see Appendix E).

**2.2.6. Facial action coding system (FACS).** The Facial Action Coding System (FACS; Ekman, Friesen, & Hager, 2002) is a reliable and valid method of assessing facial activity. A total of 41 discrete facial actions units (AUs; e.g., brow lowering, nose wrinkling) are evaluated using the FACS. Trained coders identify the frequency and intensity of each AU (Ekman et al., 2002).

Researchers have confirmed the validity and reliability of facial expression of pain across age (Craig, Prkachin, & Grunau, 2011; Kunz, Mylius et al., 2008). For instance, genuine facial displays of pain are distinguishable from facial displays in response to non-noxious events (Hale & Hadjistavropoulos, 1997) and faked pain facial expressions (Hill & Craig, 2002). The FACS has been established as a sound method of quantifying pain-related facial activity (Craig & Patrick, 1985; Hale & Hadjistavropoulos, 1997; Hill & Craig, 2002; Kunz, Mylius et al., 2008; Prkachin, 1992).

Several AUs have been consistently related to the pain experience, including: AU1 (inner brow raise), AU2 (outer brow raise), AU4 (brow lower), AU6 (cheek raise), AU7 (lids tighten), AU9 (nose wrinkle), AU10 (upper lip raise), AU12 (lip pucker), AU14 (dimpler), AU17 (chin raiser), AU20 (lip stretch), AU24 (lip press), AU25 (lips part), AU26 (jaw drop), AU27 (mouth stretch), AU43 (eyes closed), and AU45 (blink; Hadjistavropoulos & Craig, 2002; Kunz, Chatelle, Lautenbacher, & Rainville, 2008; Prkachin, 1992; Prkachin, 2005).
Although numerous AUs have been related to pain displays, most facial pain expressions are consistently accounted for in six facial actions: brow lowering, cheek raising/lid compression, lid tightening, nose wrinkling, upper lip raising, eye closure (Kunz, Mylius et al., 2008; Prkachin, 1992; Prkachin, 2005; Prkachin & Solomon, 2009). Several of these six actions consistently co-occur during pain expression; therefore, researchers have combined these AUs to create new actions (Prkachin, 1992; Prkachin & Solomon, 2008). Cheek-raising/lid and light tightening have been combined to create the movement labelled “orbit tightening” and nose wrinkling and upper lip raise has been combined to create “levator tightening.” Thus, there are four facial actions that are most consistently related to pain: brow lowering, orbit tightening, levator tightening, and closing of the eye (Prkachin & Solomon, 2009). These four facial actions reliably differentiate pain and non-painful expressions and are significantly related to self-reported pain (Prkachin, 1992; Prkachin, 2005; Prkachin & Solomon, 2008).

As validated by previous research (Prkachin, 1992; Prkachin & Solomon, 2008; Rocha, Prkachin, Beaumont, Hardy, & Zumbo, 2003), pain expressions in the stimulus videos in this present study were coded for maximum intensity of the AUs most consistently related to pain. Consistent with scoring protocols, the presence of brow lowering, orbit tightening, and levator tightening were scored on an A to E scale (essentially a 1 to 5 scale), where A = present and E = most intense version of this movement (i.e., the movement could not be any more intense). The fourth action, closing of the eye, was only scored on a present/not present basis (either 1 or 0). Therefore, the range of the global pain score is 0-16. For instance, if the intensity of brow lowering was an present at a B intensity level, orbit tightening was present at a C intensity level, and
levator tightening was present with an E intensity level, in conjunction with the presence of closing of the eye, the global pain score would be 11 (i.e., 2+3+5+1).

Interrater reliability was established by having two research assistances, experienced in quantifying nonverbal pain expressions, code all pain expressions to determine the Pearson correlation for global pain score between the two coders. A Pearson correlation of 0.70 or higher was considered acceptable for this study. In the present investigation, the Pearson correlation of the global pain scores was 0.94.

2.3. Stimulus Materials

Stimulus materials were selected from 48 pre-existing videos of (23 males and 25 females) older adult (65 years and older) physiotherapy clinic outpatients (Hadjistavropoulos et al., 2015). The videos depicted older adults undergoing a standardized physiotherapy examination designed to identify painful areas (e.g., Husebo, Strand, Moe-Nilssen, Husebo, & Ljunggren, 2009; Husebo, Strand, Moe-Nilssen, Husebo, & Ljunggren, 2010). More specifically, the protocol involved the patient lying on a bed and a qualified health professional guiding the participant through the following movements: (a) open both hands, one at a time; (b) stretch both arms towards head, one arm at a time; (c) stretch and bend both knees and hips, one leg at a time; (d) turn in bed to both sides; and (e) sit at the bedside. All movements were completed slowly/gently and the range of motion was restricted (i.e., the movements do not follow the complete range) when there were signs of pain or distress. This assessment protocol is safe and has been used without incident in past research (Husebo et al., 2009; Husebo et al., 2010). The movement protocol was completed by a licensed physical therapist. Completing all movements took approximately three to four minutes. Video recordings were taken using
a high definition camera, facing the participant directly attached overhead. The videos of older adults were supplemented by 16 videos, 8 males and 8 females, of younger adults (ages 23-39) who underwent the same procedure.

Selecting the 16 videos segments used in the final stimulus from the pool of 64 (48 older adults and 16 younger adults) videos was an eight-step process:

(1) All 64 videos (48 older adults and 16 younger adults) were edited and cropped so that just the patient’s face in view to reduces the contextual factors that may influence ratings.

(2) Subsequently, two research assistants categorized all videos in terms of video recording quality (“poor” and “acceptable”). Cohen’s kappa coefficient demonstrated good reliability in terms of categorizing video quality (κ = 0.71, 95%). A total of 22 videos were removed due to poor quality (i.e., both judges rated the videos as “poor” quality). Thus, a total of 42 videos (26 older adults and 16 younger adults) were examined further.

(3) Two judges, experienced in pain research, coded the remaining 42 videos on a 0 to 7 pain expressiveness scale (where 0 = no pain and 7 = severe pain). Interrater correlation demonstrated acceptable reliability (r = 0.70). See Table 3 for means and standard deviations by age and gender for all 42 videos.
Table 3: Means and Standard Deviations of Pain Ratings on a 0 to 7 Scale for All 42 Videos

<table>
<thead>
<tr>
<th>Video</th>
<th>First Research Assistant $M$ (SD)</th>
<th>Second Research Assistant $M$ (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Males ($n = 11$)</td>
<td>1.04 (1.15)</td>
<td>0.82 (1.25)</td>
</tr>
<tr>
<td>Younger Males ($n = 8$)</td>
<td>1.94 (1.15)</td>
<td>1.00 (1.20)</td>
</tr>
<tr>
<td>Older Females ($n = 15$)</td>
<td>1.50 (1.72)</td>
<td>1.14 (1.55)</td>
</tr>
<tr>
<td>Younger Females ($n = 8$)</td>
<td>1.94 (2.27)</td>
<td>1.25 (1.75)</td>
</tr>
</tbody>
</table>

(4) Videos were categorized as “pain present” or “no pain” using both research assistants’ scores on the 0 to 7 scale. The “pain present” criterion was videos that were coded at least 1 out of 7 by at least one coder. The “no pain” criterion was videos that were rated 0 out of 7 by both coders. Cohen’s kappa coefficient demonstrated very good reliability between the two coders ($κ = 0.81$, 95%). A total of 25 videos (14 older adults and 11 younger adults) met “pain present” criteria; therefore, these videos were analyzed further. A total of 21 videos were removed. Refer to Table 4 for means and standard deviations by age and gender for 25 “pain present” videos.
Table 4: Means and Standard Deviations of Pain Ratings on a 0 to 7 Scale for 25 Videos Rated as Pain Being Present

<table>
<thead>
<tr>
<th>Video</th>
<th>First Research Assistant $M (SD)$</th>
<th>Second Research Assistant $M (SD)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Males ($n = 5$)</td>
<td>2.3 (1.40)</td>
<td>1.80 (1.30)</td>
</tr>
<tr>
<td>Younger Males ($n = 7$)</td>
<td>2.21 (0.91)</td>
<td>1.14 (1.21)</td>
</tr>
<tr>
<td>Older Females ($n = 9$)</td>
<td>2.50 (1.54)</td>
<td>1.89 (1.62)</td>
</tr>
<tr>
<td>Younger Females ($n = 4$)</td>
<td>3.88 (1.44)</td>
<td>2.50 (1.73)</td>
</tr>
</tbody>
</table>

(5) Since the individual may express several displays of pain throughout the video, two research assistances reviewed the 25 “pain present” videos and identified the specific time that pain expressions occurred. Research assistances were considered to be in agreement if they were within five seconds of each other’s time points. A total of 42 pain expressions were identified, with good agreement between the two research assistances ($\kappa = 0.78, 95\%$).

(6) Consistent with previous research, pain expressions were segmented into 10-second videos (De Ruddere et al., 2012; De Ruddere et al., 2013; Hadjistavropoulos et al., 1996; Kappesser et al., 2006). Subsequently, two research assistances coded the 42 pain expressions using a validated approach (Prkachin, 1992; Prkachin & Solomon, 2008). The approach involves coding for maximum intensity of pain-related facial expressions using the FACS (i.e., brow lowering, orbit tightening, levator tightening, and closing of the eye; Craig & Patrick, 1985; Prkachin, 1992; Prkachin & Solomon, 2008). Interrater reliability of global pain expression demonstrated very good reliability, $r = 0.94$. As displayed in Table 5, the global pain expression score between the two coders
was averaged to result in an average global pain expression score for each pain expression video segment.

Table 5: Average Global Pain Expression for all 42 Pain Expressions By Age and Gender

<table>
<thead>
<tr>
<th>Video</th>
<th>Number of Individuals (#)</th>
<th>Number of Pain Expressions (#)</th>
<th>Average Global Pain Expression M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Males</td>
<td>5</td>
<td>6</td>
<td>5.92 (3.13)</td>
</tr>
<tr>
<td>Younger Males</td>
<td>7</td>
<td>14</td>
<td>4.28 (1.83)</td>
</tr>
<tr>
<td>Older Females</td>
<td>9</td>
<td>13</td>
<td>6.73 (2.67)</td>
</tr>
<tr>
<td>Younger Females</td>
<td>4</td>
<td>10</td>
<td>5.15 (2.35)</td>
</tr>
</tbody>
</table>

(7) Once each pain expression was quantified, video segments were balanced by matching average global pain expression scores. Four videos from each age and gender group were selected, resulting in a total of 16 videos. Each video was a unique person. Mean global pain expression scores are summarized in Table 6. The mean age of older males was 77, SD = 3.16, younger males was 25.75, SD = 1.89, older females was 82.25, SD = 3.86, and of younger females was 30.25, SD = 7.37. The global pain expressions across age and gender were not significantly different.

Table 6: Global Pain Expression Scores for Each Video Stimulus

<table>
<thead>
<tr>
<th>Average Global Pain Expression Score</th>
<th>Older Males</th>
<th>Younger Males</th>
<th>Older Females</th>
<th>Younger Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video #1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Video #2</td>
<td>4</td>
<td>5.5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Video #3</td>
<td>8</td>
<td>7</td>
<td>6.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Video #4</td>
<td>9</td>
<td>7.5</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Sum of Average Global Pain Expression Score</td>
<td>22</td>
<td>22</td>
<td>23.5</td>
<td>23.5</td>
</tr>
</tbody>
</table>

(8) The final stimulus was created by merging the 10-second videos segments in a random order with 43-second intervals between each segment which included prompts
for participants to complete the rating scales. To reduce fatigue effects, a second stimulus was created using the same procedure but reversing the random order. Thus, two video stimuli were created, both approximately 15-minutes in length.

2.4. Priming Texts

The social deception prime and control prime were based on De Reddure et al.’s (2013) investigation. Minor alterations were made the scripts (e.g., changing “Belgium” to “Canada”). The prime script focusing on the undermanagement of pain in old age was developed for this study. The scripts for each prime text are as follows:

2.4.1. Social deception prime. “Canada has developed a comprehensive health care system. Research shows that many people misuse this health care. For example, many people visit a physician not because they are ill but because they want a prescription for medication they don’t need or because they want a sick note when they are not ill.

Furthermore, in Canada, we have to pay taxes that support certain types of disability insurance. This is money that we – through our taxes – give to the government so that adequate care to ill people is warranted (for example by ensuring that sick people receive sickness benefits). Some people make misuse of it, for example, by receiving the compensation when faking or exaggerating illness. This implies that we unfairly pay for the health care of people who are actually not ill or at least not to the extent they pretend to be. Moreover, this also implies that there is less money left for those people who are ill and who could use the money.

To conclude, we can say that it is highly important to detect such misuse on time, so that care for other people who are really ill is not at risk.”
2.4.2. Undertreatment of pain in old age prime. “Chronic pain in older persons is very frequent with estimates as high as 60% of older persons experiencing significant pain. Although this type of pain has major negative consequences (e.g., leading to depression, anxiety, loneliness, social isolation, and physical suffering), pain in older adults is undertreated and underrecognized. For example, older adults are less likely than younger people to be referred to pain clinics and more likely to be prescribed treatments are often inadequate. Insufficient health provider education also contributes to undertreatment. Many health professionals falsely believe that pain is a natural part of growing old and become less likely to treat it in an older patient as compared to when they are working with younger patients. Older patients sometimes are reluctant to report their pain because they fear that they may be perceived as complainers or be pressured to move to assisted accommodations (and, thus, lose some of their independence). Although effective treatments are available, these are often not accessed by older persons, at least in part, because of the reasons described previously.”

2.4.3. Control prime. “Canada has developed a comprehensive health care system. Research shows that many people use this health care. For example, many people visit a physician because they are ill or because they need a prescription for medication to treat their complaints/symptoms. People can also visit the physician in order to get a sick note so that they can justify their absence from work due to illness.

Furthermore, in Canada, we pay taxes in order to keep the health care system working. This is money that we – through our taxes – give to the government so that adequate care to ill people is warranted (for example by ensuring that sick people receive sickness benefits). People make use of it, for example, by receiving the compensation
when being ill. Hence, the system of social security implies that we work together to ensure that people who are ill can receive appropriate care.

To conclude, we can say that it is important to get a good insight into the use of the health care system so that we can further improve the health care system.”

2.5. Procedure

Participants were asked to come to the Health Psychology Laboratory at the University of Regina or the Family Health Laboratory at the University of Saskatchewan to participate in the study. Participants self-selected location of preference. They were informed that the entire study would take approximately 35 minutes to complete.

Upon arrival, informed consent was obtained (see Appendix F). This process included a brief description of the study’s procedures, the purpose of the study, and risks/benefits of participating in the study. The researcher emphasized the importance of confidentiality and participants were asked to not discuss identifiable features about the individuals in the videos. Consenting participants were then asked to complete the demographic questionnaire. Subsequently, they were provided with the prime text to which they were randomized through restricted randomization. Participants were given approximately two minutes to read the priming text. Following this, the prime was read out loud by the experimenter and all participants were asked if they had any questions regarding the text.

Subsequently, participants viewed the video stimulus that included the 16 videos, in random order. Following each video, participants were prompted to complete ratings concerning their perception of the individual’s pain intensity, pain unpleasantness, and severity of pain condition. They also completed measures assessing their willingness to
help, sympathy, how negative/positive they feel towards the individual (i.e., valence scale), and if they believe the person should receive financial compensation for their pain.

Once all videos were viewed and measures completed, participants were asked what they believed the purpose of the study. Only three participants guessed that the priming scripts were related to the purpose of the study. At the end of the study, participants also were asked to complete the post-study questionnaire. Participants were then debriefed on the nature of the study and thanked for their participation. They were informed that they would receive an email with more information regarding the study once data collection was complete.

2.6. Analyses

2.6.1. Quantitative. All quantitative analyses were conducted with Statistical Package for Social Sciences, version 21 (SPSS, 2012). First, demographic differences between observer type (nursing vs. non-nursing students) and across priming conditions (misuse vs. undertreatment vs. control) were tested using t-tests, one-way univariate analyses of variance (ANOVAs), or chi-square tests, as appropriate. Specifically, independent sample t-tests were conducted to compare the groups for age and years of education differences between observer groups (nursing students vs. non-nursing students). ANOVAs were conducted to test differences on age and years of educations across priming conditions (misuse vs. undertreatment vs. control). Gender differences between observer type (nursing vs. non-nursing students) and priming conditions (control vs. misuse vs. undertreatment) were tested using chi-square tests.

Hypotheses. To test the research questions, two 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus
persons) mixed-model multivariate analyses (MANOVAs) were conducted. The first MANOVA included the following dependent variables: pain intensity, unpleasantness, and condition severity. The second MANOVA tested willingness to help, sympathy, deservingness of financial compensation, and valence as dependent variables. Significant multivariate tests, were followed by ANOVAs.

In all ANOVA models, the within-subjects factor was the stimulus persons’ age (young vs. old) and the between-subjects factors were observer type (nursing vs. non-nursing students) and informational prime condition (control vs. misuse vs. undertreatment). Mauchly’s tests were conducted to test the assumption of sphericity. In instances where the assumption of sphericity was violated, degrees of freedom were corrected by the following criteria: when estimates of sphericity is greater than 0.75, Huynh-Feldt correction was used, and when estimates are less than 0.75, Greenhouse-Geisser correction was used (Field, 2009). Significant univariate effects was followed-up with simple effect tests.

**Exploratory analyses.** The effect of stimulus persons’ gender (male vs. female) on observers’ ratings was tested through another mixed-model MANOVA. Stimulus person gender was not entered as a factor in the above analysis to facilitate interpretation of interaction effects without adding a fourth independent variable. In this model, gender of the stimulus person (male vs. female) was entered as the within-subjects factor (instead of age). Observer type (nursing vs. non-nursing students) and informational priming condition (control vs. misuse vs. undertreatment) were entered as the between-subjects factors. Dependent variables were pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, deservingness of financial compensation, and
valence. Multivariate significance was followed by ANOVAs. Again, Mauchly’s tests were conducted to test the assumption of sphericity Huynh-Feldt correction or Greenhouse-Geisser correction was used when appropriate (Field, 2009). Significant univariate effects were followed by simple effect tests.

**Mediation analyses testing for the indirect effect of valence.** Consistent with DeRudder et al. (2013), mediation analyses were conducted to examine the indirect role of valence ratings between priming conditions and all other outcomes, which include pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and financial compensation (refer to Figure 1 for simple mediation model). Unlike DeRudder et al. (2013), the present study involved a multicategorical predictor variable (i.e., priming condition: control vs. misuse vs. undertreatment). Therefore, indicator coding was used to transform the multicategorical predictor variable. Indicator coding involves creating new variables to represent the categorical variable (Hayes & Preacher, 2014). The number of new indicator variables that are created is one minus the number of groups of the multicategory variable \(k - 1 = \text{number of indicator coded variables}\). Since there are three priming conditions \(k\) in this investigation, two indicator variables were created \((3 - 1 = 2; \text{see Figure 2})\). Through this process, one group is explicitly not coded (Hayes & Preacher, 2014). This non-coded group functions as the reference category for the analysis. In this investigation, the reference category is the control group. Parameters of the model reflect group differences that are quantified relative to this reference group (Hayes & Preacher, 2014).
**Figure 1.** Simple mediation model. $D =$ independent variable; $M =$ mediator variable; and $Y =$ outcome variable.
To test the indirect effect of valence, a bootstrapping method (with 5000 resamples and 95% confidence intervals) was used following the procedure described by (Hayes & Preacher, 2014; Preacher & Hayes, 2004). The bootstrapping method was selected because it is a nonparametric resample procedure that is more appropriate than normal-test (i.e., Sobel’s test) for investigations with smaller sample sizes (De Roodere et al., 2013; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2004; Shrout & Bolger, 2002). Unlike the normal-test method (i.e., Sobel’s test), the bootstrapping method does not impose the assumption of normality of the sample distribution (Baron & Kenny, 1986; Preacher & Hayes, 2008). Instead, bootstrapping involves repeatedly sampling the data and estimating the indirect effects in each discrete sample. An approximation of the sampling distribution of the indirect effect and confidence intervals are derived from the repeated computations (Preacher & Hayes, 2008; Shrout & Bolger, 2002). Despite the distinctions between the bootstrapping (Preacher & Hayes, 2008) and the normal-test (Barron & Kenny, 1986) methods, as summarized in Table 7, the calculations and coefficients derived from both testing methods are comparable. Comparing the two methods was completed to assist in clarifying the origin and meaning of each coefficient.

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1 In the present investigation, the indirect effect of valence on the relationship between priming conditions and outcomes (e.g., pain intensity ratings) was also analysed using the Barron and Kenny (1986) method. This method involves calculating three regression equations: (1) regressing the mediator on the independent variable; (2) regressing the outcome variable on the independent variable; and (3) the regressing the outcome variable on both the independent variable and mediator. Mediation is assumed if: (1) the independent variable affects the mediator in the first regression equation; (2) the outcome variable affects the independent variable in the second regression equation; and (3) the mediator affects the outcome.
Table 7: Equivalent Coefficients between Hayes and Preacher’s (2014) and Baron and Kenny’s (1986) Mediation Method

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation of Coefficient</th>
<th>Description of Equivalent Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_1$ and $a_2$</td>
<td>The effects of independent variable on the mediator.</td>
<td>The unstandardized coefficients derived from regressing the mediator on the independent variable.</td>
</tr>
<tr>
<td>$c_1'$ and $c_2'$</td>
<td>The relative direct effects of independent variables on the dependent variable while also including the mediator in the model.</td>
<td>The unstandardized coefficients for the independent variable derived from regressing the outcome variable on both the mediator and independent variable.</td>
</tr>
<tr>
<td>$b$</td>
<td>The effect of the mediator on the outcome variable.</td>
<td>The unstandardized coefficients for the mediator derived from regressing the outcome variable on both the mediator and independent variable.</td>
</tr>
<tr>
<td>$c_1$ and $c_2$</td>
<td>The total effect of the independent variable on the outcome variable while not considering the mediator in the model.</td>
<td>The unstandardized coefficients derived from regressing the outcome variable on the independent variable.</td>
</tr>
</tbody>
</table>

variable in the third regression equation. An indirect effect is assumed if: (1) the independent variable affects the mediator in the first regression equation; (2) the outcome variable does not significantly affect the independent variable in the second regression equation; and (3) the mediator affects the outcome variable in the third regression equation. Sobel’s test was calculated to determine the significance of indirect effect of the independent variable on the outcome variable via the mediator.
Figure 2 illustrates the coefficients that must be identified to conduct a mediation analysis. The relative direct effects of priming conditions have the weights \( c'_{1} \) and \( c'_{2} \). Relative indirect effects (through the mediator “valence ratings”) are represented by weights \( a_{1}b \) and \( a_{2}b \). The effects of priming conditions on patient valence are represented by weights \( a_{1} \) and \( a_{2} \). The effect of valence scores on the outcome variable (e.g., pain intensity ratings) is represented by weight \( b \) (Hayes & Preacher, 2014). The total effect (represented by weights \( c_{1} \) and \( c_{2} \)) consists of both the relative direct (\( c'_{1} \) and \( c'_{2} \)) and relative indirect (\( a_{1}b \) and \( a_{2}b \)) effects.

Consistent with bootstrap analyses, the relative indirect effects are significant if the bootstrap confidence interval excludes zero (Hayes & Preacher, 2014). Mediation is assumed if: (1) the total effects “\( c_{1} \)” and/or “\( c_{2} \)” and the relative indirect effects “\( a_{1}b \)” and/or “\( a_{2}b \)” are significant and (2) the relative direct effects “\( c'_{1} \)” and/or “\( c'_{2} \)” reduce significantly when controlling for the relative indirect effects “\( a_{1}b \)” and “\( a_{2}b \).” Overemphasizing the relative direct effects “\( c'_{1} \)” and/or “\( c'_{2} \)”, however, can lead to inaccurate conclusions (Rucker, Preacher, Tormala, & Petty, 2011). Indirect effects “\( a_{1}b \)” and/or “\( a_{2}b \)” in the absence of total effects “\( c_{1} \)” and/or “\( c_{2} \)” can occur for several reasons including lack of power, measurement precision, and suppression effects of another variable (Rucker et al., 2011). Therefore, a significant indirect effect is assumed if the total effects “\( c_{1} \)” and/or “\( c_{2} \)” are not significant but the relative indirect effects “\( a_{1}b \)” and/or “\( a_{2}b \)” are significant (De Ruddere et al., 2013; Mathieu & Taylor, 2006).
Figure 2. Multicategory mediation model. Rectangles on the left ($D_1$ and $D_2$) represent the multicategory priming conditions which has been coded corresponding to the indicator coding table; $M$ = mediation variable, which is valence ratings in the present investigation; and $Y$ = outcome variable, which include pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation.
2.6.2. Narrative data. Analyses of the post-study questionnaire were conducted with the aid of NVivo Software, version 10 (QSR International Pty Ltd, Version 10, 2012). The post-study questionnaire comprised five questions that asked observers to list factors that influenced their ratings of pain, willingness to help, sympathy, patient deservingness of financial compensation, and how positively/negatively they felt towards the patient (one question for each outcome). These questions were included for exploratory purposes. Participants’ responses to these five questions were combined to explore common factors that influenced participants ratings.

Two parallel narrative approaches were used to analyze the data. First, thematic analysis was conducted following Braun and Clarke’s (2006) stepwise method in order to inductively determine a coding framework. Subsequently, a quantitative content analysis to identify frequencies of themes was conducted in order to determine the most frequently reported statements. The integration of these methods of narrative analyses have been used in previous research (Scheineder, Hadjistavropoulos, & Faller, in press). Furthermore, researchers have identified the benefits of integrating complementary mixed-methods to enhance data analyses (Caracelli & Greene, 1993; Sale, Lohfeld, & Brazil, 2002; Small, 2011).

Two researchers collaborated on the analyses to enhance trustworthiness and rigor of the results. To develop a coding framework, Braun and Clarke’s (2006) stepwise method of thematic analysis was followed. The first stage involved both coders familiarising themselves with the data by reading all responses. Coders also generated initial ideas regarding observers’ responses. Following this phase, coders collaboratively established categories and detailed categorical descriptions to systematically code the data. The categorical framework was used to code data using meaning units as the basis...
of analysis. Meaning units are the smallest amount of text that still contains meaning (Miles & Huberman, 1994).

With the established categorical framework, both researchers independently coded all participants’ responses. Subsequently, the two researchers compared their data. Consistent with quantitative content analysis (Hsieh & Shannon, 2005), percentage agreement and Cohen’s Kappa were calculated to assess interrater reliability (Cohen, 1960; McHugh, 2012). After comparisons were conducted, discrepancies were discussed. No changes to the framework were deemed necessary.

Consistent with Braun and Clarke’s (2006) final stage, the two coders discussed their impressions of the themes that emerged across the categories. Following discussions, the total frequencies for each theme was calculated (Hsieh & Shannon, 2005). The frequency score represents the total number of times observers reported the specified theme.
CHAPTER 3: Quantitative Results

3.1. Demographics

Participant characteristics are summarized on Tables 1 and 8. Two $t$-tests were conducted to evaluate possible demographic differences between nursing students and non-nursing students with respect to age and years of university education. One-way ANOVAs were conducted to evaluate possible demographic differences across priming conditions with respect to age and years of university education. Two chi-squares were also conducted to test for differences in the number of male and female participants across priming conditions and between groups (nursing students vs. non-nursing students). No differences were found on any of these tests. Correlation matrices of outcome variables stratified by observer type (nursing students vs. non-nursing students) is displayed in Table 9.

Table 8: Demographics by Prime Condition

<table>
<thead>
<tr>
<th>Prime Condition</th>
<th>Control</th>
<th>Misuse</th>
<th>Under-treatment</th>
<th>Main Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 56$</td>
<td>$n = 55$</td>
<td>$n = 54$</td>
<td>$F (2,162)$</td>
</tr>
<tr>
<td>Age</td>
<td>22.55 (2.54)</td>
<td>23.96 (3.90)</td>
<td>24.04 (4.63)</td>
<td>2.72</td>
</tr>
<tr>
<td>Years of University</td>
<td>3.63 (0.84)</td>
<td>3.54 (0.91)</td>
<td>3.58 (0.83)</td>
<td>0.15</td>
</tr>
<tr>
<td>Observers’ Gender</td>
<td># (%</td>
<td># (%)</td>
<td># (%)</td>
<td>$\chi^2(2)$</td>
</tr>
<tr>
<td>Male</td>
<td>7 (13)</td>
<td>6 (11)</td>
<td>6 (11)</td>
<td>0.08</td>
</tr>
<tr>
<td>Female</td>
<td>49 (87)</td>
<td>49 (89)</td>
<td>48 (89)</td>
<td></td>
</tr>
</tbody>
</table>

$M = \text{mean}; SD = \text{standard deviation}$
Table 9: Correlation Matrix of Outcome Variables Stratified by Observer Type

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pain Intensity</th>
<th>Pain Unpleasantness</th>
<th>Pain Condition Severity</th>
<th>Willingness to Help</th>
<th>Sympathy</th>
<th>Financial Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Nursing Students (n = 83)</td>
<td>0.90</td>
<td>0.92</td>
<td>0.72</td>
<td>0.75</td>
<td>0.72</td>
<td>0.66</td>
</tr>
<tr>
<td>Pain Unpleasantness</td>
<td>0.92</td>
<td>0.86</td>
<td>0.71</td>
<td>0.74</td>
<td>0.76</td>
<td>0.73</td>
</tr>
<tr>
<td>Pain Condition Severity</td>
<td>0.92</td>
<td>0.86</td>
<td>0.71</td>
<td>0.74</td>
<td>0.76</td>
<td>0.73</td>
</tr>
<tr>
<td>Willingness to Help</td>
<td>0.92</td>
<td>0.86</td>
<td>0.71</td>
<td>0.74</td>
<td>0.76</td>
<td>0.73</td>
</tr>
<tr>
<td>Sympathy</td>
<td>0.90</td>
<td>0.82</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>Financial Compensation</td>
<td>0.66</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>Valence</td>
<td>0.47</td>
<td>0.44</td>
<td>0.46</td>
<td>0.55</td>
<td>0.56</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Nursing Students (n = 82)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pain Intensity</th>
<th>Pain Unpleasantness</th>
<th>Pain Condition Severity</th>
<th>Willingness to Help</th>
<th>Sympathy</th>
<th>Financial Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Unpleasantness</td>
<td>0.92</td>
<td>0.85</td>
<td>0.70</td>
<td>0.79</td>
<td>0.78</td>
<td>0.77</td>
</tr>
<tr>
<td>Pain Condition Severity</td>
<td>0.92</td>
<td>0.85</td>
<td>0.70</td>
<td>0.79</td>
<td>0.78</td>
<td>0.77</td>
</tr>
<tr>
<td>Willingness to Help</td>
<td>0.92</td>
<td>0.85</td>
<td>0.70</td>
<td>0.79</td>
<td>0.78</td>
<td>0.77</td>
</tr>
<tr>
<td>Sympathy</td>
<td>0.82</td>
<td>0.88</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>Financial Compensation</td>
<td>0.66</td>
<td>0.61</td>
<td>0.61</td>
<td>0.61</td>
<td>0.61</td>
<td>0.61</td>
</tr>
<tr>
<td>Valence</td>
<td>0.32</td>
<td>0.31</td>
<td>0.27</td>
<td>0.53</td>
<td>0.41</td>
<td>0.30</td>
</tr>
</tbody>
</table>

1All outcomes were assessed on a 10cm visual analogue scale with the except of valence which was measured on a 21-point numeric scale.

All correlations were significant (p < 0.01)
### Table 10: Means and Standard Deviations of Observer Ratings

<table>
<thead>
<tr>
<th>Outcome$^f$</th>
<th>Observer Type</th>
<th>Between-Subject Effects</th>
<th>Priming Conditions</th>
<th>Within-Subjects Effect</th>
<th>Summary of Significant Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Nursing</td>
<td>Nursing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = 83$</td>
<td>$n = 82$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Intensity$^{a,b}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>4.04 (1.25)</td>
<td>4.15 (1.14)</td>
<td>4.04 (1.12)</td>
<td>4.01 (1.16)</td>
<td>4.24 (1.31)</td>
</tr>
<tr>
<td>Pain Unpleasantness$^{a,b}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>4.33 (1.32)</td>
<td>4.45 (1.33)</td>
<td>4.39 (1.27)</td>
<td>4.33 (1.39)</td>
<td>4.45 (1.33)</td>
</tr>
<tr>
<td>Pain Condition Severity$^{a,b}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>3.73 (1.27)</td>
<td>3.97 (1.31)</td>
<td>3.82 (1.19)</td>
<td>3.80 (1.33)</td>
<td>3.94 (1.38)</td>
</tr>
<tr>
<td>Willingness to Help$^{a,b}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>4.83 (1.64)</td>
<td>5.60 (1.81)</td>
<td>5.18 (1.53)</td>
<td>4.98 (1.79)</td>
<td>5.49 (1.95)</td>
</tr>
<tr>
<td>Sympathy$^{a,b,c}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>4.58 (1.53)</td>
<td>4.99 (1.68)</td>
<td>4.78 (1.41)</td>
<td>4.63 (1.71)</td>
<td>4.96 (1.72)</td>
</tr>
<tr>
<td>Financial Compensation$^{a,b}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>4.11 (1.58)</td>
<td>4.43 (1.76)</td>
<td>4.23 (1.55)</td>
<td>4.27 (1.75)</td>
<td>4.29 (1.75)</td>
</tr>
<tr>
<td>Valence$^{a,c,e,f}$</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td></td>
<td>2.33 (2.15)</td>
<td>3.26 (2.32)</td>
<td>2.66 (2.16)</td>
<td>2.06 (1.78)</td>
<td>3.68 (2.68)</td>
</tr>
</tbody>
</table>

$^a$significant main within-subject effect of ages of individuals in the videos (older adults, younger adults)

$^b$significant interaction between within-subjects effect of ages of the individuals in the videos (older adults, younger adults) X the between-subjects effect of observers’ type training (non-nursing students, nursing students)

$^c$significant main between-subjects effect of observers’ type training (non-nursing, nursing)

$^d$significant main between-subjects effect of priming condition (control, misuse, undertreatment)

$^e$significant 3 (priming condition) X 2 (observer type) X 2 (ages of individuals in video) interaction

$^f$All outcomes were assessed on a 10cm visual analogue scale with the except of valence which was measured on a 21-point numeric scale

$M$ = mean; $SD$ = standard deviation
3.2. Pain Ratings: Hypotheses I, II, and III

It was hypothesized (hypothesis I) that observers would judge older stimulus individuals as experiencing higher pain intensity, pain unpleasantness, and pain condition severity as compared to younger stimulus persons (Hadjistavropoulos et al., 1996; Hadjistavropoulos et al., 2000; Lautenbacher et al., 2013). Consistent with previous research involving practising nurses (Hadjistavropoulos et al., 1998; Prkachin et al., 2001), it was also hypothesized that nursing students would provide lower pain ratings than non-nursing students (hypothesis II). Given several researchers have found that provision of information has led to significant changes in participants’ understanding and interpretation of pain expressions of older persons (e.g., De Rudder, et al., 2013), it was hypothesized (hypothesis III) that education regarding the undertreatment of pain in older persons would result in higher pain ratings for older stimulus persons.

To test hypotheses I, II, and III, a 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing student) X 2 (older vs. younger stimulus persons) mixed-model MANOVA was conducted with pain intensity, pain unpleasantness, and pain condition severity ratings as the dependent variables. In each case, multivariate significance was followed with 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing student) X 2 (older vs. younger stimulus persons) mixed-model univariate analyses (ANOVAs) and simple effects tests.

Means and standard deviations are presented in Tables 10 and 11. The 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus persons) mixed-model MANOVA demonstrated a significant multivariate within-subjects effect (young vs. older stimulus people), $\lambda = 0.23$, $F(3,157)$.
= 137.00, $p < 0.001$, partial $\eta^2 = 0.72$, and a significant interaction effect (young vs. older stimulus people X nursing vs. non-nursing observers), $\lambda = 0.94$, $F(3,157) = 3.36$, $p = 0.020$, partial $\eta^2 = 0.06$. The between-subjects effect (priming condition), $\lambda = 0.977$, $F(6,314) = 0.62$, $p = 0.718$, and the $3 \times 2 \times 2$ interaction (control vs. misuse vs. undertreatment X younger vs. older stimulus people X nursing vs. non-nursing observers), $\lambda = 0.940$, $F(6,314) = 1.66$, $p = 0.131$, were not statistically significant.

Follow-up $3 \times 2 \times 2$ univariate analyses were conducted to clarify the significant effects. In each case, univariate significance was followed by with simple effects tests. To test hypotheses I, II, and III, three ANOVAs were conducted.
Table 11: Pain Intensity, Unpleasantness, and Condition Severity by Prime Condition, Observer Type, and Stimulus Persons’ Age

<table>
<thead>
<tr>
<th></th>
<th>Non-Nursing Students</th>
<th>Nursing Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Older</td>
<td>Younger</td>
</tr>
<tr>
<td>Stimulus Persons’ Age</td>
<td>$M$ (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td>Pain Intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.47 (1.45)</td>
<td>3.28 (1.20)</td>
</tr>
<tr>
<td>Misuse</td>
<td>4.47 (1.24)</td>
<td>3.06 (1.20)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>5.15 (1.65)</td>
<td>3.54 (1.28)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>4.79 (1.46)</td>
<td>3.29 (1.23)</td>
</tr>
<tr>
<td>Pain Unpleasantness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.84 (1.53)</td>
<td>3.66 (1.28)</td>
</tr>
<tr>
<td>Misuse</td>
<td>4.95 (1.42)</td>
<td>3.51 (1.40)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>5.28 (1.59)</td>
<td>3.77 (1.33)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>5.02 (1.50)</td>
<td>3.64 (1.33)</td>
</tr>
<tr>
<td>Pain Condition Severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.35 (1.48)</td>
<td>2.99 (1.17)</td>
</tr>
<tr>
<td>Misuse</td>
<td>4.53 (1.46)</td>
<td>2.71 (1.16)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>4.77 (1.62)</td>
<td>3.06 (1.33)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>4.55 (1.51)</td>
<td>2.92 (1.22)</td>
</tr>
</tbody>
</table>

$M$ = mean; $SD$ = standard deviation
3.2.1. Pain intensity ratings. The first follow-up ANOVA involved pain intensity ratings. Consistent with hypothesis I, it was found that observers reported significantly higher pain intensity when stimulus people were older compared to younger adults, $F(1,159) = 356.39, p > .001$, partial $\eta^2 = 0.69$. The main effect for observer type (nursing vs. non-nursing students), $F(1,159) = 0.35, p = 0.555$, and for priming condition, $F(2,159) = 0.63, p = 0.537$, were not significant. There was a significant interaction between stimulus persons’ age (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), $F(1,159) = 7.06, p = 0.009$, partial $\eta^2 = 0.04$, but the 3 X 2 interaction between priming condition (control vs. misuse vs. undertreatment) and stimulus persons’ age (older vs. younger stimulus persons), was not significant, $F(2,159) = 2.94, p = 0.056$. Finally, the three-way interaction (stimulus persons’ age x priming condition x observer type) was also not significant, $F(2,159) = 0.92, p = 0.400$. Simple effect tests were conducted to clarify effects the identified two-way interaction (stimulus person age x observer type).

As displayed in Figure 3, pain intensity ratings did not differ as a function of observer type (nursing vs. non-nursing students) for stimulus videos of older adults, $F(1,159) = 0.14, p = 0.710$. Both non-nursing and nursing students’ ratings significantly decreased when evaluating stimulus videos of younger as compared to older persons, $F(1,159)_{\text{non-nursing}} = 233.40, p < 0.001$, partial $\eta^2 = 0.60$; $F(1,159)_{\text{nursing}} = 130.80, p < 0.001$, partial $\eta^2 = 0.45$. Again, ratings did not differ as a function of observer type for videos of younger adults, $F(1,159) = 2.31, p = 0.130$.

3.2.2. Pain unpleasantness ratings. The results of the second follow up ANOVA, focusing on pain unpleasantness, were similar to the results for pain intensity.
Consistent with hypothesis I, it was found that observers reported significantly higher pain unpleasantness when stimulus people were older compared to younger adults,
\[ F(1,159) = 290.55, \ p > .001 \text{ partial } \eta^2 = 0.65. \] The main effect for observer type (nursing vs. non-nursing students), \( F(1,159) = 0.29, \ p = 0.591, \) and for priming condition, \( F(2,159) = 0.12 \ p = 0.887, \) were not significant. There was a significant interaction between ages of stimulus persons (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), \( F(1,159) = 4.44, \ p = 0.037, \) partial \( \eta^2 = 0.03, \) but the 3 X 2 interaction between priming condition (control vs. misuse vs. undertreatment) and stimulus person’s age (older vs. younger stimulus persons), \( F(2,159) = 1.38, \ p = 0.254, \) was not significant. Finally, the three-way interaction was also not significant, \( F(2,159) = 0.18, \ p = 0.834. \) Simple effect tests were calculated to clarify effects the identified two-way interaction (stimulus persons’ age x observer type).

As displayed in Figure 3, pain unpleasantness ratings did not differ as a function of observer type (nursing vs. non-nursing students) for both stimulus videos of older persons, \( F(1,159) = 0.036, \ p = 0.849, \) and younger persons, \( F(1,59) = 1.45, \ p = 0.230. \) Both nursing and non-nursing students’ ratings significantly decreased when evaluating stimulus videos of younger adults as compared to older adults, \( F(1,159)_{\text{non-nursing}} = 184.65, \ p < 0.001, \) partial \( \eta^2 = 0.54; F(1,159)_{\text{nursing}} = 110.94, \ p < 0.001, \) partial \( \eta^2 = 0.41. \)

3.2.3. Pain condition severity ratings. Results of the third ANOVA, that tested differences on pain condition severity, were consistent with findings on pain intensity and unpleasantness. In line with hypothesis I, it was found that observers reported significantly higher pain condition severity when stimulus people were older compared to younger adults, \( F(1,159) = 403.24, \ p > 0.001, \) partial \( \eta^2 = 0.72. \) The main effect for
observer type (nursing vs. non-nursing students), $F(1,159) = 1.35, p = 0.247$, and for priming condition, $F(2,159) = 0.18, p = 0.832$, were not significant. There was a significant interaction between ages of stimulus persons (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), $F(1,159) = 9.11, p = 0.003$, partial $\eta^2 = 0.05$, but the 3 X 2 interaction between priming condition (control vs. misuse vs. undertreatment) and stimulus person’s age (older vs. younger stimulus persons), $F(2,159) = 2.02, p = 0.136$, was not significant. Finally, the three-way interaction was also not significant, $F(2,159) = 2.34, p = 0.100$. Simple effect tests were conducted to clarify effects the identified 2-way interaction (stimulus person age x observer type).

As displayed in Figure 3, pain condition severity ratings for older stimulus persons did not differ as a function of observer type, $F(1,59) = 0.01, p = 0.923$. All observers’ ratings significantly decreased when rating stimulus videos of younger adults as compared to younger persons, $F(1,159)_{non-nursing} = 268.200, p < 0.001$, partial $\eta^2 = 0.63$; $F(1,159)_{nursing} = 144.49, p < 0.001$, partial $\eta^2 = 0.48$. Non-nursing students, however, provided significantly lower pain condition severity ratings when judging younger adults than nursing students, $F(1,59) = 4.79, p = 0.029$. 
Figure 3. The interaction between observer type (nursing vs. non-nursing students) and stimulus persons’ age (older vs. younger stimulus persons) for pain intensity, unpleasantness, and condition severity ratings.
3.3. Willingness to Help, Sympathy, Financial Compensation, and Valence Ratings

Consistent with previous research (De Ruddere, et al. 2013), it was hypothesized that participants’ valence ratings would significantly differ as a function of priming conditions (hypothesis IV). To test hypothesis IV and to determine if there were differences on willingness to help, sympathy and financial compensation decisions as a function of priming conditions, observer type, and age of the individual expressing pain, a 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus persons) mixed-model MANOVAs was conducted. In each case, multivariate significance was followed by with 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus persons) mixed-model ANOVAs. Willingness to help, sympathy, deservingness of receiving financial compensation, and valence ratings were entered as dependent variables.

Relevant means and standard deviations are presented in Tables 10 and 12. The 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus persons) mixed-model MANOVA demonstrated a significant multivariate within-subjects effect (ages of stimulus persons), $\lambda = 0.273, F(4,156) = 103.93, p < 0.001$, partial $\eta^2 = 0.73$. The main between-subject effects of priming condition (control vs. misuse vs. undertreatment), $\lambda = 0.90, F(8,312) = 2.12, p = 0.026$, partial $\eta^2 = 0.05$, and observer type (nursing vs. non-nursing students), $\lambda = 0.92, F(4,156) = 3.37, p = 0.011$, partial $\eta^2 = 0.08$, were also significant. The two-way interaction between ages of stimulus persons and observer training was significant, $\lambda = 0.906, F(4,156) = 4.04, p = 0.004$, partial $\eta^2 = 0.09$, but the three-way interaction across
priming condition, stimulus persons’ age, and observer type was not significant, $\lambda = 0.93$, $F(8,312) = 1.47, p = 0.167$. Four follow-up 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) X 2 (older vs. younger stimulus persons) ANOVAs were conducted, followed by simple effect tests.
Table 12: Willingness to Help, Sympathy, and Deservingness of Financial Compensation by Prime Condition, Observer Type, and Stimulus Persons’ Age

<table>
<thead>
<tr>
<th>Stimulus Persons’ Age</th>
<th>Non-Nursing Students</th>
<th>Nursing Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Older</td>
<td>Younger</td>
</tr>
<tr>
<td><strong>Willingness to Help</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>5.58 (1.48)</td>
<td>4.21 (1.68)</td>
</tr>
<tr>
<td>Misuse</td>
<td>5.62 (1.63)</td>
<td>3.73 (1.69)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>5.91 (2.00)</td>
<td>3.96 (1.91)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>5.71 (1.70)</td>
<td>3.97 (1.75)</td>
</tr>
<tr>
<td><strong>Sympathy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>5.43 (1.63)</td>
<td>3.86 (1.58)</td>
</tr>
<tr>
<td>Misuse</td>
<td>5.41 (1.66)</td>
<td>3.44 (1.51)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>5.81 (1.73)</td>
<td>3.54 (1.72)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>5.54 (1.66)</td>
<td>3.61 (1.60)</td>
</tr>
<tr>
<td><strong>Financial Compensation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.84 (1.65)</td>
<td>3.39 (1.54)</td>
</tr>
<tr>
<td>Misuse</td>
<td>5.14 (1.88)</td>
<td>3.15 (1.64)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>5.21 (1.86)</td>
<td>2.90 (1.64)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>5.06 (1.79)</td>
<td>3.15 (1.60)</td>
</tr>
</tbody>
</table>

| **Valence**            |            |            |            |            |
| Priming Condition      |            |            |            |            |
| Control               | 2.43 (2.32) | 1.96 (2.19) | 3.49 (2.21) | 2.75 (2.18) |
| Misuse                | 2.41 (1.86) | 1.53 (1.86) | 2.39 (2.22) | 1.90 (1.73) |
| Undertreatment        | 3.80 (2.62) | 1.91 (2.70) | 4.85 (2.68) | 4.17 (2.84) |
| Total Averages        | 2.87 (2.35) | 1.80 (2.25) | 3.57 (2.55) | 2.94 (2.45) |

*M = mean; SD = standard deviation

1All outcomes were assessed on a 10cm visual analogue scale with the except of valence which was measured on a 21-point numeric scale
3.3.1. Willingness to help ratings. The first ANOVA involved willingness to help ratings. Results demonstrated that observers reported significantly higher willingness to help when stimulus people were older compared to younger adults, $F(1,159) = 325.05, p > 0.001$, partial $\eta^2 = 0.67$. The main effect for observer type (nursing vs. non-nursing students) was also significant, $F(1,159) = 7.93, p = .005$, partial $\eta^2 = 0.05$. As summarized in Table 9, nursing students reported significantly higher willingness to help than non-nursing students. The main effect for priming condition was not significant, $F(2,159) = 1.17, p = 0.313$. There was a significant interaction between ages of stimulus persons (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), $F(1,159) = 15.70, p < .001$, partial $\eta^2 = 0.09$, but the three-way interaction between priming condition (control vs. misuse vs. undertreatment), stimulus person’s age (older vs. younger stimulus persons), and observer type (nursing vs. non-nursing students) was not significant, $F(2,159) = 1.09, p = 0.337$. Simple effect tests were conducted to clarify effects the identified two-way interaction (stimulus person age x observer type).

As displayed in Figure 4, willingness to help ratings for videos of older adults did not vary as a function of observer type, $F(1,159) = 2.87, p = 0.092$. Both nursing and non-nursing students’ ratings decreased when rating videos of younger adults, $F(1,159)_{\text{non-nursing}} = 242.44, p < 0.001$, partial $\eta^2 = 0.61; F(1,159)_{\text{nursing}} = 98.11, p < 0.001$, partial $\eta^2 = 0.38$. Non-nursing students, however, providing significantly lower willingness to help for stimulus videos of younger adults compared to nursing students, $F(1,159) = 13.23, p < 0.001$, partial $\eta^2 = 0.08$. 
3.3.2. **Sympathy ratings.** The second ANOVA involved sympathy ratings. Consistent with previous results, results demonstrated that observers reported significantly greater sympathy when stimulus people were older compared to younger adults, $F(1,159) = 348.43, p > 0.001$, partial $\eta^2 = 0.69$. The main effect for observer type (nursing vs. non-nursing students), $F(1,159) = 2.69, p = 0.103$, and for priming condition, $F(2,159) = 0.54, p = 0.583$, were not significant. There was a significant interaction between ages of stimulus persons (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), $F(1,159) = 14.23, p < .001$, partial $\eta^2 = 0.80$, but the three-way interaction across priming condition (control vs. misuse vs. undertreatment), stimulus person’s age (older vs. younger stimulus persons), and observer type (nursing vs. non-nursing) was not significant, $F(2,159) = 1.83, p = 0.164$. Simple effect tests were conducted to clarify effects the identified two-way interaction (stimulus person age x observer type).

As displayed Figure 4, sympathy ratings did not differ as a function of observer type (nursing and non-nursing students) for stimulus videos of older adults, $F(1,159) = 0.17, p = 0.679$. Both nursing and non-nursing students’ ratings decreased when rating videos of younger adults, $F(1,159)_{\text{non-nursing}} = 283.83, p < 0.001$, partial $\eta^2 = 0.64$; $F(1,159)_{\text{nursing}} = 129.94, p < 0.001$, partial $\eta^2 = 0.45$. Non-nursing students, however, providing significantly lower sympathy ratings for stimulus videos of younger adults compared to nursing students, $F(1,159) = 7.03, p = 0.009$, partial $\eta^2 = 0.04$.

3.3.3. **Deservingness of financial compensation ratings.** The third ANOVA involved deservingness of financial compensation ratings. Consistent with previous results, it was found that observers reported significantly higher deservingness of
financial compensation when stimulus people were older compared to younger adults,
\( F(1,159) = 348.43, p > .001, \text{ partial } \eta^2 = 0.69 \). The main effect for observer type (nursing vs. non-nursing students), \( F(1,159) = 1.49, p = 0.223 \), and for priming condition, \( F(2,159) = 0.02, p = 0.981 \), were not significant. There was a significant interaction between ages of stimulus persons (younger vs. older stimulus persons) and observer type (nursing vs. non-nursing students), \( F(1,159) = 11.48, p = 0.001, \text{ partial } \eta^2 = 0.07 \), but the three-way interaction across priming condition (control vs. misuse vs. undertreatment), stimulus person’s age (older vs. younger stimulus persons), and observer type (nursing vs. non-nursing) was not significant, \( F(2,159) = 1.63, p = 0.200 \). Simple effect tests were conducted to clarify effects the identified two-way interaction (stimulus person age x observer type).

As displayed in Figure 4, deservingness of financial compensation ratings did not vary as a function of observe type (nursing vs. non-nursing students) for stimulus videos of older adults, \( F(1,159) = 0.01, p = 0.925 \). Both nursing and non-nursing students’ ratings decreased when rating videos of younger adults, \( F(1,159)_{\text{non-nursing}} = 245.34, p < 0.001, \text{ partial } \eta^2 = 0.61; F(1,159)_{\text{nursing}} = 115.72, p < 0.001, \text{ partial } \eta^2 = 0.42 \). Non-nursing students, however, providing significantly lower and deservingness of financial compensation for stimulus videos of younger adults compared to nursing students, \( F(1,159) = 5.25, p = 0.023, \text{ partial } \eta^2 = 0.03 \).
Figure 4. Observer type (nursing vs. non-nursing students) X stimulus persons’ age (older vs. younger) for willingness to help, sympathy, and deservingness of financial compensation ratings.
**3.3.4. Valence ratings.** The final ANOVA involved valence ratings. Results demonstrated significant main effects for each independent variable (priming condition, observer type, and stimulus persons’ age). That is, participants rated videos of older adults significantly more positively than videos of younger adults, $F(1,159) = 55.69, p < 0.001$, partial $\eta^2 = 0.26$; nursing students reported significantly greater positive valence than non-nursing students, $F(1,159) = 7.20, p = .008$, partial $\eta^2 = 0.04$; and, valence ratings significantly differed depending on which priming text observers received, $F(2,159) = 7.61, p = .001$, partial $\eta^2 = 0.09$. In addition to these main effects, a three-way interaction across priming conditions, observer type, and stimulus persons’ age was also observed, $F(2,159) = 3.43, p = .035$, partial $\eta^2 = 0.04$. Simple effect tests were conducted to clarify effects this three-way interaction (stimulus person age x observer type x priming condition).

As displayed in Table 12 and Figure 5, non-nursing students in the misuse condition reported significantly higher valence towards older adults than younger adults, $F(1,159) = 10.06, p = 0.002$, partial $\eta^2 = 0.06$. Also consistent with hypotheses III and IV, both nursing students and non-nursing students reported significantly higher valence towards older adults than younger adults in the undertreatment prime, $F(1,159)_{\text{nursing}} = 5.75, p = 0.018$, partial $\eta^2 = 0.04$; $F(1,159)_{\text{non-nursing}} = 44.07, p < 0.001$, partial $\eta^2 = 0.22$. Moreover, nursing students in the undertreatment priming condition reported higher valence towards older adults, $F(1,159) = 7.53, p = 0.001$, partial $\eta^2 = 0.09$, and younger adults, $F(1,159) = 6.78, p = 0.001$, partial $\eta^2 = 0.08$, than nursing students in the misuse condition. Also, nursing students in the control condition reported significantly more positive valence to older adults than younger adults, $F(1,159) = 7.16, p = 0.008$, partial $\eta^2$...
= 0.04. Finally, non-nursing students in the undertreatment priming condition reported significantly lower valence towards younger adults than nursing students in the undertreatment priming condition, $F(1,159) = 13.16$, $p = 0.008$, partial $\eta^2 = 0.08$.

Results demonstrated that both non-nursing and nursing students in the undertreatment priming condition rated stimulus videos of older persons more positively compared to videos of younger persons. Moreover, nursing students who received information about pain and aging rated stimulus videos of older and younger adults more positively than nursing students who were primed with information about the misuse of the health care system but not differently than nursing students who received neutral information (i.e., control prime). Finally, non-nursing students in the misuse condition provided less positive ratings towards stimulus videos of younger adults compared to older adults.
Figure 5. Valence ratings as a function of the three-way interaction across priming conditions (control vs. misuse vs. undertreating) X stimulus persons’ age (older vs. younger stimulus persons) X observers type (nursing vs. non-nursing students). Undertx = undertreatment.
3.4. Mediation: The Indirect Effect of Valence

Following the procedure described by Preacher and Hayes (2004, 2009, 2014), a bootstrapping method (with 5000 resamples and 95% confidence intervals) was used to test valence ratings as a mediating variable in the relationships between the priming conditions and pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation ratings. Baron and Kenny’s (1986) method of computing regressions and calculating Sobel’s test was also conducted (see Footnote 1 and Table 7). Results from bootstrapping analyses are presented.

Given no main effects of observer type (nursing vs. non-nursing students) were found on these outcomes, observer type was combined for analyses (i.e., all responses were analyzed together). Before analyses were conducted, the multicategory predictor variable (i.e., priming condition) was coded using indicator coding procedures (Hayes & Preacher, 2014). Subsequently, six mediation analyses were calculated, one for each outcome (pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation).

As displayed in Figure 6 and Table 13, results were in line with De Ruddere et al.’s (2013) findings. Bootstrapped analyses for valence as a mediator in the relationship between priming conditions and pain intensity did not demonstrate a total effect, $c_1 = -0.033$, $SE = 0.23$, $p = 0.884$; $c_2 = 0.205$, $SE = 0.23$, $p = 0.371$. That is, relative to the control condition, neither the misuse condition nor the undertreatment condition were significant predictors of pain intensity ratings. A relative direct effect of undertreatment priming condition and valence ratings was identified, $a_2 = 1.024$, $SE = 0.43$, $p = 0.017$, indicating that participants in the undertreatment condition reported more positive
valence towards the individual in the video than those in the control condition. In contrast, a relative direct effect of the misuse priming condition on valence ratings was not found, $a_1 = -0.601$, $SE = 0.42$, $p = 0.159$.

A relative direct effect of the priming condition on pain intensity was not found, $c'_1 = 0.092$, $SE = 0.21$, $p = 0.664$; $c'_2 = -0.009$, $SE = 0.21$, $p = 0.969$. Nonetheless, a direct effect of patient valence on pain ratings was found, $b = 0.208$, $SE = 0.04$, $p > 0.001$, showing higher more positive valence was related with greater pain intensity ratings. The relative indirect effect of the undertreatment priming condition on pain intensity through valence ratings was significant as the bootstrapped confidence interval excluded zero, $a_2b = 0.214$, $SE = 0.11$, 95% CI = 0.03 to 0.48. Yet, the relative indirect effect of the misuse priming condition on pain intensity through valence ratings was not significant, as the bootstrapped confidence interval did not excluded zero, $a_1b = -0.125$, $SE = 0.08$, 95% CI = -0.31 to 0.02. Results were equivalent when mediation was examined according to Barron and Kenny’s (1986) methods (see Footnote 1 and Table 7).

These results suggest that valence ratings significantly indirectly affect the relationship between the undertreatment priming condition and pain intensity ratings. That is, relative to the control condition, participants in the undertreatment priming condition reported feeling more positively towards stimulus persons which led to higher estimates of pain. Valence was not found to indirectly influence the relationship between the misuse priming condition and pain intensity estimates.
Figure 6. Multicategorical mediation model for pain intensity. $D_1$ and $D_2$ = indicator coded priming conditions (control vs. misuse vs. undertreatment); $M$ = mediator variable (valence ratings); $Y$ = outcome variable (pain intensity ratings).
Table 13: Mediation Analyses Results for All Outcome Variables

<table>
<thead>
<tr>
<th></th>
<th>D_1</th>
<th>D_2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Direct Effect</td>
<td>a_1</td>
<td>a_2</td>
</tr>
<tr>
<td>Coefficient (SE)</td>
<td>0.601 (0.42)</td>
<td>1.024* (0.43)</td>
</tr>
<tr>
<td>p</td>
<td>0.159</td>
<td>0.017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative Direct Effects</th>
<th>Total Effects</th>
<th>Relative Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient (SE)</td>
<td>Coefficient (SE)</td>
<td>95% LCI</td>
</tr>
<tr>
<td>p</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Pain Intensity</td>
<td>c_1' 0.092 (0.21)</td>
<td>0.664</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.009 (0.21)</td>
<td>0.969</td>
</tr>
<tr>
<td></td>
<td>b 0.208* (0.04)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pain Unpleasantness</td>
<td>c_1' 0.075 (0.24)</td>
<td>0.751</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.163 (0.24)</td>
<td>0.497</td>
</tr>
<tr>
<td></td>
<td>b 0.224* (0.04)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pain Condition Severity</td>
<td>c_1' 0.109 (0.23)</td>
<td>0.639</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.104 (0.23)</td>
<td>0.660</td>
</tr>
<tr>
<td></td>
<td>b 0.217* (0.04)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Willingness to Help</td>
<td>c_1' 0.065 (0.28)</td>
<td>0.819</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.132 (0.29)</td>
<td>0.644</td>
</tr>
<tr>
<td></td>
<td>b 0.435* (0.05)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sympathy</td>
<td>c_1' 0.074 (0.27)</td>
<td>0.784</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.195 (0.27)</td>
<td>0.475</td>
</tr>
<tr>
<td></td>
<td>b 0.366* (0.05)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Financial Compensation</td>
<td>c_1' 0.218 (0.30)</td>
<td>0.464</td>
</tr>
<tr>
<td></td>
<td>c_2' -0.241 (0.30)</td>
<td>0.425</td>
</tr>
<tr>
<td></td>
<td>b 0.295* (0.05)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

D_1 = first indicator variable; D_2 = second indicator variable; SE = standard error; LCI = lower level confidence interval; ULCI = upper level confidence interval

*p < 0.001

**95% confidence intervals excluded zero
This same pattern of results was demonstrated with regards to all outcomes (pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation; see Figure 7). As displayed in Table 13, there were no significant total effects (c₁ and c₂) nor relative direct effects of priming condition (c’₁ and c’₂) on pain unpleasantness, pain condition severity, willingness to help, sympathy, or deservingness of financial compensation. As can be observed in Table 13, however, there were significant relative direct effects of patient valence (b) on all outcomes. That is, more positive valence ratings were related to higher pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation ratings. Moreover, the relative indirect effects of the undertreatment priming condition on all outcomes (a₂b) were significant, as the bootstrapped confidence intervals excluded zero. Whereas the relative indirect effect of the misuse priming condition on all outcomes (a₁b) were not significant, as the bootstrapped confidence intervals did not excluded zero. Again, results were equivalent to coefficients derived from Barron and Kenny’s (1986) method (see Footnote 1 and Table 7).

These findings indicate that priming with information about the undertreatment of pain positively influenced pain intensity, pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation ratings indirectly via how positively/negatively the observer reported feeling towards the person expressing pain (i.e., valence ratings). In other words, relative to the control condition, participants in the undertreatment priming condition reported feeling more positively
towards stimulus persons which led to higher pain, willingness to help, sympathy, and deservingness of financial compensation ratings. Valence was not found to indirectly influence the relationship between the misuse priming condition and observers’ judgements.
Figure 7. Multicategorical mediation model for pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation. $D_1$ and $D_2$ = indicator coded priming conditions (control vs. misuse vs. undertreatment); $M$ = mediator variable (valence ratings); $Y$ = outcome variable (pain unpleasantness, pain condition severity, willingness to help, sympathy, and deservingness of financial compensation).
3.5. Exploratory Analysis: Stimulus Persons’ Gender

To determine if the gender of the individual in the video affected outcomes, a 2 (gender of stimulus person) X 3 (priming condition) X 2 (observer type) mixed-model MANOVA was conducted with pain intensity, pain unpleasantness, and pain condition severity, willingness to help, sympathy, deservingness of financial compensation, and valence ratings as the dependent variables. In each case, multivariate significance was followed with 2 (male vs. female stimulus persons) X 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) ANOVAs. Significant univariate effects were followed with simple effect tests.

The 2 (male vs. female stimulus persons) X 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) mixed-model MANOVA demonstrated a significant multivariate within-subjects effect (gender of stimulus persons), $\lambda = 0.53$, $F(7,153) = 24.69$, $p < 0.001$, partial $\eta^2 = 0.53$, and a significant interaction effect (gender of stimulus persons X observer training), $\lambda = 0.15$, $F(7,153) = 3.94$, $p = 0.001$, partial $\eta^2 = 0.15$. The 2 X 3 X 2 interaction (gender of stimulus persons x priming condition x observer type) was also statistically significant, $\lambda = 0.20$, $F(14,308) = 2.39$, $p = 0.004$, partial $\eta^2 = 0.10$. Seven follow-up 2 (male vs. female stimulus persons) X 3 (control vs. misuse vs. undertreatment) X 2 (non-nursing vs. nursing students) ANOVAs were conducted to clarify the significant effects. In each case, univariate significance was followed by with simple effects tests.
The first ANOVA tested pain intensity. This analyses revealed a significant within-subjects effect of stimulus persons’ gender (male vs. female), $F(1,59) = 102.55, p > 0.001$, partial $\eta^2 = 0.39$. That is, participants judged males as experiencing greater pain intensity, $M = 4.39, SE = 1.22$, compared to females, $M = 3.80, SD = 1.29$. Pain intensity did not significantly vary as a function of any interactions involving the within-subjects factor of stimulus persons’ gender. More specifically, the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,59) = 0.21, p = 0.809$, the two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,59) = 1.87, p = 0.173$, and the three-way across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students), $F(2,59) = 2.91, p = 0.057$, were all not significant.

The second ANOVA involved pain unpleasantness ratings. Similar to intensity ratings, pain unpleasantness was found to significantly differ as a function of the gender of the stimulus person, $F(1,59) = 67.86, p > 0.001$, partial $\eta^2 = 0.30$. Again, observers rated pain unpleasantness higher for male stimulus persons, $M = 4.65, SD = 1.30$, compared to females, $M = 4.13, SD = 1.46$. No interactions were found. More specifically, the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,59) = 1.40, p = 0.250$, two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,59) = 1.28, p = 0.260$, and three-way across
stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students), $F(2,59) = 1.64, p = 0.198$, were all not significant.

Consistent pain intensity and unpleasantness ratings, the third ANOVA, that involved pain condition severity ratings, revealed a significant main within-subjects effect of stimulus persons’ gender (male vs. female), $F(1,59) = 150.12, p > 0.001$, partial $\eta^2 = 0.49$. Results demonstrated that observers rated pain condition severity as higher for male stimulus persons, $M = 4.24, SD = 1.30$, compared to female, $M = 3.46, SD = 1.42$).

A significant three-way interaction across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students) was also found, $F(2,59) = 3.12, p = 0.047$, partial $\eta^2 = 0.04$, but the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,59) = 0.78, p = 0.840$, and the two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,59) = 1.34, p = 0.249$, were not significant.

Simple effect tests were conducted to clarify effects this three-way interaction (stimulus person age x observer type x priming condition).
Table 14: Pain Condition Severity by Prime Condition, Observer Type, and Stimulus Persons’ Gender

<table>
<thead>
<tr>
<th>Stimulus Persons’ Gender</th>
<th>Non-Nursing Students $n = 83$</th>
<th>Nursing Students $n = 82$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male $M (SD)$</td>
<td>Female $M (SD)$</td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>3.97 (1.27)</td>
<td>3.37 (1.37)</td>
</tr>
<tr>
<td>Misuse</td>
<td>4.09 (1.27)</td>
<td>3.15 (1.22)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>4.19 (1.34)</td>
<td>3.63 (1.61)</td>
</tr>
<tr>
<td>Total Averages</td>
<td>4.08 (1.28)</td>
<td>3.38 (1.40)</td>
</tr>
</tbody>
</table>

$M = \text{mean}; SD = \text{standard deviation}$
As summarized in Table 14 and displayed in Figure 8, observers in the control, $F(1,159)_{\text{non-nursing}} = 15.48, p < 0.001$, partial $\eta^2 = 0.09$; $F(1,159)_{\text{nursing}} = 43.67, p < 0.001$, partial $\eta^2 = 0.22$, misuse, $F(1,159)_{\text{non-nursing}} = 37.29, p < 0.001$, partial $\eta^2 = 0.19$; $F(1,159)_{\text{nursing}} = 16.73, p < 0.001$, partial $\eta^2 = 0.10$, and undertreatment, $F(1,159)_{\text{non-nursing}} = 12.84, p < 0.001$, partial $\eta^2 = 0.08$; $F(1,159)_{\text{nursing}} = 32.04, p < 0.001$, partial $\eta^2 = 0.17$, priming conditions attributed significantly higher pain severity ratings to male stimulus persons compared to female stimulus persons. No other simple effect tests were statistically significant.

Figure 8. Pain condition severity ratings as a function of the three-way interaction across priming conditions (control vs. misuse vs. undertreating) X stimulus persons’ gender (male vs. female) X observers type (nursing vs. non-nursing students). Undertx = undertreatment.
The fourth ANOVA tested differences on willingness to help ratings. Consistent with pain ratings, results demonstrated a significant main within-subjects effect of stimulus persons’ gender (male vs. female), $F(1,59) = 52.70, p > 0.001$, partial $\eta^2 = 0.25$. Again, observers reported higher willingness to help male stimulus persons, $M = 5.00$, $SD = 1.58$, compared to females, $M = 4.54$, $SD = 1.80$. No interactions were significant. That is, the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,59) = 0.34, p = 0.715$, the two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,59) = 3.00, p = 0.085$, and the three-way across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students), $F(2,59) = 2.85, p = 0.061$, were all not significant.

The same pattern of results was also found the firth ANOVA that involved sympathy ratings. That is, a main within-subjects effect of stimulus persons’ gender (male vs. female) was found, $F(1,59) = 50.39, p > 0.001$, partial $\eta^2 = 0.24$. Again, participants provided greater sympathy ratings to male stimulus persons, $M = 5.03$, $SD = 1.55$, compared to females, $M = 4.54$, $SD = 1.80$. No interactions were significant. More specifically, the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,59) = 0.08, p = 0.922$, the two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,59) = 1.25, p = 0.265$, and the three-way
across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students), \( F(2,59) = 0.685, p = 0.506, \) were all not significant.

The six ANOVA that involved financial compensation ratings paralleled previous results. A main effect for stimulus persons’ gender was identified where observers provided significantly higher deservingness of financial compensation ratings for male stimulus persons, \( M = 4.53, SD = 1.61, \) compared to females, \( M = 4.00, SD = 1.83, \) \( F(1,59) = 70.68, p > 0.001, \) partial \( \eta^2 = 0.31. \) The three-way interaction across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students) was also significant, \( F(2,59) = 4.02, p = 0.020, \) partial \( \eta^2 = 0.05, \) but the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), \( F(2,59) = 0.83, p = 0.439, \) and the two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), \( F(1,59) = 0.46, p = 0.499, \) were not significant. Simple effect tests were conducted to clarify effects this three-way interaction (stimulus person age x observer type x priming condition).
Table 15: Deservingness of Financial Compensation by Prime Condition, Observer Type, and Stimulus Persons’ Gender

<table>
<thead>
<tr>
<th>Stimulus Persons’ Gender</th>
<th>Non-Nursing Students</th>
<th>Nursing Students</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Pain Condition Severity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priming Conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.32 (1.56)</td>
<td>3.91 (1.53)</td>
<td>4.48 (1.52)</td>
</tr>
<tr>
<td>Misuse</td>
<td>4.54 (1.62)</td>
<td>3.76 (1.78)</td>
<td>4.57 (1.87)</td>
</tr>
<tr>
<td>Undertreatment</td>
<td>4.32 (1.54)</td>
<td>3.79 (1.88)</td>
<td>4.69 (1.63)</td>
</tr>
<tr>
<td><strong>Total Averages</strong></td>
<td>4.39 (1.56)</td>
<td>3.82 (1.71)</td>
<td>4.67 (1.66)</td>
</tr>
</tbody>
</table>

*Mean; SD = standard deviation

As summarized in Table 15 and displayed in Figure 9, observers in the control,

\[ F(1, 159)_{\text{non-nursing}} = 7.41, p = 0.007, \text{ partial } \eta^2 = 0.05; F(1, 159)_{\text{nursing}} = 28.15, p < 0.001, \]

\[ \text{partial } \eta^2 = 0.15, \text{ misuse, } F(1, 159)_{\text{non-nursing}} = 25.52, p < 0.001, \text{ partial } \eta^2 = 0.14; \]

\[ F(1, 159)_{\text{nursing}} = 4.34, p = 0.039, \text{ partial } \eta^2 = 0.03, \text{ and undertreatment, } F(1, 159)_{\text{non-nursing}} = 11.42, p = 0.001, \text{ partial } \eta^2 = 0.07; F(1, 159)_{\text{nursing}} = 4.01, p = 0.047, \text{ partial } \eta^2 = 0.03, \]

priming conditions attributed significantly higher pain severity ratings to male stimulus persons compared to female stimulus persons. No other simple effect tests were statistically significant.
Figure 9. Deservingness of financial compensation ratings as a function of the three-way interaction across priming conditions (control vs. misuse vs. undertreating) X stimulus persons’ gender (male vs. female) X observers type (nursing vs. non-nursing students). Undertx = undertreatment.
The final ANOVA that involved valence ratings was the only univariate test that did not demonstrate a significant main-within subjects effect of stimulus persons’ gender. Observers’ valence ratings were not found to differ depending on the gender of the stimulus person, $M_{\text{male}} = 2.74, SD = 2.31; M_{\text{female}} = 2.85, SD = 2.45; F(1,59) = 1.88, p = 0.172$ partial $\eta^2 = 0.01$. The two-way interaction between stimulus persons’ gender (male vs. female) and observer type (nursing vs. non-nursing students), $F(1,159) = 8.03, p = 0.005$, partial $\eta^2 = 0.05$, was found but the two-way interaction between stimulus persons’ gender (male vs. female) and priming condition (control vs. misuse vs. undertreatment), $F(2,159) = 0.03, p = 0.973$, and three-way across stimulus persons’ gender (male vs. female), priming condition (control vs. misuse vs. undertreatment), and observer type (nursing vs. non-nursing students), $F(2,59) = 0.15, p = 0.862$, were all not significant. Simple effect tests were conducted to clarify effects the two-way interaction (stimulus person age x observer type).
Table 16: Interaction Between Stimulus Persons’ Gender and Observer Type on Valence Ratings

<table>
<thead>
<tr>
<th>Observer Type</th>
<th>Stimulus Persons’ Gender</th>
<th>Male M (SD)</th>
<th>Female M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-nursing (n = 83)</td>
<td>Male</td>
<td>2.40 (2.18)</td>
<td>2.28 (2.25)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.01 (2.40)</td>
<td>3.43 (2.52)</td>
</tr>
</tbody>
</table>

*M = mean; SD = standard deviation

As summarized in Table 16 and displayed in Figure 10, nursing students rated stimulus videos of both genders more positively than non-nursing students, $F(1,159)_{\text{male}} = 4.03, p = 0.046$, partial $\eta^2 = 0.03$; $F(1,159)_{\text{female}} = 10.31, p = 0.002$, partial $\eta^2 = 0.06$.

Nursing students rated stimulus videos of females as more positive than videos of males, $F(1,159) = 8.83, p = 0.003$, partial $\eta^2 = 0.05$, whereas non-nursing students’ valence ratings did not significantly differ as a function of the gender of the stimulus persons, $F(1,159) = 1.06, p = 0.305$. In general, this interaction demonstrated that nursing students rated female stimulus persons more positively than male stimulus persons, while non-nursing students’ ratings did not significantly differ depending on the stimulus persons’ gender.
Figure 10. The interaction between observer type (nursing vs. non-nursing students) and stimulus persons’ gender (male vs. female) for valence ratings.
CHAPTER 4: Narrative Data Results

4.1. Overview

Participants were asked to identify factors that affected their pain, sympathy, willingness to help, and deservingness of financial compensation ratings. They were also asked to identify factors that influenced how positively/negatively they felt towards the stimulus person. Observers did not specify if these factors increased or decreased their ratings. For example, participants often indicated that “age” influenced their estimates of pain, but they did not state if patients’ age increased or decreased their ratings of pain. As such, the purpose of these analyses was to develop a list of factors that observers indicated influenced their ratings.

A coding framework was developed following Braun and Clarkes’ (2006) stepwise methods. Subsequently, two researchers coded the data independently. Percentage agreement and Cohen’s Kappa demonstrated good to excellent reliability (percentage agreement = 97%, Kappa = 0.57; Cohen, 1960; McHugh, 2012).

Results from thematic and content analyses are displayed in Figure 1 and summarized in Tables 17, 18, and 19. Overall, observers indicated that their ratings varied as a function of several factors. Although observers frequently listed pain-related factors, such as “pain expressed” or “facial grimaces” as variables that influenced their ratings, they also identified numerous non-pain related characteristics. Indeed, the gender and age of the patient was the most frequently identified factor that influenced observers’ ratings. Grounded in observers’ responses, results were divided into two categories: (a)
observable pain-related changes and (b) non-pain-related factors. Distinct themes emerged within each category.

Figure 11. Thematic analysis summary of factors identified by participants that influenced their ratings of pain, sympathy, willingness to help, and deservingness of financial compensation ratings, and how positively/negatively they felt towards the stimulus person. General personal characteristics comprised general statements about the stimulus persons’ general physical characteristics, such as being “well groomed.”
4.2. Observable Pain-Related Changes.

Results of quantitative content analysis are summarized in Table 17. Table 18 includes specific quotation examples that fell within this category. Not surprisingly, observers indicated that their ratings varied as a function of numerous pain-related changes in the stimulus persons. The most frequently identified observable changes were “general pain expressed” and “facial movements.” Observers’ commonly referred to stimulus persons’ pain intensity or general changes in stimulus persons’ facial expressions as variables that affected their ratings. Participants also specified that their ratings were influenced by other observable changes including, but not limited to, eye and mouth movements, laughing or smiling, bodily movements, and changes in breathing. In general, participants identified a variety of observable changes throughout stimulus videos that they acknowledged moderated their judgements.
Table 17: Quantitative Content Analysis: Frequency of Themes for Specific Questions and Overall Totals

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Pain</th>
<th>Sympathy</th>
<th>Willingness to Help</th>
<th>Financial Compensation</th>
<th>Positive/Negative Feelings</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observable Pain-Related Changes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Expressed</td>
<td></td>
<td>60</td>
<td>70</td>
<td>86</td>
<td>78</td>
<td>51</td>
<td>345</td>
</tr>
<tr>
<td>General facial movements</td>
<td></td>
<td>179</td>
<td>45</td>
<td>30</td>
<td>22</td>
<td>21</td>
<td>297</td>
</tr>
<tr>
<td>Mouth movements</td>
<td></td>
<td>75</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>92</td>
</tr>
<tr>
<td>Eye movements</td>
<td></td>
<td>62</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>66</td>
</tr>
<tr>
<td>Tearful/upset</td>
<td></td>
<td>32</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>64</td>
</tr>
<tr>
<td>Laughing or smiling</td>
<td></td>
<td>29</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>16</td>
<td>56</td>
</tr>
<tr>
<td>Body movements</td>
<td></td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Relaxed</td>
<td></td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Changes in breath</td>
<td></td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Bracing</td>
<td></td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td><strong>Non-Pain-Related Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient-Level Personal Characteristics</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Demographics</td>
<td></td>
<td>81</td>
<td>100</td>
<td>56</td>
<td>71</td>
<td>81</td>
<td>389</td>
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<tr>
<td>General personal characteristics</td>
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<td>3</td>
<td>3</td>
<td>1</td>
<td>22</td>
<td>35</td>
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<tr>
<td><strong>Observers’ General Impressions of Patients</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helplessness/ coping abilities</td>
<td></td>
<td>7</td>
<td>10</td>
<td>24</td>
<td>21</td>
<td>13</td>
<td>75</td>
</tr>
<tr>
<td>Willingness to accept help</td>
<td></td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>32</td>
<td>4</td>
<td>49</td>
</tr>
<tr>
<td>Sympathy</td>
<td></td>
<td>0</td>
<td>26</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>Valence</td>
<td></td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>Suppressing pain experience</td>
<td></td>
<td>18</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Disingenuous pain expression</td>
<td></td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td><strong>Additional Contextual Characteristics</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>General experiences or beliefs</td>
<td></td>
<td>41</td>
<td>38</td>
<td>63</td>
<td>52</td>
<td>83</td>
<td>277</td>
</tr>
<tr>
<td>Comparison to other videos</td>
<td></td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Priming text</td>
<td></td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

*General personal characteristics comprised general statements about the stimulus persons’ general physical characteristics, such as being “well groomed.”*
Table 18: Frequency of Identified Observable Pain-Related Changes that Influenced Observers’ Ratings

<table>
<thead>
<tr>
<th>Theme</th>
<th>Frequency</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Expressed</td>
<td>“If the persons’ expressions looked like they were in pain.” (Control; NNS)</td>
<td>“Displayed the severity of their pain.” (Control; NS)</td>
</tr>
<tr>
<td></td>
<td>“How much pain intensity.” (Misuse; NNS)</td>
<td>“Intensity of pain.” (Undertx; NNS)</td>
</tr>
<tr>
<td>General facial movements</td>
<td>“Face distortion.” (Misuse; NNS)</td>
<td>“Facial grimacing for pain.” (Misuse; NS)</td>
</tr>
<tr>
<td></td>
<td>“The intensity of facial expressions.” (Undertx; NS)</td>
<td>“More intense the facial expression.” (Undertx; NNS)</td>
</tr>
<tr>
<td>Mouth movements</td>
<td>“Mouth movements for words like ouch.” (Control; NNS)</td>
<td>“Looked as if they were saying ouch.” (Undertx; NNS)</td>
</tr>
<tr>
<td></td>
<td>“How much their mouths reacted.” (Undertx; NNS)</td>
<td>“Opened mouth.” (Misuse; NS)</td>
</tr>
<tr>
<td>Eye movements</td>
<td>“Closed their eyes really tight.” (Control; NNS)</td>
<td>“Squinty eyes.” (Undertx; NNS)</td>
</tr>
<tr>
<td></td>
<td>“Eyes closing.” (Misuse; NS)</td>
<td>“If people had to close their eyes.” (Undertx; NS)</td>
</tr>
<tr>
<td>Tearful/upset</td>
<td>“If the person looked upset or like they could.” (Control; NNS)</td>
<td>“Tearful eyes.” (Undertx; NS)</td>
</tr>
<tr>
<td></td>
<td>“If they had glossy eyes and a frowned face.” (Misuse; NNS)</td>
<td>“The looks in peoples eyes – some looked so sad.” (Control; NNS)</td>
</tr>
<tr>
<td>Laughing or smiling</td>
<td>“Smiling whiles expression of pain.” (Control; NNS)</td>
<td>“Less sympathetic of people who smiled.” (Undertx; NNS)</td>
</tr>
<tr>
<td></td>
<td>“If the person was smiling.” (Misuse; NS)</td>
<td>“People who smiled often got lower scores of pain.” (Misuse; NNS)</td>
</tr>
<tr>
<td>Body movements</td>
<td>“Tensing of neck muscles.” (Control; NS)</td>
<td>“I judge the patients’ mobility.” (Undertx; NS)</td>
</tr>
<tr>
<td></td>
<td>“Body movement – Some people would jerk more their bodies very suddenly.” (Misuse; NNS)</td>
<td>“Was triggered by a moving part of the body.” (Misuse; NNS)</td>
</tr>
<tr>
<td>Relaxed</td>
<td>“Didn’t looked strained seemed less in pain.” (Control; NNS)</td>
<td>“Seemed relaxed.” (Misuse; NNS)</td>
</tr>
<tr>
<td></td>
<td>“If they looked relaxed.” (Undertx; NNS)</td>
<td>“How comfortable they were just laying down on the bed.” (Misuse; NS)</td>
</tr>
<tr>
<td>Changes in breath</td>
<td>“Seemed to be struggling or holding their breath (struggling with breathing normally).” (Control; NNS)</td>
<td>“Exhaling after holding their breath.” (Misuse; NNS)</td>
</tr>
<tr>
<td></td>
<td>“Holding breath.” (Undertx; NS)</td>
<td>“Heavy breathing.” (Control; NS)</td>
</tr>
<tr>
<td>Bracing</td>
<td>“Some of the participants bracing to endure the pain.” (Undertx; NS)</td>
<td>“I gave higher raters when someone appeared to be bracing themselves until the pain was over.” (Misuse; NNS)</td>
</tr>
<tr>
<td></td>
<td>“If they had to grip on something to endure the pain.” (Undertx; NNS)</td>
<td>“Cringed.” (Undertx; NS)</td>
</tr>
</tbody>
</table>

Control = participants from the control priming condition; Misuse = participants from the misuse condition; Undertx = participants from the undertreatment priming condition; NS = nursing student; NNS = non-nursing student
4.3. Non-Pain-Related Characteristics.

Results of quantitative content analysis are summarized in Table 17. Table 19 includes specific quotation examples that fell within this category. Three subcategories emerged: (a) patient-level personal characteristics; (b) observers’ general impressions of patients; and (d) additional contextual characteristics. Specific themes emerged from each category.

4.3.1. Patient-level personal characteristics. Observers frequently noted that their ratings varied as a function of non-pain related characteristics of the stimulus persons. They often noted, for instance, that the stimulus persons’ gender and age moderated their ratings. Observers also noted that their ratings differed as a function of the stimulus persons’ general physical characteristics, such as being “well groomed.”

4.3.2. Observers’ general impressions of patients. Observers reported that their ratings varied as a function of general inferences they made about the stimulus persons. In other words, they made general judgements about stimulus persons which then influenced their specific ratings. The most frequently identified theme was observers’ general impressions of how helpless stimulus persons were in coping with their pain. Observers also inferred, as potential influences on their ratings, the extent to which stimulus persons appeared willing to receive help, how sympathetic observers felt towards stimulus persons, and their overall impression (i.e., positive or negative valence) of stimulus persons. Although less frequently identified, observers noted that their ratings were influenced by the extent to which they perceived the stimulus persons as faking or
exaggerating their pain experience. Finally, observers indicated that perceiving stimulus persons as withholding pain expressions or suppressing the experience also affected their ratings.

4.3.3. Additional contextual characteristics. Observers indicated that their ratings varied as a function of supplementary information as well as beliefs and attitudes. That is, additional information that extended beyond the information presented in each distinct stimulus video (e.g., previous life experiences/beliefs, comparisons to others’ pain, informational primes). The most frequently identified theme was observers’ own personal experiences and beliefs. For example, observers noted that their previous experiences influenced their ratings of the videos (e.g., whether the individual reminded them of a friend/grandparent). Although less frequently noted, participants also stated that their ratings were affected when they compared the stimulus persons’ experience to previous stimulus persons’ expression. Finally, the informational priming texts were noted to influence ratings by a small number of observers.
Table 19: Frequency of Identified Non-Pain-Related Characteristics that Influenced Observers’ Ratings

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Example</th>
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<tbody>
<tr>
<td>Patient-Level Personal Characteristics</td>
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<tr>
<td>Demographics</td>
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<tr>
<td><strong>General personal characteristics</strong></td>
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<tr>
<td><em>Demographics</em></td>
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<tr>
<td><em>“I gave higher to people who are elderly because I respect elder people.” (Control; NS)</em></td>
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<tr>
<td><em>“Age of participant.” (Undertx; NNS)</em></td>
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<td><em>“Male elderly – higher rating – more sympathy.” (Undertx; NNS)</em></td>
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<tr>
<td><em>“When a man seemed to be in pain.” (Undertx; NS).</em></td>
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<td><em>“Positive feelings to those who looked nice and quite groomed.” (Control; NS)</em></td>
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<td><em>“Hair was nice and neat.” (Undertx; NNS)</em></td>
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<td><em>“Physical appearance.” (Undertx; NS)</em></td>
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<tr>
<td><em>“How they appeared, if they were wearing makeup or hair done nicely.” (Misuse; NNS)</em></td>
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<tr>
<td>Observers’ General Impressions of Patients</td>
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<tr>
<td>Helplessness/ coping abilities</td>
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<tr>
<td><em>“Those who looked to not be coping well with the pain.” (Control; NS)</em></td>
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<tr>
<td><em>“How bad the pain can disturb their normal everyday body function.” (Misuse; NNS)</em></td>
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<tr>
<td><em>“Depending on how helpless they looked in the video whether or not they looked able to help themselves.” (Undertx; NNS)</em></td>
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<tr>
<td><em>“If they looked like they were having trouble coping.” (Undertx; NS)</em></td>
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<tr>
<td>Willingness to accept help</td>
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<tr>
<td><em>“If they seemed interested in help.” (NS)</em></td>
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<tr>
<td><em>“Willing to receive help.” (Undertx; NNS)</em></td>
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<tr>
<td><em>“Some just kind of looked more helpless than others and in need of assistances (or accepting of help).” (Control; NNS)</em></td>
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<tr>
<td><em>“If they seemed interested in help.” (Misuse; NS)</em></td>
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<tr>
<td>Sympathy</td>
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<tr>
<td><em>“The sympathy I felt towards the person.” (Misuse; NNS)</em></td>
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<tr>
<td><em>“How sympathetic I felt for the patient.” (Undertx; NS)</em></td>
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<tr>
<td><em>“If I felt more sympathetic towards them.” (Misuse NS)</em></td>
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<tr>
<td><em>“Higher ratings were based on how much sympathy I had for participants.” (Control; NNS)</em></td>
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<td>Valence</td>
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<tr>
<td><em>“If the pt seemed like they would have been nice in person and nice to the physio I rated higher.” (Control; NS)</em></td>
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<tr>
<td><em>“If people looked friendly,” (Misuse; NNS)</em></td>
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<tr>
<td><em>“Kinder looking.” (Undertx; NS)</em></td>
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<tr>
<td>Suppressing pain experience</td>
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<tr>
<td><em>“Some seemed to be trying to hold in how much pain they were actually feeling.” (Misuse; NNS)</em></td>
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<tr>
<td><em>“Try to conceal pain expressions to appear strong.” (Undertx; NNS)</em></td>
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<tr>
<td><em>“Those who appeared to be suppressing their pain, trying not to show it.” (Undertx; NS)</em></td>
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<tr>
<td><em>“Those people trying to be strong (those who showed expressions/ held back).” (Misuse; NS)</em></td>
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<tr>
<td>Disingenuous pain expression</td>
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<td><em>“People who seemed to be exaggerating led me to give lower ratings.” (Control; NS)</em></td>
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<td><em>“Could have been exaggerating how bad the pain was.” (Undertx; NNS)</em></td>
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<td><em>“If I felt he she was bluffing.” (Misuse; NNS)</em></td>
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<td><em>“I got the feeling they were “faking” how much it hurt.” (Undertx; NS)</em></td>
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<tr>
<td>Additional Contextual Characteristics</td>
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<tr>
<td>General experiences or beliefs</td>
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<tr>
<td><em>“I think that I was very strict in my ratings because of my own background in sport injuries and physiotherapy.” (Misuse; NSS).</em></td>
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<td><em>“I felt a level of willing to help no matter what.” (Undertx; NNS)</em></td>
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<td><em>“Reminded me of my grandpa who has passed.” (Misuse; NNS)</em></td>
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<td><em>“If I thought they were working and contributing to society.” (Control; NS)</em></td>
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<td>Comparison to other videos</td>
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<td><em>“As the videos went on I felt I was more sympathetic and felt more positively to the people in the video may be because I was exposed to more people experiencing pain.” (Control; NS)</em></td>
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</table>
“Comparing it with previous individual’s from previous videos.” (Undertx; NNS)
“Some seemed to be trying to hold in how much pain they were actually feeling compared to others who tried to act like they were in more pain than they actually were.” (Misuse; NNS)
“Comparing individuals from videos.” (Undertx; NNS)

<table>
<thead>
<tr>
<th>Priming text</th>
<th>“Preamble of information before study.” (Undertx; NNS)</th>
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<tbody>
<tr>
<td></td>
<td>“The reading I read before watching the videos.” (Undertx; NS)</td>
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Control = participants from the control priming condition; Misuse = participants from the misuse condition; Undertx = participants from the undertreatment priming condition; NS = nursing student; NNS = non-nursing student
CHAPTER 5: Discussion

The primary purpose of this investigation was to examine the influence of informational primes on observers’ interpretations of others’ pain. More specifically, two informational primes were evaluated: (a) information about the misuse of the health care system [misuse condition] and (b) information about the undertreatment of pain in older persons [undertreatment condition]. Additionally, the role of observer and stimulus person characteristics in pain decoding was examined. That is, observers’ judgements were studied as function of observer type (i.e., nursing students vs. non-nursing students) and stimulus persons’ age (younger vs. older stimulus persons). Exploratory analyses were also conducted to identify the role of stimulus persons’ gender (male vs. female stimulus persons) on observers’ perceptions. Finally, the influence of interactions across priming conditions (misuse vs. undertreatment vs. control), observer type (nursing student vs. non-nursing student), and stimulus persons’ age (older vs. younger) in decoding pain was explored.

The most significant contribution of this research was the evaluation of the influence of informational primes on observers’ judgements of older persons’ pain. Information about the misuse of the health care system has been found to impact observers’ interpretations of younger adults’ pain (De Ruddere et al., 2013). The influence of informational primes, however, has not been investigated in decoding older adults’ pain. Given the underassessment and undertreatment of pain in older persons (Gauthier & Gagliese, 2011; Herman et al., 2009; Horgas & Elliott, 2004), specifying
contextual factors that affect observers’ interpretations of pain of older persons is especially important.

Another novel feature of this study was the examination of observers’ judgements of others’ pain as a function of interactions across multiple contextual variables. This investigation involved analyzing observers’ estimates as a function of several parameters including observer type (nursing vs. non-nursing student), informational prime (control vs. misuse vs. undertreatment), stimulus persons’ age (younger vs. older persons), and stimulus persons’ gender (male vs. female). Considering the role of several influential factors provides a more precise characterization of the impact of situational variables on the interpretation of pain signals.

5.1. General Overview of Findings

Consistent with biopsychosocial formulations of pain (Hadjistavropoulos, et al., 2011), this study demonstrated that certain contextual factors, unrelated to the pain experience, significantly moderate observers’ judgements of others’ pain. In general, observers’ ratings varied as a function of stimulus persons’ age, observer type, and informational primes provided to the observer. Consistent with previous research (e.g., Hadjistavropoulos et al., 1996; Hadjistavropoulos et al., 2000), observers ascribed greater levels of pain to older stimulus persons compared to younger. Moreover, observers reported higher willingness to help, sympathy, and deservingness of financial compensation to older adults compared to younger adults.
Observer type and stimulus persons’ age also interacted to influence observers’ ratings. Nursing students attributed greater levels of pain to younger adults than did non-nursing students. Younger stimulus persons also received higher scores on willingness to help, deservingness of financial compensation, and sympathy measures from nursing students (compared to non-nursing students).

Additionally, informational primes also influenced valence ratings. Informational primes interacted with both observer type and stimulus persons’ age to moderate observers’ valence towards the stimulus person. In general, this interaction demonstrated that observers, primed with information about the undertreatment of pain in older persons, report more positive valence towards older patients. It also suggests that priming observers with information about the misuse of the health care system attenuated their valence ratings towards younger patients.

The undertreatment of pain in older adults priming text also influenced observers’ pain estimates indirectly through observers’ valence towards the stimulus persons. More specifically, participants in the undertreatment prime condition reported more positive valence towards stimulus persons. The higher valence subsequently resulted in higher pain, willingness to help, sympathy, and deservingness of financial compensation ratings.

Finally, stimulus person’s gender was found to significant affect observers’ ratings. Observers ascribed significantly higher estimates of pain, willingness to help, sympathy, and deservingness of financial compensation to male stimulus persons compared to females.
Analyses of the narrative data also supported the influence of personal and situational parameters in the interpretation of pain signals. Participants acknowledged both observable pain-related changes and non-pain-related factors as influencing their ratings. Observable pain-related changes included features of the patients that were altered in response to a nociceptive event (e.g., facial grimaces). Non-pain-related factors including patient characteristics (e.g., age and gender), perceptions of the patient (e.g., how “nice” the patient appeared), and other contextual features (e.g., informational primes). Interestingly, demographics of the patient (a non-pain-related factor) was the most frequently identified element that observers reported affecting their ratings.

Overall, results from this study are consistent with the communications model of pain. Non-pain related factors were found to significantly influence the process of decoding pain expressions. This is particularly important given this is one of the few studies examining the influence of personal and situational factors on decoding older persons’ pain experience. Results contribute to the theoretical model by providing increased specificity to the role of contextual features in interpreting nonverbal pain expressions.

5.2. Discussion of Specific Findings

5.2.1. The role of stimulus persons’ age. As hypothesized, observers judged older stimulus adults as experiencing greater pain intensity, pain unpleasantness, and condition severity compared to younger adults (hypothesis 1). Moreover, older adults, compared to younger adults, were rated higher on measures of observers’ willingness to
help, sympathy, and patient deservingness of financial compensation. Observers were also found to feel more positively towards older stimulus persons compared to younger stimulus persons. These results are in line with previous investigations that have shown observers estimate older persons’ pain as more intense than younger persons’ pain (Hadjistavropoulos et al., 1996; Hadjistavropoulos et al., 2000; Lautenbacher et al., 2013; Matheson, 1997). Researchers have also demonstrated that observers attribute greater disability, more impact to everyday activities, and increased need for tangible assistance to older patients compared to younger patients (Hadjistavropoulos et al., 2000).

One factor contributing to this consistent finding may be stereotypes about older individuals (Hadjistavropoulos et al., 2000; Herr & Mobily, 1991; Herr & Garand, 2001; Hofland, 1992; Matheson, 1997). A common belief is that older persons are less healthy and experience more pain and pain-related problems (e.g., disability) than younger persons (Hadjistavropoulos et al., 2000; Herr & Garand, 2001; Matheson, 1997). Indeed, narrative data from the present investigation supported that observers commonly acknowledged that their judgments were influenced by the patients’ age. In turn, this heightened awareness to older persons may have increased observers’ sensitivity towards older persons’ nonverbal pain cues (Matheson, 1997).

One perplexing question, however, remains: If observers are more sensitive to pain in older persons compared to younger persons, why is pain continuously undertreated in older adults? Although the widespread belief that pain is a natural occurrence of aging may result in higher estimates of older persons’ pain, it is also an
unfounded myth that may complicate patient care (Thielke, Sale, & Reid, 2012). While pain increases in prevalence with older age, it is not natural. Pain is always the results of pathology that warrants treatment regardless of a person’s age. Nonetheless, holding the belief that pain is inevitably related to aging is known to interfere with the provision and access of effective pain management services (Makris et al., 2015; Richeson & Shelton, 2006; Weiner & Rudy, 2002). The findings from this study support the notion that people believe that older individuals may be suffering more from pain. Educational programs aimed to translate such beliefs into better pain care for older individuals need to be developed and evaluated.

In summary, results from this investigation support hypothesis I; observers are more sensitive towards nonverbal pain cues of older persons compared to younger persons. Indeed, the higher estimates of older persons’ pain may be a result of a combination of factors, including observers’ beliefs about pain and aging. Future research should aim to clarify the mechanisms that influence observers’ estimates of older persons’ pain and identify how observers’ judgements directly affect patient care.

5.2.2. The role of observers’ professional training. Based on previous findings showing that health professionals assign lower pain ratings to people expressing pain than non-health professionals (Hadjistavropoulos et al., 1998; Prkachin et al., 2001), it was expected that the nursing students’ ratings of stimulus persons’ pain would be lower than ratings made by non-nursing students (hypothesis II). Contrary to hypothesis II, nursing students did not provide lower estimates of pain than non-nursing students. In fact, an
unexpected interaction between observer type and stimulus persons’ age was identified. Specifically, nursing students judged younger persons’ pain as being more severe than did non-nursing students. Furthermore, nursing students (compared to non-nursing students) also provided higher ratings of willingness to help, sympathy, and deservingness of financial compensation when evaluating younger adults’ pain. Judgements of older persons’ pain did not differ as a function of observer type.

These findings conflict with results from previous investigations. Experimental studies have demonstrated that practicing health care professionals (Hadjistavropoulos et al., 1998; Prkachin et al., 2001) provide lower estimates of others’ pain compared to non-health care professionals. Moreover, clinical research has consistently revealed that nurses tend to underestimate patients’ pain in real-world settings (e.g., hospitals; Duignan & Dunn, 2008; Puntillo et al., 2003). Several studies, however, have failed to replicate this underestimation bias (Ammaturo, Hadjistavropoulos, & Williams, in press; Lautenbacher et al., 2013; Poole & Craig, 1992).

In line with results from the present study, Pool and Craig (1992) found that nursing students did not ascribe lower pain estimates than non-nursing students to others’ pain. Moreover, Lautenbacher et al. (2013) found no differences in evaluations of younger and older persons’ pain between practicing nurses and non-health care professionals. Finally, Ammaturo, Hadjistavropoulos, and Williams (in press) showed that long-term care nurses were actually more sensitive than lay people at detecting pain behaviours in older persons with dementia. These inconsistent findings have prompted
researchers to identify methodological differences across studies to account for the discrepancies.

Grounded in empirical evidence, Prkachin, Solomon, and Ross (2007) proposed that the underestimation effect was a result of health care professionals’ increased exposure to high amounts of pain which, subsequently, biases them against identifying pain in others. Consequently, the lack of clinical work experience in the present sample may have contributed to the inconsistent findings. Another explanation for discrepant findings may be methodological differences across investigations. Lautenbacher et al. (2013) proposed that the discrepant findings may be a function of the variable amount of contextual information provided to observers. In the present study, observers were deprived of many contextual cues. Stimulus videos were exclusively of the patient’s face during a brief painful task. This is consistent with methods of Lautenbacher et al. (2013), who also failed to find the underestimation bias in nurses. In contrast, experimental research that has demonstrated an underestimation bias in health care professionals provided observers with more contextual information (e.g., stimulus videos of the entire body and stimulus videos of baseline expressions; Hadjistavropoulos et al., 1998; Prkachin et al., 2001). Therefore, observers had additional information to consider when formulating judgements. Consequently, the limited contextual cues presented to observers’ in the present study may have also influenced results.

Although the literature is inconsistent and explanations for these discrepancies have been proposed, this is the first investigation to find that nursing students actually
provided higher estimates of pain than non-nursing students when judging younger persons’ pain. Since this was the first study to demonstrate this finding, replication using a methodology similar to the one employed in this study is needed. Given the novelty of this result speculating on the underlying mechanism is done cautiously.

One potential explanation for the higher estimates from nursing students may be related to the evolution of nursing programs. Since the 1990s, researchers have advocated for improved pain education earlier in health care professionals’ training (Brown et al., 2011; Ferrell, 1995; Twycross, 2002). This concern has received substantial attention, given that lack of education is a commonly cited barrier in effective pain assessment and treatment (Duke, Haas, Yarbrough, & Northam, 2013; Manias, Botti, & Bucknall, 2002; Plaisance & Logan, 2006) and educational initiatives implemented with practicing nurses have improved patient care (de Rond et al., 2000; Ghandehari et al., 2013; Manias et al., 2011; Tse et al., 2012). Accordingly, nursing curriculums have advanced to include current pain management technologies and interprofessional practices (Scheckel, 2009). Thus, the improved education in nurses’ programs may influence nursing students’ ability to detect pain in others.

In summary, nursing students reported greater pain condition severity, willingness to help, and sympathy ratings towards younger adults compared to non-nursing students. In conjunction with previous research, these findings emphasize the influence of observers’ training experiences in the interpretation of pain expressions. The interaction
between observer-level characteristics (e.g., professional experience) and patient-level characteristics (e.g., age of stimulus person) warrants more attention.

5.2.3. The role of informational primes. Consistent with De Ruddere et al. (2013), informational primes significantly moderated how positively/negatively observers’ felt towards the patient. More specifically, ratings of valence varied as a function of a three-way interaction across priming condition, stimulus persons’ age, and observer type. Clarifying this interaction helps explain the role of primes about the undertreatment of pain in older persons and the misuse of the health care system on pain decoding.

Undertreatment of pain in older persons prime. According to hypothesis III, priming nursing students about the undertreatment of pain and aging was anticipated to result in significantly higher valence ratings. Findings partially support this hypothesis. Consistent with expectations, both nursing and non-nursing students primed about the undertreatment of pain in old age, rated older persons significantly more positively compared to younger persons. Additionally, nursing students in the undertreatment priming condition reported higher valence towards older adults than nursing students in the misuse condition. Contrary to hypothesis, non-nursing students in the undertreatment priming condition did not provide higher estimates of valence to older persons compared to non-nursing students in either the control or misuse priming condition.

These results highlight an important interaction between an informational prime and an observer characteristic; nursing students’ valence was more greatly influenced by
information about the undertreatment of pain in older persons than non-nursing students. One potential explanation may be that nursing students are more sensitive to information about the undertreatment of health conditions in vulnerable populations due to their education. In line with this speculation, senior nursing students have been found to have significantly more favourable attitudes towards older persons compared to first year students (Soderhamn, Lindencrona, & Gustavsson, 2001). Future research should explore the impact of primes on judges’ perceptions of others pain in relation to both patient and observer characteristics.

**Misuse of the health care system prime.** Based on De Rudder et al.’s (2013), it was hypothesized that observers primed with information about the misuse of the health care system would provide significantly lower valence ratings (hypothesis IV). Findings from this study support this hypothesis. Consistent with expectations, nursing students in the misuse priming condition reported significantly lower valence towards younger adults than nursing students in the undertreatment condition. Additionally, non-nursing students in the misuse condition reported significantly lower valence towards stimulus videos of younger adults compared to videos of older adults. These finding are in line with several researchers who have found that explicitly inferring that individuals’ pain expressions may not be genuine interferes with judges’ willingness to attribute pain and offer assistance (Kappesser et al., 2006; Poole & Craig, 1992).

Results from this present study contribute to the literature by demonstrating that priming observers about the misuse of the health care system exclusively reduces positive
valence towards younger patients. This is not surprising since younger adults compose most of Canada’s work force (Statistics Canada, 2015). As such, younger persons are more likely to require financial compensation because of missed work due to pain. Given that this is the first investigation to examine the influence of a misuse condition in relation to the age of the stimulus person, findings should be replicated. In general, future research should aim to consider the interaction of multiple contextual features, including implicit primes, on decoding pain expressions.

**The indirect effect of valence.** Although priming did not directly influence estimates of pain, willingness to help, sympathy, and deservingness of financial compensation, priming with information about the undertreatment of pain in older adults was directly associated with more positive valence toward all patients. In turn, greater positive valence was correlated with higher pain, willingness to help, sympathy, and deservingness of financial compensation ratings to all patients. The association of valence to estimates of other dimensions, including pain intensity, is consistent with De Ruddere et al.’s (2013) investigation.

As summarized by De Ruddere et al., 2013, this indirect relationship is in line with results from several researchers who have demonstrated the significant role of valence in pain estimates (Chibnall & Tait, 1995; Tait & Chibnall, 1997; Tait, Chibnall, & Kalauokalani, 2009). These investigations have revealed that observers attribute higher pain, distress, and disability scores to more likable patients (Chibnall & Tait, 1995; Chibnall, Tait, & Ross, 1997). Interestingly, the undertreatment of pain in older persons’
prime positively influenced observers’ ratings of both younger and older persons. Since this is the first study to demonstrate the indirect effect of information about pain and aging on observers’ ratings through valence, findings should be replicated. Nonetheless, an explanation for the potential mechanisms is presented cautiously.

As reviewed in chapter 1, priming is a process where exposure to a stimulus activates an implicit memory which subsequently influences a response to a following stimulus (Meyer & Schvaneveldt, 1971). The notion that the prime and the response share categorical features is a specific form of priming known as semantic priming (Ferrand & New, 2003; Hutchison, 2003; Hutchison et al., 2013). Semantic priming has been supported in several lexicon decision studies, where participants primed with a word were more likely to associate it with a semantically-related word (dolphin-whale; Fischler, 1977). This is theorized to occur because of a spreading activation process that automatically takes place in neural networks. More specifically, according to spreading-activation theory, memory consists of interconnected concept-nodes where the activation of one concept-node can spread in the neural network along connections to similar concept-nodes (Collins & Loftus, 1975). In line with the spreading-activation theory, it is speculated that priming observers about the undertreatment of pain in older adults may have activated semantically-related concept-nodes, which may include beliefs about the undertreatment of younger persons’ pain. In turn, observers may display a heightened sensitivity to all persons’ pain. Clarifying the relationship between primes and activation of related beliefs should be a focus of future investigations.
Unlike De Rudder et al. (2013), priming about the misuse of the health care system did not indirectly influence pain and sympathy estimates through observers’ valence ratings. Given De Rudder et al. (2013) have been the only research group to demonstrate this effect, it is possible that their finding was a function of chance. Replication of findings should be attempted and potential explanations for discrepancies should be explored.

5.2.4. The role of stimulus persons’ gender. Exploratory analyses demonstrated that observers provide higher estimates of pain, increased willingness to help, sympathy, and deservingness of financial compensation for male stimulus persons compared to female. This is consistent with findings of several researchers who have shown that observers are more likely to underestimate pain of female targets compared to male targets (compared to the targets’ own reports; Beaupre et al., 1997; Cano et al., 2004; Pronina & Rule, 2014; Riva et al., 2011). Nonetheless, not all research in this area is consistent. Observers have also been found to judge females as experiencing greater pain intensity and unpleasantness compared to males (Hadjistavropoulos et al., 1996; Lautenbacher et al., 2013; Robinson & Wise, 2004; Stutts, Hirsh, George, & Robinson, 2010).

Currently, the inconsistencies in the literature are not well understood. Although researchers suggest that methodological differences may account for discrepancies (Pronina & Rule, 2014), consistent patterns are difficult to identify. For example, both Pronina and Rule (2014) and Robinson and Wise (2004) had undergraduate observers
assess pain expression of individuals’ who completed an experimentally induced pain task. Yet, their results were inconsistent: Pronina and Rule (2014) found that observers’ estimated males’ pain higher the females, while Robinson and Wise (2004) found observers’ judged females pain higher than males. Future research should aim to clarify the mechanisms that are contributing to the observed discrepancies.

Although research on the influence of patients’ gender has been mixed, several explanations for the identified gender influence are available. One explanation for this effect may be gender differences in the pain experience. Women are more frequently afflicted with a range of pain syndromes and are more likely to describe pain as more intense and widespread than men (Bartley & Fillingim, 2013; Dao & LeResche, 2000; Heitkemper & Jarrett, 2001; Morin, Lund, Villarroel, Clokie, & Feine, 2000). Moreover, laboratory studies have shown that women exhibit greater sensitivity and lower tolerance for experimentally-induced pain (Fillingim, Maixner, Kincaid, & Silva, 1998; Gagnon, Hadjistavropoulos, & MacNab, in press). Although facial expressions of pain are not found to vary as a function of gender (Kunz et al., 2008), both clinical (Bartley & Fillingim, 2013; Dao & LeResche, 2000; Heitkemper & Jarrett, 2001; Morin et al., 2000) and experimental (Fillingim et al., 1998; Gagnon, Hadjistavropoulos, & MacNab, in press) research suggests that observers’ may be more frequently exposed to facial expressions of pain by females compared to males. A consequence of this repeated exposure may be a habituation effect (Prkachin et al., 2007). Specifically, observers may experience a diminished sensitivity to pain in females given the more frequent displays of
female pain compared to male. This habituation bias has been demonstrated in judgements studies, where repeated exposure directly reduced estimates of others’ pain (Prkachin, Mass, & Mercer, 2004).

In conjunction with the habituation bias, Riva et al. (2011) proposed that lower estimates of females’ pain may be related to gender stereotypes. Stereotypes have been found to significantly moderate observers’ judgements of target faces (Hugenberg & Bodenhausen, 2004; Hugenberg & Sacco, 2008). Interestingly, both men and women hold similar gender stereotypes regarding the pain experience. That is, both genders perceive men as less willing to report their pain and women as more sensitive and less enduring of pain (Robinson & Wise, 2004). Given the stereotypical views of women as more sensitive to pain, observers may feel less certain regarding the female’s pain experience. The reduced certainty may result in observers’ underreporting females’ pain more consistently than males (Riva et al., 2011).

The general underestimation of females’ pain experience compared to males is consistent with clinical research that demonstrates women are less likely to be given access to appropriate treatment for pain than men (Calderone, 1990; Hoffmann & Tarzian, 2001; McDonald, 1994; Michael, Sporer, & Youngblood, 2007). Observers’ bias towards females may contribute to them disregarding the individuals’ needs and, in turn, reduce the likelihood that observers will facilitate adequate care (Riva et al., 2011).

Researchers have suggested a method to counter the gender bias effect. Pronina and Rule (2014) suggest that consciously creating an environment that reduces masculine
stereotypes (e.g., focusing on collaboration and not individual achievement/admiration) will reduce the discrepancy between observers’ judgements and patients’ experiences. Simply having observers identify three instances in which they displayed collaborative behaviours and empathized with others successfully altered their perceptions of the individuals’ pain (Pronina & Rule, 2014). Future research should investigate effective interventions to facilitate more accurate judgements of females’ pain.

In general, results from this investigation suggest that observers underestimate the female pain experience. Not only did observers judge pain intensity, unpleasantness, and condition severity lower for females than males, they also reported being less willing to help, feeling less sympathy, and believing that females are less deserving of financial compensation. Given the tendency for women to be less likely to receive effective pain management treatments (Calderone, 1990; Hoffmann & Tarzian, 2001; McDonald, 1994; Michael et al., 2007), these results underscore the importance of exploring effective interventions to reduce observers’ bias towards females’ expressing pain.

5.2.5. Findings based on observers’ narratives. Analysis of narrative data supported observers’ awareness of the influence of personal and situational characteristics in the interpretation of pain expressions. Observers most frequently indicated that the patients’ demographic characteristics influenced their ratings. This is consistent with findings of the quantitative analysis showing that observers’ ratings differed as a function of patients’ gender and age. Additionally, observers documented
various other contextual features that influenced their ratings, including their own previous experiences and beliefs.

General trends suggest that observers believed that some influences had a more widespread impact than others. That is, observers reported that pain expressed, patient demographics, and their general experiences/beliefs frequently influenced their ratings of various indices (e.g., pain, sympathy, willingness to help). In contrast, other contextual characteristics were mentioned less frequently as being influential. This may suggest that some contextual factors (e.g., patient age) have a more pervasive influence on observers’ judgements while other factors (e.g., bracing) are more limited to observers’ estimations of patients’ pain.

Given observers did not specify in their narratives whether the various reported influences increased or decreased their ratings, it is difficult to determine the directional impact of contextual variables on observers’ judgements. An area of future research may be to clarify the role of these factors on observers’ ratings. The results from this narrative analysis may be used as a foundation for the development of a questionnaire that asks observers to specify the exact nature of influence of contextual characteristics on their interpretations of others’ pain.

5.3. Theoretical Implications

Findings from this study add specificity to the communications model of pain by clarifying the influence of specific contextual factors on decoding nonverbal pain expressions. More specifically, the consideration of multiple variables allows for a more
comprehensive depiction of the factors that influence pain communication. Also, the inclusion older persons’ pain displays allow for an understanding of contextual features that impact decoding pain expressions over the life span.

Consistent with the model, this investigation may be conceptualized as an $A\rightarrow B\rightarrow C$ process of communication. Stimulus patients completed a physiotherapy protocol designed to identify a painful experience (step A) which was then encoded through facial expressions (step B). Subsequently, observers viewed stimulus persons’ facial displays and decoded these pain expressions (step C). Although it is recognized that contextual factors influence each step of the communication process, the role of contextual features is heavily emphasized in pain decoding (step C; Hadjistavropoulos & Williams, 2004; Hadjistavropoulos & Craig, 2002). Consistent with the communications model, both characteristics of the stimulus person and observer, as well as informational primes, influenced observers’ judgements.

Although results are consistent with the communications model, this model does not provide sufficient specificity to fully explain some findings. In this study, several contextual variables interacted to influence pain decoding. For instance, the combination of observer type and stimulus persons’ age moderated observers’ pain estimates. Moreover, primes about the undertreatment of pain led to increased pain ratings indirectly through the valence of observers’ impressions. These results emphasize the intricate relationships across contextual factors and how combinations of variables can subsequently affect pain decoding.
Moreover, the results identified unique factors that impact the decoding of older and younger persons’ pain experience. Observer type (nursing vs. non-nursing student) and informational primes about the misuse of the health care system had a greater impact on observers’ judgements of younger persons’ pain experience. Specifically, nursing students ascribed higher ratings of pain, sympathy, willingness to help, and deservingness of financial compensation to younger adults compared to non-nursing students. Additionally, observers primed with information about the misuse of the health care system attributed lower pain estimates to younger patients; however, this prime did not influence observers’ ratings of older adults’ pain. In contrast, priming observers with information about the undertreatment of pain in older persons had a positive influence on observers’ ratings of younger and older persons’ pain. Observers primed with information about pain in advancing age reported more positive valence towards all patients, which indirectly increased ratings of pain, willingness to help, sympathy, and patient deservingness of financial compensation. These findings suggest that specific contextual variables influence pain decoding differently depending on the age of the person expressing pain. Consequently, deciphering parameters that influence decoding of pain expressions over the life span is a particularly important area of further study. In summary, results support the influence of contextual features in interpreting others’ pain and add specificity to the communications model by delineating the role of specific contextual factors on observers’ interpretations of nonverbal pain expressions.

5.4. Clinical Implications
While this study focused on contextual features that affect the decoding of facial pain displays, results are relevant to understanding chronic pain. Chronic pain patients display brief pain reactions when they engage in particularly movements or shift positions. As such, inferences made about acute phasic pain exacerbations may affect the manner in which chronic pain patients are perceived (Hadjistavropoulos et al., 2000).

Results from this study may serve as a starting point for clinical investigations. As contextual factors in decoding pain are better understood, pain assessment protocols may be evaluated to determine whether considering the types of contextual influences studied herein enhances pain detection and leads to improved access to treatment. For example, current pain assessment practices do not always involve acknowledging the impact of key contextual features in evaluating patients’ pain. In this study, observers were significantly more likely to attribute pain and be willing to offer assistance after they received information about the undertreatment of pain in older persons. With additional clinical research, these results may inform a brief intervention designed to facilitate better pain assessments. Moreover, future research should evaluate the influence of such factors on pain detection in clinical settings. With further research, pain assessment protocols may be modified in order to facilitate the most efficient access to treatment for patients with pain.

5.5. Limitations and Future Directions

It is acknowledged that this is the first study to explore the influence of an informational prime about the undertreatment of pain in older adults on observers’
judgements. Moreover, this is the first study to examine the interaction across priming conditions (i.e., regarding the undertreatment of pain in older adults and the misuse of the health care system), observer type (nursing vs. non-nursing student), and patients’ gender and age on decoding pain. Given the novelty of several contextual features included in this investigation, replication is needed. Moreover, since observers were predominantly young females in university, future research should also test the impact of these contextual factors in a more diverse sample of observers as well as in clinical settings.

Although this investigation made contributions by expanding this area of study through the examination of the interactions among multiple contextual features, not all possible influences on observers’ judgements were studied. For instance, observers’ ethnicity is known to influence the decoding process (Bartley et al., 2014). Moreover, introducing bias through information about gender roles has also been demonstrated to modulate observers’ estimates of others’ pain (Pronian et al., 2014). Future studies should focus on the role of additional contextual factors in understanding decoding pain.

An additional limitation was the lack of information yielded in this study regarding the influence of the patients’ age on real life decisions about patients. Although results demonstrated observers provided higher ratings of pain, willingness to help, sympathy, and deservingness of financial compensation for older persons, it is unclear whether these ratings translate into actual different decisions about patients in real clinical settings. Clinical research, evaluating health care professionals’ behaviour, is needed to examine the ecological validity of these findings.
Another limitation was the lack of direct effects (i.e., $X \rightarrow Y$) in the mediation analyses. That is, the informational primes were not directly related to pain, sympathy, willingness to help, or deservingness of financial compensation. This can occur for several reasons including lack of power, measurement precision, and suppression effects of another variable (Rucker et al., 2011). Future research should aim to identity factors that are contributing to the lack of a direct relationship. For example, additional variables should be assessed as potential suppressors including perceived importance of the priming text information.

Finally, future research should investigate the impact of the amount of pain-related information provided to observers. In this study, observers were presented exclusively with the stimulus person’s face. No other information, such as bodily movements, was provided. As proposed by Lautenbacher et al. (2013), the amount of information in the stimulus may impact results. As such, future studies should further evaluate the impact of amount of information provided on raters’ judgements.

5.6. Conclusion

This investigation expanded our current understanding of the influence of contextual features in decoding pain. Ultimately, the unique conceptual and methodological features of this study provide greater meaning to the results and allow for increased specificity in the communications model of pain (Hadjistavropoulos et al., 2011). Results suggest that informational primes, observer-level factors, and patient characteristics all interact to influence observers’ interpretations of others’ pain.
Moreover, valence of observers’ perceptions toward the stimulus people was found to indirectly influence their willingness to attribute pain, sympathy, help, and financial compensation. These results highlight the complexity of pain decoding and identify unique combinations of variables that influence perceptions of others’ pain. Future research should be aimed to clarify further the complex relationship between situational factors and the pain experience.
CHAPTER 6: References


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doi:10.1111/j.1471-6712.2009.00710.x


doi:10.3758/BF03196544


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doi:S0885392403001453


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doi:10.1023/A:1024973615079


doi:10.1002/nur.4770170107


doi:10.1016/S0304-3959(99)00145-1


doi:10.1155/2002/323085


QSR International Pty Ltd. (Version 10, 2012). *NVivo qualitative data analysis software*


Appendix A

Ethics Approval

University of Regina
Research Ethics Board
Certificate of Approval

Investigator(s): Amy Hampton
Department: Psychology
Funder: Saskatchewan Health Research Foundation
Supervisor: Dr. Thomas Hadjistavropoulos
Title: Contextual Influences in Decoding Pain Expressions: Effects of Patient Age, Informational Priming, and Observer Characteristics

APPROVED ON: March 31, 2016
RENEWAL DATE: March 30, 2017

APPROVAL OF:
Application For Behavioural Research Ethics Review
Appendix A: Poster-Part 1
Appendix B: Poster-Part 2
Appendix C: Consent Form-Part 1
Appendix D: Consent Form from REB Approved Study
Appendix E: Consent Form-Part 2
Appendix F: Demographic Questionnaire-Part 1
Appendix G: Demographics Questionnaire-Part 2
Appendix H: Information Priming Texts
Appendix I: Numeric Rating Scales
Appendix J: Post-Study Questionnaire
Appendix K: Debriefing

FULL BOARD MEETING
DELEGATED REVIEW.X.

The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: http://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/forms1/ethics-forms.html.
Dr. Larena Hoeber, Chair
University of Regina Research Ethics Board

Please send all correspondence to:
Research Office
University of Regina
Research and Innovation Centre 109
Regina, SK S4S 0A2
Telephone (306) 585-4775
Fax: (306) 585-4893
research.ethics@uregina.ca
Research Ethics Board
Certificate of Amendment Approval

PRINCIPAL INVESTIGATOR
Amy Hampton

DEPARTMENT
Psychology

REB#
2016-047

SUPERVISOR
Dr. Thomas Hadjistavropoulos

TITLE
Contextual Influences in Decoding Pain Expressions: Effects of Patient Age, Informational Priming, and Observer Characteristics

AMENDMENT APPROVAL
OF
Expanding recruitment strategies to include emailing nursing students

ORIGINAL DATE OF APPROVAL
March 30, 2016

NEXT RENEWAL DATE
March 30, 2017

DATE OF AMENDMENT APPROVAL
September 29, 2016

Full Board Meeting □
Delegated Review ☑

AMENDMENT CERTIFICATION
The University of Regina Research Ethics Board has reviewed the changes to the above-named research project as outlined in your e-mail dated September 29, 2016 and they are approved.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions:
http://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/forms1/ethics-forms.html

__________________________
Ara Steininger
Research Ethics Board

Please send all correspondence to:
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Research Ethics Board
Certificate of Amendment Approval

PRINCIPAL INVESTIGATOR
Amy Hampton

DEPARTMENT
Psychology

REB#
2016-047

SUPERVISOR
Dr. Thomas Hadjistavropoulos

TITLE
Contextual Influences in Decoding Pain Expressions: Effects of Patient Age, Informational Priming, and Observer Characteristics

AMENDMENT APPROVAL OF
Expand recruitment strategies to include handing-out flyers to nursing students outside of classrooms.

ORIGINAL DATE of APPROVAL
March 30, 2016

NEXT RENEWAL DATE
March 30, 2017

DATE OF AMENDMENT APPROVAL
October 17, 2016

Full Board Meeting
Delegated Review

AMENDMENT CERTIFICATION
The University of Regina Research Ethics Board has reviewed the changes to the above-named research project as outlined in your e-mail dated October 17, 2016 and they are approved.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions:
http://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/forms1/ethics-forms.html

_________________________
Ana Steininger
Research Ethics Board
November 29, 2016

Dr. Thomas Hadjistavropoulos
Professor
Department of Psychology
University of Regina

Student: Amy Hampton

RE: Contextual Influences in Decoding Pain Expressions. Effects of Patient Age, Informational Priming, and Observer Characteristics

U of R File#: 2016-47; U of S File#: BEH 16-472

Your application for research ethics review has undergone a harmonized review by the University of Saskatchewan and University of Regina. In accordance with the Research Ethics Review Reciprocity Agreement signed by the University of Saskatchewan, University of Regina, and Regina Qu’Appelle Health Region, the University of Saskatchewan REB accepts the Certificate of Approval issued by the University of Regina REB. This letter permits you to conduct research activities as approved by the University of Regina, provided that you maintain a valid and up-to-date Certificate of Approval.

All continuing ethics reviews will be conducted by the University of Regina REB. The University of Regina is authorized to share all communications pertaining to this file with the University of Saskatchewan REB at their discretion. The University of Saskatchewan REB may provide input into continuing ethical review activities, as agreed upon by both REBs.

The University of Saskatchewan REB reserves the right to revoke the privileges described in this letter at any time in order to conduct their own independent research ethics review of your project. Such a decision would be communicated to you and the University of Regina REB in writing.

Best wishes for your continuing research endeavours.

Sincerely,

[Signature]

Vivian Ramsden, Chair
University of Saskatchewan
Behavioural Research Ethics Board

Cc: University of Regina Research Ethics Board
Research Ethics Board
Certificate of Amendment Approval

PRINCIPAL INVESTIGATOR
Amy Hampton

DEPARTMENT
Psychology

REB#
2016-047

SUPERVISOR
Dr. Thomas Hadjistavropoulos

TITLE
Contextual Influences in Decoding Pain Expressions: Effects of Patient Age, Informational Priming, and Observer Characteristics

AMENDMENT APPROVAL OF
• Increasing the inclusion criteria for non-nursing student participants from 20 to 25 years of age, and older.
• Adding “female” to the inclusion criteria
• Revised Recruitment Poster
• Revised Consent Form

ORIGINAL DATE OF APPROVAL
March 30, 2016

NEXT RENEWAL DATE
March 30, 2017

DATE OF AMENDMENT APPROVAL
March 17, 2017

Full Board Meeting
Delegated Review

AMENDMENT CERTIFICATION
The University of Regina Research Ethics Board has reviewed the changes to the above-named research project as outlined in your e-mail dated March 10, 2017 and they are approved.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions:
http://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/forms1/ethics-forms.html

Ara Steininger
Research Ethics Board

Please send all correspondence to:
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University of Regina
Research and Innovation Centre 109
Regina, SK S4S 0A2
Telephone: (306) 585-4775 Fax: (306) 585-4683
research.ethics@uregina.ca
Appendix B

Advertisement Posters

Nursing Students
(in 3rd or 4th year) needed for research that will contribute to understanding pain and improving patient care.

As a participant in this study, you will be asked to evaluate videos of individuals undergoing physical therapy manipulations.

Participation involves a one 35-minute session completed in CL206.

In appreciation for your time, you will receive an honorarium: $15.00

For more information about this study, or to volunteer for this study, contact Amy Hampton at 306-585-4428 or via email at hamptoam@gmail.com

This study has been reviewed and has received approval from the Research Ethics Board University of Saskatchewan (REB: 16-472) and University of Regina (REB: 2016-047).
U of R Undergraduate Students
(at least 20 years old)
needed for research!

As a participant in this study, you will be asked to
evaluate videos of individuals undergoing physical therapy manipulations.

Participation involves a one 35-minute session
completed in the U of S Arts Building.

In appreciation for your time, you will receive an honorarium: $15.00

For more information about this study, or to volunteer for this study, contact
Amy Hampton at
306-585-4428 or via email at hamptoam@gmail.com

This study has been reviewed and has received approval from the Research Ethics Board,
University of Saskatchewan (REB 16-472) and University of Regina (REB 2018-047).
Nursing Students
(in 3rd or 4th year) needed for research that will contribute to understanding pain and improving patient care.

As a participant in this study, you will be asked to evaluate videos of individuals undergoing physical therapy manipulations.

Participation involves a one 35-minute session completed in the U of S Arts Building.

In appreciation for your time, you will receive an honorarium. $15.00

For more information about this study, or to volunteer for this study, contact Amy Hampton at 306-585-4428 or via email at hamptoam@gmail.com

This study has been reviewed and has received approval from the Research Ethics Board, University of Saskatchewan and University of Regina.
Appendix C
Demographic Questionnaire

These questions are about your demographic information. These items are very important for our research. Responses are confidential. Please answer honestly.

1. Age: ______
2. Gender □ MA □ FEMALE
3. What are you majoring in at the university?: ______________________
4. Current year of university: ______
5. How many university courses have you completed? __________
6. Do you know someone who experiences chronic pain (or pain that occurs more days than not (more than 50% of the time) for at least 3 months)?
   □ YES □ NO
   If YES:
   
   6a. What is your relationship with this person?
      □ Parent/guardian
      □ Child
      □ Sibling
      □ Friend
      □ Other: ______________________

   6b. How much contact do you have with this person?
      □ Daily
      □ Several times a week
      □ Weekly
      □ Monthly
      □ Less than monthly
Appendix D

Visual Analogue Scales and Valence Scale

1. How intense is this person’s pain?
   I---------------------------------------------------------I
   Not Intense At All                                      Most Intense Possible

2. How unpleasant is this person’s pain?[
   I---------------------------------------------------------I
   Not Unpleasant At All                                  Most Unpleasant Possible

3. How severe is this person’s pain condition?
   I---------------------------------------------------------I
   Not Severe At All                                       Most Severe Possible

4. How much would you be willing to help this person?
   I---------------------------------------------------------I
   Not Willing At All                                          Most Willing Possible

5. How much sympathy do you feel towards this person?
   I---------------------------------------------------------I
   No Sympathy At All                                           Most Sympathy Possible

6. How deserving is this person of financial compensation for his/her pain?
   I---------------------------------------------------------I
   Not Deserving At All                                        Most Deserving Possible

7. Please circle a number that best indicates your general feelings toward this person:

   -10  -9  -8  -7  -6  -5  -4  -3  -2  -1  0  +1  +2  +3  +4  +5  +6  +7  +8  +9  +10

   Very Negative       Neutral       Very Positive
Appendix E

Post-Study Questionnaire

These questions are about your views concerning the study. These items are very important for our research. Responses are confidential. Please answer honestly. There are no right answers.

1. Please describe what you believe the main goal of this study was?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. Please describe what influenced your ratings of pain? In other words, what factors led you to give higher ratings to some participants compared to others?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. Please describe what influenced your sympathy ratings? In order words, what factors led you to give higher ratings to some participants compared to others?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
4. Please describe what influenced your *willingness to help ratings*? In order words, what factors led you to give higher ratings to some participants compared to others?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

5. Please describe what influenced your *financial compensation ratings*? In order words, what factors led you to give higher ratings to some participants compared to others?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

6. Please describe what influenced how *positive/negative you felt towards the individual*? In order words, what factors led you to give higher ratings to some participants compared to others?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

*Thank you for your participation!*
Appendix F

Informed Consent

Project Title: Judging Pain in Others

Researcher(s): Amy Hampton, M.A.
Doctoral Student in Clinical Psychology
Department of Psychology
University of Regina
hamptoam@uregina.ca
(306) 585-5684

Supervisor: Thomas Hadjistavropoulos, Ph.D., ABPP
Professor of Psychology
Department of Psychology
University of Regina
hadjistt@uregina.ca
(306) 585-4457

Purpose(s) and Objective(s) of the Research:
• The purpose of this study is to explore how observers judge pain in others

Procedures:
• The experiment will take approximately 60 minutes to complete.
• You will be assigned an ID number to ensure confidentiality of your responses.
• You are asked to respect the confidentiality of the individuals in the videos; please do not disclose any identifiable information regarding the individuals in the video recordings.
• You will first be asked to complete a demographics questionnaire and read an informational hand-out.
• You will then view a series of videos of adults undergoing a safe physical therapy protocol.
• After each video, you will be asked to complete a series of ratings concerning the individual in the video.
  o Specifically, you will be asked to assess the individual’s pain intensity and pain unpleasantness; rate your willingness to help, sympathy towards, how negative/positive you feel towards the individual (i.e., valence scale),
and if you believe the person should receive financial compensation for their pain.

- Subsequently, you will be asked to complete a post-study questionnaire.
- Please feel free to ask any questions regarding the procedures of the study or your role.

**Inclusion Criteria:**
- Please ensure you meet the following criteria:
  - Speak/read English fluently
  - 20 years or older, enrolled in an undergraduate program other than nursing OR in 3rd or 4th year of the nursing program

**Potential Risks:**
- There are no negative effects.

**Potential Benefits:**
- Your participation will assist in furthering the understanding of how observers interpret pain.
- Results may provide direction for the development of future pain assessment initiatives.
- Results will enhance the conceptualization of pain expression and pain communication.

**Compensation:**
- You will receive an honorarium of $15.00.
- Even if you choose to withdraw, you will receive the honorarium.

**Confidentiality:**
- Although the data from this research project will be published and presented at conferences, the data will be reported in aggregate form, so it will not be possible to identify any individuals.
- Consent forms will be stored separately from the questionnaires, so that it will not be possible to associate a name with any given set of responses.
- Please do not put your name or other identifying information on the questionnaires

**Storage of Data:**
- Only the researchers and research assistants will have access to the data.
- All original data (hard copies) will be securely kept.
- Informed consent and identifying information will be kept in a separate locked cabinet.
- Electronic data will be kept in password protected databases and on password protected computers.
- Data will be stored for no less than 7 years following publication.
- Subsequent to this period, all data will be shredded and deleted.
Right to Withdraw:
- Your participation is voluntary and you can answer only those questions that you are comfortable with.
- You may withdraw from the research project for any reason, at any time without explanation or penalty of any sort.
- Should you wish to withdraw, please notify the researcher and he/she will immediately end the experiment and all data will be permanently deleted.
- Your right to withdraw data from the study will apply until April 1, 2017. After this date, it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your data.

Follow up:
- The goal is to have results from this study available in the fall of 2018.
- We will send you (via email) a summary of the results when these become available.

Questions or Concerns:
- Contact the researcher(s) using the information at the top of page 1.
- This project has been approved on ethical grounds by the UofR Research Ethics Board on March 31, 2016, and the UofS Research Ethics Board on November 29, 2017. Any questions regarding your rights as a participant may be addressed to the committee (585-4775 or research.ethics@uregina.ca). Out of town participants may call collect.
Your signature below indicates that you:
- Have read and understand the description provided;
- Have had an opportunity to ask questions and these questions have been answered;
- Will not disclose any identifiable information regarding the individuals in the video recordings; and
- Consent to participate in this research study and understand your participation is voluntary.

Name of Participant ___________________________ Signature ___________________________ Date ____________

Name of Researcher ___________________________ Signature ___________________________ Date ____________

Please provide your email address because we would like to send you more information about the study at a later time.

Email: _______________________________________

A copy of this consent will be left with you and a copy will be taken by the researcher.