COMPARISON OF PAIN PERCEPTIONS AMONG MALES AND FEMALES

Janice Lander, Susan Fowler-Kerry and Ann Hill

Convictions about male or female superiority in bearing pain have inspired much research. This research, which dates back to the 1930's, has been the domain of psychologists and physicians. Traditionally, researchers have examined many aspects of pain mechanisms in the laboratory by studying normal subjects in whom pain is induced by application of physical stimuli (Procacci, Zoppi & Maresca, 1979). Seldom have gender effects been examined in clinical populations; that is, in those who have endogenous pain or pain caused by procedures.

While the majority of the research has indicated that females are more responsive to pain than males, a review of the literature indicates that this conclusion may not be warranted. There are two purposes to this paper. One is to present the historical background to this issue, through a critical review of the literature. Some technical aspects of the research will also be delineated as techniques used by researchers have influenced the interpretation of the findings. The second purpose is to assess clinical pain experienced by males and females.

The Research Paradigm

The research techniques of clinical and experimental pain studies are distinguished by the nature of the pain and by the manner in which pain is measured. As mentioned, clinical pain is endogenous or is induced by procedures. It is normally of longer duration and greater intensity than experimentally induced pain. Furthermore, the person with clinical pain may be concerned about death, disability or other consequences of the illness that is the source of the pain.

Experimental pain, on the other hand, is induced for the sole purpose of studying pain. Stimuli used to induce pain can be classified as thermal (heat

Janice Lander, Ph.D., is Associate Professor in the Faculty of Nursing at the University of Alberta, in Edmonton. Susan Fowler-Kerry, M.N., is Associate Professor in the College of Nursing at the University of Saskatchewan. Ann Hill, M.N. is Instructor at Misericordia Hospital School of Nursing, in Edmonton.

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and cold), mechanical (pressure), electrical (electric shock) and chemical (injection or application of irritating substances). What these stimuli have in common is that they are safe, controlled and produce short-term pain which is cutaneous, deep somatic or visceral in nature. Cutaneous pain arises from stimulation of the skin, whereas deep somatic pain arises from stimulation of tissues like bone, muscle and tendons. Visceral pain originates from stimulation of organs such as the bladder or stomach. Neither visceral nor deep somatic pain are commonly chosen for study in laboratory pain research (Wolff, 1977) whereas clinical pain research includes cutaneous, deep somatic and visceral pain.

Moreover, in laboratory studies, pain is assessed with psychophysical measures that are particular to the setting (Chapman et al., 1985). The measures that are employed include pain threshold and pain tolerance. By contrast, clinical studies about pain do not employ psychophysical measures like threshold and tolerance because they are not useful concepts in the clinical management of pain. Instead, pain is often measured by subjective reports of pain intensity. Less valid and more error-prone clinical measures of pain include observation of behaviour and analgesic intake, both of which are used to infer occurrence of pain.

To date, much research on gender and pain employs an experimental research paradigm in which cutaneous pain is induced through the application of ice-water, pin-point heat or electric shock. Further, pain threshold, tolerance and intensity have been utilized as measures of pain.

Experimental studies on gender and pain

Experimental studies of gender and pain have generated consistent findings. This can be seen in Table 1, which summarizes the results of the studies by crosstabulating type of pain stimulus and measure of pain. Females have lower pain thresholds and lower pain tolerances, and they report greater pain intensity than males. Where these conclusions were not supported (Notermans & Tophoff, 1967; Tedford, Warren & Flynn, 1977), the studies were noted to have weaknesses, especially with regard to data analyses and statistical power.

These observations of the relationship of gender to pain can be interpreted in several ways. One view is that there are gender differences in pain threshold, tolerance and intensity. Evidence for this view comes from findings of alterations to pain sensation during the ovulatory phase of the menstrual cycle where sensitivity to pain has been found to be both heightened (Goolkasian, 1980) and diminished (Tedford et al., 1977) during the ovulatory phase. Lack of consistency in the results from the two studies may be attributable to the use of different measures of pain.

Table 1

Research on Gender Effects in Pain: Crosstabulation of Type of Pain Stimulus and Measure of Pain

Pain Stimulus	Measure of Pain		
	Threshold	Tolerance	Intensity
Heat	Procacci et al., 1970[1]		Goolkasian, 1980[1] Clark & Mehl, 1971[2] Clark & Goodman, 1974[2]
Pressure		Otto & Dougher, 1985[1] Dubreuil & Kohn, 1986[1] Woodrow et al., 1972[1]	Dubreuil & Kohn, 1986[1]
Electric Shock	Notermans & Tophoff, 1967[1] Leon, 1974[1] Kennard, 1952[1]	Notermans & Tophoff, 1967[1] Tedford et al., 1977[2]	Davis et al., 1979[1]
Cold Pressor	Westcott et al., 1977[1]	Westcott et al., 1977[1]	

[1] Females found to have greater pain threshold, lesser pain tolerance or greater reported pain intensity compared to males.

[2] No difference found between males and females.

Another interpretation for the observed gender effect in these experimental studies is that pain sensation is the same for males and females, but that some feature of the experiment causes males to delay their response compared to females, or alternatively, results in females responding more quickly than males. In short, a response bias has occurred. Subjects may be reacting to what has been labelled the "demand characteristics" of the study, resulting in biased responses among subjects (Orne, 1962).

In pursuing the latter explanation, some researchers sought to apply a complex psychophysical method called Signal Detection Theory (Green & Swets, 1966), in order to assess gender differences in pain. The Signal Detection approach is used to partition the outcome variable into that which is due to the sensory effects of the stimulus and that which is due to response biases from such factors as motivation, attitude, anxiety and reactivity. When this approach has been used, males and females have not been found to differ in sensitivity to pain (Clark & Goodman, 1974; Clark & Mehl, 1971). However, Rollman (1977) has argued convincingly that Signal Detection Theory cannot be applied to pain research and that, where it has been used, considerable theoretical and methodological flaws are evident. The issue of whether or not the gender differences associated with experimentally induced pain can be attributed to gender differences in pain sensation or to response bias remains unresolved and, perhaps, unresolvable.

Clinical studies of gender and pain

Information about gender effects on pain obtained from clinical studies is often incidental and not related to the main purpose of the studies. Hence, the information tends to be lost in the literature, rather than to be added to knowledge derived from experimental studies about gender and pain.

It has been found that women report more physical symptoms, including pain (Davis, 1981; Edwards, Zeichner, Kuczmierczyk & Bockowski, 1985; Margolis, Zimny, Miller & Taylor, 1984). This was also related in a report of a Canadian survey of patients from a group family practice unit (Crook, Rideout & Browne, 1984). Women were more likely than men to report having experienced pain in the two weeks prior to the survey. Women have also been noted to complain of greater intensity of back pain than men, although the proportion of variance in pain accounted for by gender was very small (Keefe, Wilkins, Cook, Crisson & Muhlbaier, 1986). In a number of studies the differences between males and females were so small that it would be reasonable to conclude that males and females are more alike than they are different, with respect to reported pain intensity and observed pain behaviours (Davis, 1981; Haley, Turner & Romano, 1985; Keefe et al., 1986). Moreover, it is not apparent that a gender difference in symptom reporting indicates a gender difference in pain perception.

There have been reports of gender differences among children, when pain behaviours are observed. Females have been observed to show distress of pain more than males (Katz, Kellerman & Siegel, 1980), and to react by orienting toward a painful stimulus - unlike males do (Craig, McMahon, Morison & Zaskow, 1984). Further, younger females demonstrate more verbal resistance to painful procedures when compared to older females and when compared to older and younger males (Jay, Ozolins, Elliott & Caldwell, 1983). On the other hand, neither heart rate nor crying were found to differ for male or female neonates following heel lance (Owens & Todt, 1984). Further, no gender differences were found in knowledge about pain or in ability to communicate about pain among school age children (Ross & Ross, 1984).

Nurses' inferences about gender and pain

As mentioned, psychologists and physicians have been responsible for much of the research on gender differences in pain. Nurse researchers have contributed through the study of nurses' judgments and inferences about pain. In some studies, it has been reported that nurses believe that there is no difference in pain experienced by males and females (Dudley & Holm, 1984; Holm, Cohen, Dudas, Medema & Allen, 1989). Others have reported that nurses believe that females suffered more pain than males (Davitz & Davitz, 1981). An apparent contradiction to that view is the observation that nurses believed females should have smaller amounts of narcotics than males (all other conditions except gender were held constant) (Cohen, 1980).

The purpose of this paper was to address the question of whether males and females react to clinical pain in dissimilar ways. In this study, three clusters of patients were studied to determine if perceived pain intensity was related to gender. As the three clusters were examined separately, this study could be considered to be three replications of the study of gender on pain. A comparative descriptive design was employed.

Method

Subjects

Three clusters of subjects were selected because each had one source of pain in common: either cutaneous or deep somatic. The first cluster of subjects consisted of 200 children, aged 4.5 to 6.5 years (mean age 5.5 years), receiving preschool immunizations. There were 100 males and 100 females. The second cluster consisted of 75 post-surgical patients who were having their abdominal incision cleaned and packed. They ranged in age from 18 to 89 years (mean age 56.9 years) and there were 41 males and 34 females. The last cluster consisted of 78 patients, aged 18 to 61 years (mean age 45.9

years), who complained of knee pain caused by osteoarthritis, rheumatoid arthritis or traumatic arthralgia. There were 48 females and 30 males.

Instrument

In this study, pain was measured with self-report pain scales. This is a reliable and valid approach to the measurement of pain for adults and children (Huskisson, 1974; Scott, Ansell & Huskisson, 1977). The two adult clusters of subjects were presented with 11-point self-report numerical pain scales, where "0" represented no pain and "10" represented the worst pain possible. Because of the young age and level of cognitive development of the children, pain intensity was measured with a simplified version of the adult pain scale. The children used a four-point self-report pain scale, where "0" represented no pain and "3" was the worst possible pain. The scale consisted of four equal sized grey blocks printed on white paper.

Procedure

Two clusters of subjects were exposed to procedural pain. One of these consisted of children making a visit to a community health clinic for a preschool Diphtheria-Pertussis-Tetanus immunization injection. Consent was obtained separately from the parent and child before they proceeded into the immunization room. While being informed about the study, the parent was instructed not to prompt the child during pain reporting. The child was instructed in use of the pain scale and presented with the anchors (the block on the left was no pain and the block on the right was the worst pain there could be). Then the child was asked to rate the pain that would be experienced from three hypothetical problems. This was done to ascertain that the child could understand how to use the pain scale. No child was excluded for being unable to comprehend the pain scale.

There were a number of community health nurses and all gave immunizations during the course of the study. The staff nurse positioned the child, prepared the injection site and administered the injection as would routinely be done in that setting. Hence, the preparation and injection were not controlled; this was done to avoid conducting the study in an artificial environment. Immediately following the procedure the research assistant asked the child to rate the pain from the injection by using the four-point scale. The child was shown the scale and asked to point to the block which was most like the pain from the needle. Notwithstanding the prior warning given to the parent not to prompt the child about amount of pain, the research assistant made it impossible for the parent to communicate non-verbally with the child by taking a position between the parent and child, thus obstructing the child's view. The staff nurse had also been instructed not to provide any cues about the pain of injection.

The second cluster of subjects who were exposed to procedural pain were those having wound packing removed from an abdominal incision. On the day prior to surgery, potential subjects were approached and asked to participate in the study. If they agreed, the research assistant instructed them in use of the 11-point pain scale. If the patient returned from the operating room with an incision requiring wound packing and cleaning, he or she was included in the study. Surgery had been performed by one of six surgeons. The reasons for surgery were primarily for cancer, diverticular disease, Crohn's disease, gastric ulcer, ostomy closure, cholelithiasis and colitis. The incisions were located in the upper or lower abdomen or midline and they were vertical, transverse or diagonal. Subjects received routine nursing care prior to having their pain assessed. This included post-operative mobilization, dressing change and analgesia.

The routine wound packing and cleaning taking place two mornings after surgery became the procedural pain stimulus. Immediately prior to the dressing change, the subject was re-acquainted with the pain scale. The dressing procedure was completed by the staff nurse caring for the patient. Accordingly, a number of nurses participated in this study. After the nurse had completed the dressing, the research assistant then entered the room and asked the subject to mark the point on the scale which best represented the pain experienced from the procedure. The research assistant also reviewed the patient chart and obtained information about analgesia given prior to the pain rating of the dressing procedure.

The third cluster of subjects were attending a first appointment with a physician for complaints of knee pain. These subjects complained of pain which had been present from four months to 32 years (mean 7.3 years) and had been referred for treatment by a specialist in rheumatology. The study was described to potential participants and informed consent obtained. Then the 11-point pain scale was presented and subjects were instructed in its use. Subjects were asked to complete the pain scale after seeing the physician, but before any new treatment had commenced. For those subjects who had bilateral pain, one knee was randomly selected to be the knee to be rated. Subjects were asked to report their present pain intensity.

The inclusion of these three clusters permitted the study of two types of clinical pain in subjects having a broad age-range. The types of pain were: cutaneous pain, in children with injections and in adults with wound packing during dressing change; and deep somatic pain, in patients with knee pain.

Although all data collectors, nurses and subjects knew that clinical or procedural pain was to be assessed, none was aware of the specific purpose of the study reported in this paper. This reduced the potential for bias to occur in subjective pain reports arising from demand characteristics of the study.

Results

Inasmuch as the three clusters were heterogeneous, gender effects were analyzed separately for each cluster of subjects. A chi-square analysis was chosen to examine data about children's reported injection pain because the scale of measure was a four-point ordinal scale. This analysis did not indicate a significant difference in pain for boys and girls. Mean pain for boys was 1.5 and for girls was 1.6.

Analysis of variance indicated that there were no significant differences in reported pain arising from wound packing and cleaning for males or females. Mean pain for males was 4.0 and for females was 4.5. Further, analysis of variance demonstrated that wound characteristics were not factors that influenced the pain rating provided after the dressing change. Neither frequency of narcotic administration ($r=.16$) nor the amount of analgesia ($r=.12$) given at the last administration prior to the dressing were significantly correlated with reported pain. The time since the last analgesia was significantly, negatively correlated with pain from the dressing change ($r=-.25$, $p=.01$). In addition, there were no significant differences for males or females in frequency of narcotic administration nor in time since and amount of last narcotic before the dressing (analysis of variance).

The subjects with knee pain were diagnosed as having rheumatoid arthritis ($n=39$), osteoarthritis ($n=27$) or traumatic arthralgia ($n=12$). There were significantly more females who were diagnosed as having rheumatoid arthritis than males (chi-square=7.15, $df=2$, $p=.03$). However, there were no significant differences in reported pain for the three diagnostic categories of knee pain (analysis of variance). Duration of pain was not significantly correlated with reported knee pain ($r=-.05$). There was no significant difference between males and females for reported knee pain (analysis of variance). Mean reported pain for males was 5.9 and for females was 5.7.

Discussion

Analysis of gender effects for three different clusters of subjects with clinical pain failed to find differences in reported pain between males and females. This finding was noted for both child and adult subjects, and for acute and chronic pain.

Subjects in two clusters had pain induced by clinical procedures. Although not as controlled as laboratory techniques for inducing pain, these methods provided a satisfactory clinical alternative to laboratory procedures. The advantage of using the clinical procedures is that of ecological validity. Arthritic pain, the third source of clinical pain included in this study, was a much less controlled source of pain than the other two sources. However,

even when a disease process was used as the source of pain, no gender effect was noted in reported pain.

The results of this study are in disagreement with those from laboratory studies of gender effects on pain perception where, compared to males, females have lower pain threshold and tolerance and they rate experimentally induced pain as being more intense. Even though gender differences in behavioural response to pain have been observed, males and females do not perceive or report clinical pain in a manner that is gender related. The findings of differences in pain behaviour for males and females in past research and no gender differences for reported clinical pain in this study give credence to the view that gender differences in laboratory pain are caused by demand characteristics associated with the studies.

It is not clear that results obtained from normal subjects who have had experimentally induced pain should be generalized to clinical populations. Experimentally induced pain likely differs markedly from clinical pain. The main advantage of using experimentally induced pain in research is control; the cost of achieving this control may be poor ecological validity, as the results may not be applicable to pain situations. In spite of this shortcoming, it is important to note that lack of ecological validity should not be used to trivialize the importance of experimental pain research. Rather, differences in findings from the two research paradigms should be valued for they help us to understand the behaviour of humans under different circumstances.

These results are important because, as researchers and clinicians, we often overhear views expressed that either males or females are more tolerant of pain in clinical settings. If pain perceptions do not differ for males and females, then perhaps what is influencing clinicians' beliefs are gender differences in pain behaviours. It is important that clinicians' perceptions and ultimately their clinical decisions not be biased by irrelevant information.

Nurses have been found to make hypothetical pain management decisions for female patients that were different from those made for male patients described in case vignettes (Cohen, 1980). In this study, there was no evidence that nurses actually did vary analgesic administration on the basis of gender, at least for one cluster of subjects. Future research should extend the study of nurses' management of pain with regard to gender to other populations. If the finding is supported in other settings, then it can be concluded that, notwithstanding of the debate about gender and pain perception, nurses provide males and females equally with analgesia for their pain.

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RÉSUMÉ

Comparaison de la perception de la douleur chez les hommes et les femmes

La documentation sur les différences liées au sexe en matière de perception de la douleur est analysée et résumée. La plupart des rapports signalés font état de douleurs provoquées en laboratoire. On a signalé un seuil de douleur plus bas, une moindre tolérance à la douleur et une plus grande intensité de la douleur chez la femme que chez l'homme. Toutefois, on ignore si les résultats d'études réalisées en laboratoire s'appliquent dans le contexte clinique. Dans la présente étude, trois groupes de sujets de sexe masculin et de sexe féminin ont été étudiés en vue d'évaluer les douleurs dont les intéressés se plaignaient. Aucune différence significative liée au sexe n'a été notée. Ces résultats et leurs implications cliniques sont exposés.

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Pain Secretariat
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Tel: (514) 398 3770 Fax: (514) 398 4854
Telex: 05-268510 E-Mail:PAIN@CO.LAN.MCGILL.CA

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