

OBSERVER'S WILLINGNESS TO EXPRESS PAIN BEHAVIORS INFLUENCES
THE ACCURACY OF ESTIMATING PAIN IN OTHERS

By

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Abstract of Thesis Presented to the Graduate School
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This study examined specific variables that may account for individual differences in the accuracy of estimating pain intensity in others undergoing an experimental pain task (cold pressor). Previous personal pain experiences, family history of pain, and belief in the appropriateness of expressing pain behaviors were tested as predictors. Analyses revealed that these three variables accounted for over 41% of the variance in accuracy scores when combined. However, only the belief in the appropriateness of expressing pain behaviors was found to be significant in predicting accuracy. Results demonstrated that the more a person believed it was appropriate for him/her to express pain behaviors, the more accurate he/she was in estimating pain in others. Previous literature indicates that health care professionals' estimations of patient pain are often different from patient ratings. Likewise, the present study revealed that observers generally underestimated the pain intensity ratings of those they were observing. By targeting specific factors that

influence the perception of pain in others, health care providers can ultimately be more objective and accurate in their medical decisions concerning their patients.

CHAPTER 1 INTRODUCTION

Within the last few years, there has been an expanding interest in research on individual differences in pain perception. One of the most widely studied variables is sex differences and pain with previous research demonstrating the existence of sex differences in the experience of pain. Similarly, a number of other factors including family models (Edwards et al., 1985; Fillingim et al., 2000; Robinson et al., 2001), personal experience of pain (Holm et al., 1989), and expressiveness and willingness to report (Nayak et al., 2000), have been associated with sex differences in pain responding.

The existence of sex differences in the pain experience has been established in numerous previous studies. Unruh (1996) conducted a review of research examining gender variations in clinical pain experience. She found sex differences in the prevalence of migraine, headache, facial pain, back pain, musculoskeletal pain, and abdominal pain as well as different pain experiences from similar diseases. Unruh suggested that women seem more likely than men to have persistent and recurrent pain due to chronic but not life-threatening conditions. Rollman (1997) acknowledged that the evidence favoring sex differences in pain seems compelling and considered the role of other factors such as anxiety, somatosensory amplification, and coping style to account for the differential response to pain. He noted that somatosensory amplification was much stronger in women than in men, which may predict the propensity to seek medical care, which in turn is correlated with hypochondriacal symptomatology (Barsky & Wyshak, 1990). Furthermore, women reported higher levels of catastrophizing ideation when describing

thoughts or feelings related to pain (Sullivan & Pivik, 1995). Next, Rollman and Lautenbacher (2001) speculated that a state of increased pain sensitivity, with a peripheral or central origin predisposes individuals to chronic muscle pain conditions and that there are sex differences in the operation of these mechanisms which account for some of the previously found sex differences in pain responsivity. Additionally, Fillingim and Maixner (1995) reviewed the literature in sex differences, which was followed by a meta-analytic review by Riley et al. (1998). These reviews conclude that there is consistent evidence that the sexes differ in their response to experimental pain.

Researchers have explored additional variables in addition to sex, particularly involving health care professionals. Polkki et al. (2003) found that a pediatric patients' surgical pain relief in the hospital was affected more by the nurses' personal characteristics (age, education, work experience) than by work related factors or characteristics of the child or the child's parents. Sheiner et al. (1999) also concluded that the ethnic background of the care provider is an important determinant in estimating the suffering of the patients. These studies illustrate the role of numerous factors in play for estimating pain in other people.

Several studies have investigated the role of family history and pain models in relation to pain behavior. In an experimental setting, a high frequency of family pain models was found to be associated with higher frequency of pain episodes, more types of pain, greater intensity, and lower physiological arousal and subjective pain ratings during the cold pressor task. Clinically, Fillingim et al. (2000) found that a positive family history of pain was associated with increased reports of pain over the previous month and poor general health, in addition to enhanced sensitivity of thermal stimuli among women.

Lester et al. (1994) found that subjects with a strong family history of pain problems reported a greater number of pain sites, and higher levels of pain related interference.

Sex differences have also been implicated in the role of family models with women reporting significantly more pain models than men (Koutanji et al., 1998). Edwards et al. (1985) offered one possible explanation for the mechanism of relating family models and pain behavior. He suggested that frequent secondary gains associated with the evidence of pain may foster a link between familial pain models and current complaints of pain.

Previous personal pain experience is another variable that may be related to pain intensity assessments. In one of the few studies, Holm et al. (1989) examined the effect of personal pain experiences on the assessment of patient pain in 134 nurses. Results indicated that the intensity of pain experienced by the nurse was the only variable that significantly predicted their perception of the patients' physical suffering and distress. In general, nurses who have experienced intense pain seemed to be more sympathetic to patients in pain, which may influence their accuracy of assessment of other's pain. However, another study found that nurses' previous personal pain experiences were negatively related to their initial pain management knowledge (Wessman & McDonald, 1999). These findings suggest that a nurses' personal experience has some influence in estimating patient pain, but the exact nature of its influence seems unclear.

Gender differences have been found in terms of expressiveness in pain in that men are generally less willing to report pain (Robinson et al., 2001). Similarly, Klonoff et al. (1993) found that males were less likely to disclose pain to others and associated feelings of embarrassment with having to admit pain. Furthermore, women rated their response to

pain as entailing more irritability and worrying when compared to men, and a higher likelihood of disclosing their distress. Koutantji and colleagues (1998) hypothesize that social roles for women are more supportive of pain expression and pain awareness, making them more cognizant of their own and others' pain, thus learning to model their behavior after those in their environment. Expressiveness is an important variable because higher non-verbal expressiveness is associated with higher ratings of patient pain and distress and observer concern (von Baeyer et al., 1984).

Accurate pain assessments are crucial to health care professionals. However, there is evidence that nurses are inaccurate in assessing pain and often underestimate the pain experience of others. Zalon (1993) examined 119 nurses' assessments of pain in postoperative patients using a visual analog scale (VAS). Results indicated that although nurses' assessments were correlated with their patients' pain, the majority of nurses underestimated more severe pain and overestimated milder pain. Zalon found that patients' reported pain ratings contributed the largest portion of the variance (9.25%) to nurses' assessments of pain. Krivo (1996) even concluded that many physicians and nurses may be aware of patients' perceptions of pain intensity, but think that they overstate the intensity of their pain. So what cues could these nurses and physicians be using to assess their patients?

Previous findings suggest that health care professionals such as nurses use more than just a patient's reported pain ratings when estimating their pain. When verbal cues were used, the findings were relatively consistent with small correlations between nurses' estimation and patients' pain ratings. (Choiniere et al., 1990; Salmon & Manyade, 1996) However, other studies, where verbal cues were not used, found that nurses were not very

accurate in their estimation of patients' reported pain (Thomas et al, 1998). Katsma and Souza (2000) found that older nurses with more experience were less likely to believe or document their patient's self-report of pain than younger nurses with fewer years of experience. Halfens et al. (1990) found that third- and fourth- year nurses of a hospital based program and registered nurses attributed more pain when test results of physical pathology were positive. Additionally, third- and fourth- year student nurses also attributed more pain to depressive patients. Nursing experience was also found to be an important predictor of pain ratings in Halfens and colleagues' study. First-year student nurses attributed less pain to the hypothetical patient than third- and fourth- year student nurses and registered nurses.

The accuracy of pain estimates may also be affected by a health care professionals' gender. A study by Baron et al. (1990) found that there was a tendency for female dentists to demonstrate greater accuracy than male dentists, but this effect was nonsignificant. In addition, dentists' accuracy in assessing overall patient discomfort was significantly lower in that segment of the treatment procedure that was most stressful for dentists.

Based on the previously mentioned research we hypothesized that (1) the more incidences of painful conditions a person's biological parents and siblings have had, the more accurate he/she will be in assessing other people's pain intensity. (2) The more a person considers it to be appropriate to express pain, the more accurate he/she will be in assessing others' pain intensity. (3) The more painful experiences a person has had in his/her past, the more accurate he/she will be in assessing other people's pain intensity. Sex was found to be a significant predictor of accuracy of pain intensity in a previous

study conducted by Robinson and Wise (2003). We predict that appropriateness of pain expression, personal pain history, and family history of pain will significantly predict the accuracy of pain intensity and that sex will not be a significant independent predictor with the previously mentioned variables in the model. In other words, sex differences as found in previous studies will be explained by the three variables: willingness to express pain, personal pain history, and family history of pain.

CHAPTER 2 MATERIALS AND METHODS

Participants

Subjects were recruited from the undergraduate psychology pool and from flyers posted on campus requesting volunteers for research at the University of Florida. The sample consisted of 28 subjects, 14 females and 14 males. The mean age of the sample was 21.7 years ($SD = 3.1$ years; age range, 18-33 years), of whom 96.0% were single. Most of the sample reported their race as Caucasian (85.7%), with 10.7% reporting their race as Hispanic, and 3.6% as African American. Mean years of formal education were 14.7 ($SD = 1.6$). Approximately, 75% of the subjects were recruited from flyers and thus were compensated volunteers while 25% of the subjects were recruited from undergraduate psychology courses. Robinson and Wise (2003) previously used a portion of this data set.

Procedures

Upon arrival, all subjects read and signed an Institutional Review Board approved consent form acknowledging that the experimental procedures had been explained and that they could withdraw, without prejudice, from the experiment at any time. Prior to the video presentation, subjects were read a standardized set of instructions, including a description of the cold pressor task and instructions on the brief packet they were asked to complete after viewing each video clip. All subjects were then seated at a large table in front of a projection screen to watch ten randomly ordered video clip presentations.

A randomly selected half of the subjects completed a battery of psychological questionnaires prior to the video presentation and the other half filled the packet out after the video presentation. In the packet, subjects were asked to complete a series of Visual Analogue Scales (VAS) measuring their estimation of the pain intensity.

Each presentation consisted of 10 video clips. Each video clip lasted 30 seconds, and consisted of a participant in the cold pressor task (described below). The time for each video clip presented was the 30 seconds prior to the participant's self-report of pain tolerance. The participants in the videos were recruited from undergraduate courses at the University of Florida. There were 5 male and 5 female participants. Mean age was 20.4 years ($SD = 0.97$) and mean years of formal education were 15.0 ($SD = 1.25$). Nine of the participants were Caucasian and 1 was African American. Each of the participants described themselves as single. After completing a consent form and filling out a brief demographics form, they were escorted to a small laboratory and seated in front of a video camera. Beside them was the cold water immersion device (cold pressor). Pain was induced with a NESLAB RTE Series Refrigerated Bath/Circulator maintaining a constant water temperature of 1-3 degrees Celsius for a maximum of three minutes. The participants were read a standardized set of instructions regarding the pain ratings. They were asked to provide pain intensity ratings ranging from 0 ("no pain sensation") to 100 ("the most intense pain imaginable") and ratings for pain unpleasantness (0 "not at all unpleasant" to 100 "most unpleasant imaginable"). They were instructed to leave their hand in the water as long as they could and to withdraw their hand when they could no longer tolerate the sensation. They were then asked to provide ratings of pain intensity and pain unpleasantness of the cold-water task, using the scales described above.

Measures

Demographics Questionnaire: Provided information concerning the participants' sex, age, marital status, race, work status, and education.

Previous Pain Experience Questionnaire (PPEQ): The PPEQ includes 79 examples of potentially painful events ranging from mild (i.e. mosquito bite, dust in eye, bright light, paper cut and splinter) to major (i.e. gun shot, advanced cancer, serious burns, and heart attack) events. The participants rate the number of times they experienced a specific event and how painful that event was on a 10-point scale from no pain to the worst possible pain. If the participant had not experienced the event, they were asked to rate how painful they would imagine the event to be. This measure has been used in previous studies, however it not been published and its psychometric properties are unknown.

Family History Questionnaire (FHQ): The FHQ lists numerous chronic pain and psychological conditions. The participants are asked to report whether their biological mother, father, sister(s), brother(s) or the participants themselves have ever experienced the 17 listed conditions (i.e., rheumatoid arthritis, irritable bowel syndrome, chronic fatigue syndrome, menstrual pain, fibromyalgia, reflex sympathetic dystrophy, arthritis/joint pain, chronic headaches, back, neck, leg, and dental pain, other chronic pain, depression, anxiety disorder, Post Traumatic Stress Disorder, and other psychiatric diagnosis). To determine the number of pain exposure from the subject's family, their reports for their mother, father, sister(s), and brother(s) were totaled. Multiple siblings were not distinguished from single siblings. This measure has been used in previous studies; however, it has not been published and its psychometric properties are unknown.

Appropriate Pain Behavior Questionnaire – Y (APBQ-Y): The APBQ was created to assess beliefs about the appropriateness of pain behaviors. The APBQ-Y was revised from the APBQ-M and APBQ-F developed by Nayak et al. (2000). The APBQ-M and APBQ-F has revealed the existence of sex differences where American men believed that expressive pain behavior was more appropriate in females than males while American women did not believe that different levels of pain expression are acceptable in males and females (Nayak et al, 2000). The APBQ-Y includes 14 statements (i.e. It is acceptable for me to cry when in pain, I believe I should keep pain in private, It is appropriate for me to ignore my pain, and I should be able to tolerate pain in most circumstances) on a 7 point scale (1= strongly disagree and 7 = strongly agree) that assesses the participant's personal beliefs about appropriate pain behavior.

CHAPTER 3 RESULTS

To analyze viewer accuracy, the accuracy of pain intensity was calculated by subtracting the estimated pain intensity of the viewers from the actual reported pain intensity of the video participants. A hierarchical regression was conducted to determine whether the number of previous painful experiences (PPEQ), previous family history of pain (FHQ), and the Appropriate Pain Behavior Questionnaire (APBQ-Y) predicted the accuracy of observed pain intensity (Table 1).

The PPEQ score was calculated by adding all of the pain ratings of those events the participant had experienced. This sum was divided by the total number of experienced events. The FHQ score was calculated by adding all the all of the health problems that were indicated in the questionnaire. The APBQ-Y score was calculated by totaling ratings were after the responses were weighted according to the statement's positive and negative valences.

Block 1 consisted of, the PPEQ, FHQ and APBQ and predicted approximately 40.8% of the variance in accuracy of observed pain intensity ($F(3,24)=5.507, p=.005$). However, the regression revealed that the APBQ-Y was the only measure that significantly predicted the pain intensity accuracy (st. beta=-.649, $p=.001$). This indicates an inverse relationship between the accuracy of pain intensity estimation and how appropriate the participant felt about expressing painful behaviors. In other words, higher willingness to express pain was associated with smaller difference scores, therefore higher accuracy.

Sex was added in block 2 of the model to determine if it predicted any variance in pain intensity accuracy above and beyond that accounted for by block 1. This analysis was conducted to determine whether the sex differences found in previous studies could be explained by family history, previous pain experience and willingness to express pain behaviors (Wise & Robinson, 2003). The addition of sex in block 2 predicted an additional 4.9% of the variance in pain intensity accuracy but was not statistically significant ($F(4,23)=4.841, p=.006$).

Table 3-1. Results from hierarchical regression

	Measure	Standardized Beta	P	R ²	F
Block 1	APBQ	-.649	.001	.408	$(F(3,24)=5.507, p=.005)$
	PPEQ	-.036	-.218		
	FHQ	.118	.715		
Block 2	APBQ	-.574	.003	.457	$(F(4,23)=4.841, p=.006)$
	PPEQ	-.039	.810		
	FHQ	.082	.500		
	Sex	.234	.234		

CHAPTER 4 DISCUSSION

The results of this study strengthen the conclusion that personal expectations such as the belief in the appropriateness of expressing pain behaviors influence the perception of pain in others. Previous studies (Robinson et al., 2001; Wise et al., 2002) have demonstrated that people are influenced in their own pain perception by their pain related gender stereotypes under laboratory-based experimental paradigms. Nayak et al. (2000) found cultural and sex differences in beliefs about appropriate pain behaviors between participants in India and the United States. Indian participants and male participants were less accepting of overt pain expression and had higher pain tolerances than their American and female counterparts, respectively. Furthermore, Robinson and Wise (2003) showed that given the same sex video to view, men and women rated the observed pain differently with women rating the observed pain higher than men.

Results of this study suggest that another construct, in addition to sex, may play an important part in accurately estimating pain intensity in others. Previous studies have indicated that personal pain experiences may be associated with rating pain intensity in others (Holm et al., 1989). However, personal pain experiences were not found to be a significant predictor of accuracy of pain intensity estimation in this study.

Additionally, previous studies indicated a relationship between subjective ratings of pain and family history of pain (Edwards et al., 1985; Fillingim et al., 1999), possibly due to modeling, heredity, or other factors. We attempted to expand on this concept to

estimating pain in others. However, family history of pain was not found to be a significant predictor of estimating pain in others.

Interestingly, beliefs in the appropriateness of expressing pain behaviors, as measured by the APBQ-Y, were significantly related to more accurate ratings of pain. The entire model consisting of personal pain experiences, family history of pain and the APBQ-Y accounted for approximately 41% of the variance, however only the APBQ-Y was found to be significant in the accuracy of estimating pain intensity in others. Results demonstrated that the more a person believed it was appropriate for him/her to express painful behaviors, the more accurate they were in estimating pain in others. These results appear to be consistent with Nayak et al. (2000), Rollman et al. (2001), and Wise et al. (2002).

The data revealed that observers generally underestimated the amount of pain of those they were observing. This led to an interesting phenomena where, the higher the observer's estimation, the more accurate they were in their estimation. This leads to a second, but very similar interpretation of our results: beliefs in the appropriateness of pain behaviors as measured by the APBQ-Y were related to more accurate of pain ratings. Previous researchers have found that gender roles appear to be related to the pain experience (Robinson and Wise, 2003; Wise et al., 2002). It can be hypothesized that the willingness to express pain behaviors may be related to perceived gender roles as found by Nayak et al. (2000). Whether or not the perceived roles are gender related, these roles appear to be involved in not just the subjective pain experience, but also play a factor for those who view and estimate the pain experience in others.

It is important to recognize that certain characteristics or beliefs of the observer affect their accuracy of estimating pain in others. Most health care providers make frequent medical decisions about people in pain, especially in settings where prescribing or administering pain medications is required. However, these biases have not been fully explored in a health care context. By targeting these factors, it becomes possible to allow health care providers to understand that these characteristics are influencing their perception of others. This can ultimately provide assistance for those in such professions to be more objective and accurate in their medical decisions concerning their patients. Future research employing similar methodology including clinically relevant scenarios need to be examined in order to determine the influence of other factors in health care providers estimates of patient's pain.

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BIOGRAPHICAL SKETCH

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